



Focus on Iran Part 2



Winged bull. Circa 510BC. In the palace of Darius I, ancient city of Susa

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This is the second issue of the journal with focus on Iran a country with rich cultural heritage and recent academic advancement in all scientific fields. The papers in this issue focus on various topics of importance to the society. Nikfarjam M et al in a cross-sectional study, 160 students were assigned to two groups. The study was conducted to compare spiritual well-being and social health between the students attending group religious rituals and those attending individual religious rituals. The spiritual well-being and social health scores of group 2 was significantly higher than those of group 1 ($p=0.001$ and 0.002 , respectively). The authors concluded that the mean scores for spiritual well-being and social health were higher in the group who attended group religious rituals.

Jahromi AS et al in a case-control study, anti-diphtheria toxin antibody concentration and serum ferritin levels were compared. The authors concluded that, patients with beta thalassemia major had lower anti-diphtheria antibody level than healthy subjects. Thus monitoring immunization status and recommendations for vaccine are essential for increased serum anti-diphtheria antibody concentration.

Erfanian S et al in a case-control study, 100 patients with a history of premature coronary artery diseases and 100 healthy control. The authors concluded that according to the results derived from this study, it seems like the existence of the genotype carrying the mutated allele (TC+CC) in rs1927911's mononucleotide polymorphism of TLR gene is associated with an increased risk of premature myocardial infarction.

Rashnou, F et al. did a descriptive qualitative study by using the

conventional content analysis approach. The authors concluded that nurses can help manage effective VAP through learning new and standard approaches to care delivery and adhering to standards of care.

Pooria, A, et al. compare postoperative bleeding in patients undergoing coronary artery bypass surgery in two groups taking aspirin and aspirin plus CLS clopidogrel. The rate of postoperative bleeding in the clopidogrel plus aspirin group was higher than the rate in the aspirin group, but this difference was not significant ($PV=0.067$).

Jafrasteh A et al, conducted a descriptive-analytical investigation on premature neonates with very low birth weight (less than 1500 g) and gestational age less than 32 weeks. This study showed that CRIB II index has higher value in prediction of mortality in premature neonates with very low birth weight.

Yavangi, M et al carried a randomized clinical trial on women aged 20-59 years with moderate to severe POP. The authors concluded that Pre-colporrhaphic physiotherapy can improve quality of life and sexual function in the patients' candidate for colporrhaphy.

Hashemzadeh-Chaleshtori, M et al reviewed TECTA gene function and hearing. TECTA is a modular, non-collagenous protein of the tectorial membrane that plays a more dynamic role in normal hearing. Mutations in TECTA cause dominant and recessive forms of non-syndromic hearing loss.

Ghasemi M et al used available sampling was done using 80 patients with knee osteoarthritis and samples were divided into two groups. The authors concluded that in general, it can be suggested that the use of dextrose prolotherapy is a simple, safe, inexpensive, accessible and uncomplicated method than other treatments in these patients.

Ebrahimi H.A et al did a descriptive-analytical study on evaluation of seizures in pregnant women. Among 3807 admitted pregnant women, 38 cases (1%) experienced epileptic seizures. The authors concluded that more than 6 in 1000 pregnant women suffer from epilepsy. Eclampsia is the most prevalent cause. Epileptic seizures increased in 21% of epileptic pregnant women, and declined in 21% of the cases.

Jafarpour, E did a pre-test and post-test study to evaluate the blood level of leptin hormone before and after treatment with metformin. It is concluded that, the effect of metformin during the treatment period reduced the blood glucose level of adolescents, but its effect on weight loss and HbA1c did not significantly increase due to the duration of treatment.

Dargahi, H et al, carried a cross-sectional research on 1238 non-academic employees. The required data was collected by the Quality of Work life (QWL) questionnaire. The authors concluded that in the present study no significant relationship between the quality of work life and general health, socio-economic status and quality of work life, and also general health and socio-economic status was found.

Mangeli, M et al., explored the factors that encourage early marriage and motherhood in Iranian culture. The authors concluded that various factors (personal, social, economic, cultural, spiritual and technological) encourage adolescent to early marriage and motherhood.

Soltanian, F evaluated psychological and social factors effective on emotional separation among attendants to well-fare social emergency centers. The results showed that psychological and social factors have positive correlation with emotional divorce and regression analysis showed that social factors rank first and psychological problems are next in importance when it comes to emotional divorce.

Rajabi, M et al., investigated perceived organizational justice and organizational trust and their relationship in nurses of public and private hospitals in north of Iran. According to the results, in order to improve organizational trust, it is necessary that hospital managers develop organizational justice.

Bachari, Y.H et al conducted a quasi-experimental intervention study to compare the effects of two educational methods of role play and video feedback on learning CPR. The authors concluded that the video self-feedback method in compare to the role play method is more effective in improving cognitive and psychomotor learning of nursing students in basic cardiopulmonary resuscitation. Ziapour A et al did a pre-test-post-test study. The statistical population consisted of all couples in Kermanshah City.

At the theoretical level, the results of this research can confirm the results of previous research. At the practical level, the findings of this study can be used to develop educational and therapeutic programs.

Barekati1, S et al., carried out using a pretest-posttest semi-experimental design with control group and random assignment. The findings of this research can be considered as a confirmation of the basic assumption of the cognitive-existential approach about the effect of correcting cognitive distortions that activate non-authentic responses to the existential anxieties.

Elmi, R et al., did a cross-sectional study on 87 cadavers to compare morphine in urine and other body fluids, including cerebrospinal fluid (CSF), bile, pericardial fluid (PCF), and vitreous humor to determine the most reliable fluid for detection of postmortem morphine. The moderate agreement between urine TLC and bile TLC reveals bile sample as the most reliable fluid for morphine detection, when a urine sample is not accessible.

Farzaneh Norouzi, F et al., carried out a cross-sectional study, 204 nursing and midwifery students. The authors concluded that the presence of high spiritual motivation in nursing and midwifery students compared to other types of motivation is regarded as a strong point in the education of students.

Fakheri T et al., attempted to compare the LUS (lower uterine segment) thickness among nulliparous pregnant women without uterine scar and pregnant women with previous cesarean section using trans-abdominal ultrasound in the third trimester. The authors concluded that LUS thickness was significantly lower in pregnant mother with previous CS and this led to dehiscence in such patients. In case of LUS thickness of < 1.7 mm, the risk of dehiscence and rupture increases.

Jafarkhani, F et al., examined the effectiveness of the blended approach in learning English through the mobile social networks to enhance the level of listening and speaking skills of primary school students. The findings of the study bear some significant implications for curriculum designers, teachers and students and highlight the crucial role of using the technological devices and applications in promoting the learners' capabilities in listening/speaking.

Haghanifar, S et al., attempt to determine the course of MC, anterior branch and its relation to mandibular teeth. In cross-sectional view, the MC diameter, the distance from root apex to MC. So, any procedures in mandibular posterior area should be performed with sufficient knowledge of the nervous canal.

Shateri, L et al., evaluated the extent to which the association between chronic pain and obesity are mediated by anxiety and moderated by coping strategies. In summary, chronic pain predicted obesity directly, and specific coping strategies (emotional coping strategies) did not moderate the relationship between chronic pain, obesity and anxiety, but anxiety mediates this relationship.

Shekarbaghani, A tried to interpret the Commercial situation of astronomy, religious culture and curriculum. The author concluded that the creation of the preparing the needed science for the compilation of astronomy affect daily life with the other curriculum.

Taheri, S et al., conducted a clinical trial with the aim to determine the effect of environmental and behavioral interventions on physiological and behavioral responses of preterm infants during intravenous catheterization. It was found that dimming light and noise, nursing manipulations, and fetal positioning during intravenous catheterization effectively reduce neonatal pain.

We have two papers that dealt with obesity. Molaei, K. conducted a semi-experimental to evaluate the effect of 8 weeks aerobic exercise on the amount of resistin and body mass index (BMI) of overweight women. Data analysis indicated that the 8-week exercise program had a significant effect on BMI ($P=0/001$), body weight ($P=0/000$), and resistin ($P=0/001$). In the second paper data analysis showed that 8-weekly sport exercises had a significant effect on BMI ($P = 0.001$), body weight ($P = 0.000$), and leptin ($P = 0.001$).

Ban, M et al., carried a descriptive-analytic study on 202 nurses. Results of this study showed that nurses should firstly recognize the dimensions and ethical issues in their profession for the ethical performance of professional nursing; therefore, it is recommended to maximize the efficiency and quality of health care by educating the medical staff and raising their awareness of professional ethics.

Javadi, M.S et al., carried a retrospective descriptive cross-sectional study on 148 cases of admitted children due to febrile convulsion. This study showed that the prevalence of febrile convulsion in children younger than 2 years old is more common in males and prevalence of simple seizure is more common compared to complex one. Also, the history of seizure, seizure duration, child's age, and duration of fever onset to seizure occurrence are effective in seizure incidence.

Raezian M provides a brief report on the components of national strategies for suicide prevention suggested by the World Health Organization. Based on this report a well-designed national strategy for suicide prevention should have at the very least twelve components.

Sani, M.S et al did a causal comparative study, all fertile and infertile women referred to Arash Hospital and Mirza Kuchak Khan Hospital in Tehran. The results showed that the level of quality of life, self-efficacy and resiliency in infertile women is less. Based on these results, it can be said that considering the importance of psychological factors in exacerbating the physical and mental damages associated with infertility, psychological interventions focused on quality of life, self-efficacy and resiliency with the aim of improving the mental health of the infertile people, is necessary.

Aliza V et al did a reassessment of factor structure of the Short Form Health Survey (SF-36) where four theoretical and experimental factor structures of the SF-36 were tested and compared here to establish a best-fitting model for Iranian older people. A sample of 391 participants (60-89 years) years completed the Farsi SF-36. This study provides strong evidence that the Farsi SF-36 has the potential to measure well-being status of older people. Such an application application is valid if the Vitality items are modified and new items are developed for the Well-being scale.

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Immunity level to diphtheria in beta thalassemia patients

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Abstract

Introduction: Beta thalassemia major which is very common is a principal health problem in Iran. These patients are more often affected by several infections. The aim of the study was to determine the immunity of patients with beta thalassemia major, to diphtheria.

Methods: In this case-control study, anti-diphtheria toxin antibody concentration and serum ferritin levels were compared in 224 patients with thalassemia major and in 224 sex and age matched healthy subjects as control group. The serum concentrations of antibody and ferritin were determined by ELISA and CLIA methods, respectively. Subjects who had diphtheria antibody level >0.1 IU/ml were seen to have complete protection, between 0.1 and 0.01 IU/ml as partial protection and <0.01 IU/ml as no protection. For the analysis we used SPSS version 15 software. A two sided P-value less than 0.05 was considered statistically significant.

Results: The mean serum anti diphtheria antibody level was lower in patients with beta thalassemia major than in healthy subjects (1.51 ± 1.60 vs 2.10 ± 1.86 , $p < 0.001$). Seventy percent and 20.0% of patients and 87.9% and 12.1% of healthy subjects had complete and partial protective serum anti diphtheria level, respectively ($p < 0.001$). Only 24.1% of anti-diphtheria antibody (IgG) was dependent to serum ferritin level in patients group ($P < 0.001$). Thus serums anti diphtheria antibody decreased 0.001IU/ml, when serum ferritin increased 1ng/ml.

Conclusion: In conclusion, patients with beta thalassemia major had lower anti-diphtheria antibody level than healthy subjects. Thus monitoring immunization status and recommendations for vaccine are essential for increased serum anti-diphtheria antibody concentration.

Key words: diphtheria, antibody, thalassemia, immunity

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Introduction

Beta thalassemia major which is very common (1), is a central health problem in Iran (2) with at least 800 new cases every year (1). These patients are more often affected by several infections. It is suggested a chief defect in the host defense can be caused by iron overload, splenectomy and repeated transfusion (3).

Susceptibility to bacterial infections increased in splenectomized subjects (4). Lifetime risk of developing an overwhelming post splenectomy infection and mortality rates is 1–5% and 40–70%, respectively. The spleen plays a role in the maintenance of a pool of memory B cells involved in the protection against bacterial infections (5).

According to the latest figures released by the World Health Organization, 4,530 cases of diphtheria have been diagnosed worldwide and 28 of those cases occurred in Iran in 2015 (6). The diphtheria surveillance in Iran was done according to national protocol (7, 8).

In Iran, every subject under 7 years old routinely receives 5 doses of diphtheria-pertussis-tetanus (DPT) vaccine (at 2, 4, 6 and 18 months and 4 years of age) and patients and the healthy subjects have been vaccinated against diphtheria consistent with this program.

Although survival of children with beta thalassemia major has improved, both medical therapy and the disease causes immunodeficiency (9). But others have indicated that there is no significant change in humeral immune markers in patients with beta thalassemia major (10, 11). One of the most beneficial and cost effective measures for prevention of infectious diseases, especially diphtheria, is immunization (12). Immunity to diphtheria decreases with advancing age (13). Kruger et al (14) and Xu et al (15) showed that the antibody levels of diphtheria decreased over time.

Median antibody level for diphtheria was higher in patients with acute lymphoblastic leukemia than in the control group (0.202 IU/ml vs 0.071, $p < 0.001$) (16). In a study, only 56.8% of patients with hematologic disorders had completely protective levels of diphtheria antibody, that was lower than healthy children (88.3%) (17). Also, more than 50% patients after anti neoplastic therapy (18) and more than 83% dialysis patients (19) had lacked protective immunity for diphtheria.

Previous studies described that 56.8% of patients with hemato-oncologic illnesses (17), 17% of patients with acute lymphoblastic leukemia (20), 82% of pediatric patients with sarcoma after antineoplastic therapy (21) and 70% in Indian pre-school children (22) had completely protective immunity. Loss of immunity to previous vaccinations, necessity and timing of re-immunization remains controversial.

Antibody level of diphtheria decreased over time and also the subjects with hematologic diseases especially

thalassemia major does not respond well to immunization, because of iron overload. Thus the aim of this study was to compare diphtheria antibody levels in patients with beta thalassemia major and healthy subjects.

The general objective of the current study was to investigate the immunity of patients with beta thalassemia major to diphtheria. The specific objectives were to determine the immunity of patients with beta thalassemia major to diphtheria and healthy people according to the age, gender, serum ferritin level, splenectomy and non-splenectomy status and post splenectomy time.

Material and Methods

Patients and controls had been previously vaccinated according to the Iranian national vaccination program. During 2010–2011, two hundred and twenty-four patients with major beta thalassemia referred to thalassemia ward of hospitals in Jahrom and in Bandar Abbas, Iran, enrolled in this study. Patients included 109 subjects with spleen and 115 individuals without spleen. Also, 224 healthy subjects that were similar for sex and age were considered as the control group.

Blood samples for determination of diphtheria antibodies and ferritin were collected from both groups. Five milliliters of venous blood were obtained from participants. Serum samples were stored at -80 degree centigrade until analyses were performed.

Serum antibodies against diphtheria toxin were determined using an ELISA kit (IBL, Germany). Results are expressed as international unit (IU). Serum diphtheria antibody levels greater than 0.1 IU/ml were considered as complete protection, titers 0.01 to 0.1 IU/ml were considered as partial protection and titers less than 0.01 IU/ml were interpreted as non-protection (23). Serum ferritin levels were also measured using CLIA method (Chemiluminescent Immunoassay Technology, Liasion, Italy, REF 313, 551).

The information and data about the patients were extracted without name by using codes and were kept confidential. This study was approved by the Research Ethics Committee of Jahrom University of Medical Sciences (ethic code: JUMS.REC.1389.65.1).

Data are presented as median \pm standard deviation and percent. We used the independent-samples t-test, One-way ANOVA and chi square test to compare the means and percent in the two groups (beta thalassemia patients and healthy subjects). For the relation of antibody titers with age and serum ferritin, we used backward linear regression test. Also, the backward linear regression analysis was used for relation of antibody with ferritin and age. For the analysis we used SPSS version 15 software. A two sided P-value less 0.05 was considered statistically significant.

Results

Totally 50.9% (114) of healthy people and 50.9% patients were females. Also, the mean age of subjects between two groups was no different ($p=0.633$, Table 1). Among the thalassemia group, 56.5% (65) of non-splenectomized subjects and 45.0% splenectomized subjects were female ($p=0.083$). The splenectomized subjects (6.85 ± 1.69 years) were younger than non-splenectomized subjects (7.37 ± 1.71 $p=0.023$).

Serum ferritin level in healthy subjects was much lower than patients ($p<0.001$, Table 1), but there was no significant difference between the two patient groups, splenectomized (832.11 ± 568.08) and non-splenectomized (981.37 ± 592.99 , $p=0.056$). Serum anti-diphtheria antibody level in the healthy group was higher than in patients group ($p<0.001$, Table 1).

Table 1: The mean and standard deviation of age, serum anti diphtheria and ferritin level in the two study groups

Variables	Healthy subjects, 224		Beta thalassemia major, 224		p value
	Mean	SD	Mean	SD	
Age, year	7.04	1.64	7.12	1.72	0.633
Anti-diphtheria antibody, IU/ml	2.10	1.88	1.51	1.59	< 0.001
Serum ferritin (ng/ml)	64.47	65.41	908.74	584.49	< 0.001

Although, serum antibody level against diphtheria was higher in splenectomized patients (1.60 ± 1.76) than in non-splenectomized ones (1.43 ± 1.43), there were no significant difference ($p=0.448$).

All participants had protective serum anti diphtheria antibody level (partial or completely protected). One hundred and ninety-seven (87.9%) of healthy individuals were completely protected against diphtheria which was significantly higher than patients (71.0%, $p<0.001$) (Table 2).

Table 2: The percent of protective immunity level against diphtheria in the two study groups

Variables	Healthy subjects, 224		Beta thalassemia major, 224		p value	
	Number	Percent	Number	Percent		
diphtheria immunity level groups	Partial protection (0.01 to 0.1 IU/ml)	27	12.1	65	29.0	< 0.001
	Complete protection (> 0.1 IU/ml)	197	87.9	159	71.0	

Although, the percent of complete anti-diphtheria protection was higher (75.2%) in splenectomized patients than in non-splenectomized patients (73.9%), there was no significant difference ($p=0.821$).

Table 3 shows the relation between diphtheria antibody level with age and serum ferritin by backward linear regression analysis. In this model, age did not affect the relationship.

Table 3: Relation of anti-diphtheria antibody titers to serum ferritin levels in study groups

Groups		R Square	Adjusted R Square	B Coefficients		p value
				Constant	Ferritin	
Healthy subjects		0.018	0.014	2.35	-0.004	0.046
Beta thalassemia major	All patients	0.241	0.237	2.73	-0.001	< 0.001
	Non splenectomized	0.308	0.302	2.75	-0.001	< 0.001
	Splenectomized	0.191	0.183	2.72	-0.001	< 0.001

This analysis showed that only 24.1% anti-diphtheria antibody (IgG) alterations was dependent to serum ferritin level in the patients group ($p<0.001$), while, in healthy subjects only 1.8% of anti-diphtheria antibody was dependent to serum ferritin ($p=0.045$). The level of anti-diphtheria antibody decreased with intensification of ferritin level. Thus, when serum ferritin increased 1 ng/ml among patients, serum diphtheria antibody decreased 0.001 IU/ml. This model is better predicted in non-splenectomized patients; with about 31% of the serum anti-diphtheria antibody which is predictable by knowing the serum ferritin level ($p<0.001$).

Discussion

Although survival of subjects with beta thalassemia major has improved, both treatment modalities and the underlying disease may effect in secondary immunodeficiency. Thus these patients are at risk of attaining a variation of infectious diseases. We therefore assessed the serologic immunity against diphtheria in patients with beta thalassemia major and compared to healthy subjects.

Our study found that the mean of serum diphtheria antibody was lower in patients with beta thalassemia major than age and sex-adjusted healthy subjects. But for ferritin level it was the reverse, in other words, the level of serum ferritin was much higher in healthy subjects than in patients. Also, less percent of patients had complete antibody protection against diphtheria as compared to healthy subjects.

From the 1980s serological research showed that a high percentage of subjects become susceptible to diphtheria with advancing age. This may be due to a decrease in the level of antibody in individuals over time. Chatchatee et al in the Thai population demonstrated that subjects aged between 5 and 9 years had the highest titer of tetanus antibody, and subjects above 60 years of age had the lowest titer (24). In the present study to eliminate the effect of time and sex on the antibody levels; we used sex and age-adjusted healthy subjects as controls for patients.

We found no similar research that compared diphtheria antibody among patients with beta thalassemia major and healthy subjects.

Our study showed that the diphtheria antibody level and the percent of complete protection antibody were lower in patient groups than controls. Jahromi and Rahmanian (25) reported that mean anti-tetanus antibody titers (1.53 ± 1.71 vs 2.02 ± 2.05) and the complete protective level of anti-tetanus antibody (71% vs 87.9%) were lower in patients with beta thalassemia major in comparison to healthy persons. Also Modarresi et al reported that the patients on dialysis had less protective levels of anti-diphtheria than normal populations (19).

In the present study seventy-one percent of beta thalassemia patients were completely protected against diphtheria. Our finding is in contrast with other published results. Kown et al (17) reported that 31.5% of 146 Korean children with hematologic malignancies aged 1-17 years were completely protected against diphtheria. Also, van der Hardt et al (18), Ek et al (20) and Small et al (26) found that less than 50% patients against diphtheria, 17.0% of ALL patients against diphtheria and less than 70% of peripheral blood stem cell transplantation recipients against pertussis had complete immunity, respectively. Similarly, complete protection anti-diphtheria antibody was found in our study to be more than anti tetanus titers that were reported by Aminzade (27), Modarresi et al (19) and Kruger et al (28) in dialysis patients; but less than that Zengin and Sarper (83.3-100%) in patients with acute lymphoblastic leukemia (16).

One of the reasons for this difference in patients with beta thalassemia major may be related to high level of serum iron. Iron overload, a primary complication of both thalassemia itself and transfusion therapy, is thought to be the main causing mechanism of immune incompetence in beta thalassemia major (3). Patients with thalassemia major who had serum ferritin level more than 3000 ng/ml had lower C4 and CH50 levels (10). Recent studies on immune competence in beta-thalassemia have revealed numerous quantitative and functional defects, involving T and B lymphocytes and immunoglobulin production (3). Also, Alavi et al (29) indicated that chemotherapy has independent adverse effects on vaccine-induced antibody protection against diphtheria. In the present study, serum ferritin levels were found to be much higher in patients than in healthy subjects.

In our study, only 25.4% of the thalassemia patients had a partial protective level of IgG against diphtheria and they may susceptible to infection. Adversely, in one study conducted in beta thalassaemic patients (aged 5-17 years) who were submitted for bone marrow transplantation, a high percentage (83%) of subjects had anti-diphtheria antibody levels below the protective levels (30). Zengin and Sarper (16) in their study showed that 11.1% of subjects with acute lymphoblastic leukemia had protective level for diphtheria after chemotherapy. Also, Alavi et al (29) reported that chemotherapy in hematologic malignancies caused failure to achieve protective levels of antibodies against diphtheria. In another study, Aminzadeh et al found a non-protective level of IgG against tetanus in most of the hemodialysis patients (27). This alteration seems to be due to difference in mean age of study participants.

Conclusion

Our study indicated that increased serum iron levels in beta thalassemia patients decreased the level of antibody against diphtheria. Therefore, lowering the serum levels of iron may prevent further reduction of antibody levels as compared to healthy people over time. It is suggested that further studies are done.

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References

1. Sharifi Z, Milani S, Mahmoodian Shooshtari M. Study on Efficacy of Hepatitis B Immunization in Vaccinated Betathalassemia Children in Tehran. Iran J Pediatr. Jun 2010;20(2):211-5.
2. Farhud D, Sadighi H. Investigation of prevalence of thalassaemia in Iran. Iran J Public Health. 1997;26:1-2.
3. Farmakis D, Giakoumis A, Polymeropoulos E, Aessopos A. Pathogenetic aspects of immune deficiency associated with beta-thalassemia. Med Sci Monit. 2003;9(1):19-22.

4. DiSabatino A, Carsetti R, Corazza GR. Post-splenectomy and hyposplenic states. *Lancet*. 2011;378:86–97.
5. Holdsworth RJ, Irving AD, Cuschieri A. Postsplenectomy sepsis and its mortality rate: actual versus perceived risks *Br J Surg*. 1991;78:1031–8.
6. Organization WH. World health statistics 2015: World Health Organization; 2015.
7. Zahraei SM, Gouya MM, Mokhtari Azad T, Soltanshahi R, Sabouri A, Naouri B, et al. Successful control and impending elimination of measles in the Islamic Republic of Iran. *The Journal of infectious diseases*. 2011;204(suppl_1):S305-S11.
8. Zahraei SM, Marandi A, Sadrizadeh B, Gouya MM, Rezaei P, Vazirian P, et al. Role of National Immunization Technical Advisory Group on improvement of immunization programmes in the Islamic Republic of Iran. *Vaccine*. 2010;28:A35-A8.
9. Lombardi G, Matera R, Minervini MM, Cascavilla N, D'Arcangelo P, Carotenuto M, et al. Serum Levels Of Cytokines And Soluble Antigens In Polytransfused Patients With B-Thalassemia Major: Relationship To Immune Status. *Haematologica*. 1994;79(406-412).
10. Ghaffari J, Vahidshahi K, Kosaryan M, Soltantooyeh Z, Mohamadi M. Humoral immune system state in β thalassemia major. *Med Glas (Zenica)*. 2011;8(2):192-6.
11. Ezer U, Gulderen F, Culha VK, Akgul N, Gurbuz O. Immunological status of thalassemia syndrome. *Pediatr Hematol Oncol*. 2002;19(1):51-8.
12. Maciosek MV, Coffield AB, Edwards NM, Flottesmesch TJ, Goodman MJ, Solberg LI. Priorities among effective clinical preventive services: results of a systematic review and analysis. *Am J Prev Med*. 2006;31:52–61.
13. Lee HF, Tseng LR, Yueh YY, Wu YC. Immunity against diphtheria in Taiwan. *J Microbiol Immunol Infect*. 1999;32(3):206-12.
14. Krüger S, Müller-Steinhardt M, Kirchner H, Kreft B. A 5-year follow-up on antibody response after diphtheria and tetanus vaccination in hemodialysis patients. *Am J Kidney Dis*. 2001;38(6):1264-70.
15. XU L, DING X-z, LU J. Survey On The Antibody Level Of Diphtheria And Tetanus Among Healthy People Aged Under 25 Years In Nanjing. *Modern Preventive Medicine*. 2010;16.
16. Zengin E, Sarper N. Humoral immunity to diphtheria, tetanus, measles, and hemophilus influenzae type b in children with acute lymphoblastic leukemia and response to re-vaccination. *Pediatr Blood Cancer*. 2009;53(6):967-72.
17. Kwon HJ, Lee JW, Chung NG, Cho B, Kim HK, Kang JH. Assessment of Serologic Immunity to Diphtheria-Tetanus-Pertussis After Treatment of Korean Pediatric Hematology and Oncology Patients. *J Korean Med Sci*. 2012;27:78-83.
18. von-der- Hardt K, Jungert J, Beck JD, Heininger U. Humoral immunity against diphtheria, tetanus and poliomyelitis after antineoplastic therapy in children and adolescents: a retrospective analysis. *vaccine*. 2000;18:2999-3004.
19. Modarresi M, Gheissari A, Sattari M. Protective Status of End-Stage Renal Disease Children Against Tetanus and Diphtheria Vaccination. *Int J Prev Med*. 2013;4(4):420–4.
20. Ek T, Mellander L, Hahn-Zoric M, Abrahamsson J. Intensive treatment for childhood acute lymphoblastic leukemia reduces immune responses to diphtheria, tetanus, and Haemophilus influenzae type b. *J Pediatr Hematol Oncol*. 2004;26:727-34.
21. Paulides M, Stöhr W, Laws HJ, Graf N, Lakomek M, Berthold F, et al. Antibody levels against tetanus and diphtheria after polychemotherapy for childhood sarcoma: a report from the Late Effects Surveillance System. *Vaccine*. 2011;29(8):1565-8.
22. Satwekar AM, Telang SS, Ghorpade NA, Barde PJ, Patwardhan MR, Kulkarni PS. Diphtheria and Tetanus Antibody Persistence in Indian Pre-school Children and Response to a Booster dose of DT Vaccine. *World Journal of Vaccines*. 2011;1:5-9.
23. Galazka AM. The immunological basis for immunization series (2); Diphtheria. Expanded Programme on Immunization. Geneva: WHO. 1993.
24. Chatchatee P, Chatproedprai S, Warinsathien P, Tharmaphornpilas P, Yoocharoen P, Warinrawat S, et al. Seroprevalence of Tetanus Antibody in the Thai Population: A National Survey. *Asian Pacific Journal Of Allergy And Immunology*. 2007;25:219-23.
25. Sotoodeh-Jahromi A, Rahmanian K. Immunity to tetanus in major beta thalassemia patients. *Clin Exp Vaccine Res*. 2015;4:1-5.
26. Small TN, Zelenetz AD, Noy A, Rice RD, Trippett TM, Abrey L, et al. Pertussis immunity and response to tetanus-reduced diphtheria-reduced pertussis vaccine (Tdap) after autologous peripheral blood stem cell transplantation. *Biol Blood Marrow Transplant*. 2009;15:1538-42.
27. Aminzadeh Z, Yaghmaei F, Poorkazemi A, Gachkar L. Tetanus antitoxin levels and cutaneous anergy in hemodialysis patients in two university hospitals in Iran. *Iranian Journal of Clinical Infectious Diseases*. 2006;1(1):31-4.
28. Kruger S, Seyfarth M, Sack K, al e. Defective immune response to tetanus toxoid in hemodialysis patients and its association with diphtheria vaccination. *Vaccine*. 1999;17:1145-50.
29. Alavi S, Rashidi A, Arzani MT, Shamsian B, Nourbakhsh K. Humoral immunity against hepatitis B, tetanus, and diphtheria following chemotherapy for hematologic malignancies: a report and review of literature. *Pediatr Hematol Oncol*. 2010;27(3):188-94.
30. Li-Volti S, Mauro L, Di-Gregorio F, Romeo Ma, Lupo L, Pizzarelli G, et al. Immune status and immune response to diphtheria-tetanus and polio vaccines in allogeneic bone marrow-transplanted thalassemic patients. *Bone marrow transplantation*. 1994;14(2):225-7.

Genetic Variants of Toll Like Receptor-4 in Patients with Premature Coronary Artery Disease, South of Iran

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Abstract

Introduction: Ischemic cardiovascular diseases are the leading causes of morbidity and mortality in most developed and developing countries including Iran. Premature myocardial infarction has a polygenic base with a complex relation with environmental factors. Since expression of different inflammatory genes especially toll like receptor-4 (TLR4) has increased considerably in human atherosclerotic plaques, we have decided to study variants of TLR4 in premature coronary artery disease in patients in Jahrom city, Iran.

Methods: In this case-control study, 100 patients with a history of premature coronary artery diseases and 100 healthy control subjects referred to health centers in Jahrom city were studied. Target sequences of TLR4 gene were amplified by PCR amplification and digestion was done by Styl restriction enzyme (PCR-RFLP method).

Results: There was no significant difference regarding age ($P>0.05$). The distribution of TC heterozygote genotype in the premature myocardial infarction group is significantly higher than in the

healthy group ($P<0.05$) but the homozygote mutated genotype showed no significant difference ($P>0.05$). In addition, the genotype carrying the mutated allele (TC+CC) showed a significant difference when compared to TC variant ($P < 0.05$). The genotype distribution in rs1927911 in both genders shows no concomitance between males and females ($P>0.05$).

Conclusion: According to the results derived from this study, it seems like the existence of the genotype carrying the mutated allele (TC+CC) in rs1927911's mononucleotide polymorphism of TLR gene is associated with an increased risk of premature myocardial infarction.

Key words: Premature coronary artery disease – TLR4 gene - rs1927911 polymorphism

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Introduction

Despite improvements in diagnosis and treatment of coronary artery disease (CAD), it is still among the leading causes of death and disability in the world. Cardiovascular diseases are the most common life threatening diseases in industrial societies and a rapidly growing problem in developing countries (1). MI is a complex multifactorial and polygenic disorder (2). There are several environmental risk factors correlating with CAD such as obesity, diabetes mellitus, hypertension, family history and smoking (1). Twenty percent of acute myocardial infarction patients are referred to as premature MI (3), which is defined as the first attack occurring in males aged 50 years and younger and females aged 55 years and younger (4). Premature CAD is known to be the most aggressive form of the disease (5). In recent decades, the idea of the inflammatory nature of atherosclerosis has been strongly propounded and therefore serum levels of inflammatory markers for risk stratification of cardiovascular events have been considered (6, 7). Inflammatory cells, especially macrophages, are present in atherosclerotic plaques (8).

There is a family of receptors that present in phagocytic cells like macrophages which are named as Toll like receptors (TLR) (9).

When TLRs on macrophages are activated, these lead to activation of the nuclear factor kappa B (NFkB) pathway which results in production and expression of pro inflammatory molecules (10).

TLR4 is one of the important members that is expressed by macrophages and endothelial cells in human atherosclerotic lesions (11).

Some clinical studies have demonstrated that the effects of polymorphisms of genetic variants of the human TLR4 gene, located on chromosome 9, on the progression of the atherosclerosis, is controversial (12-14).

Single nucleotide polymorphisms (SNPs) are the most common type of genetic variation in a population (15). There are 10 SNPs in the genotyping system of TLR4: Re10759930, rs2737191, rs2770150, rs1927914, rs1927911, rs5030728, rs11536889, rs1554973, rs11536897, rs11536891 (16). The rs1927911 SNP is located within the intron – coding region of the TLR4 gene on chromosome 9 (17).

Due to the lack of data about the role of TLR4 gene polymorphism in premature CAD in the literature, this study was conducted to determine the association between polymorphism in variants of TLR4 gene and occurrence of premature MI.

Materials and Methods

Design and participants

The study was retrospective, observational, and cross-sectional. One hundred patients with a history of premature coronary artery diseases and 100 healthy control subjects referred to health centers in Jahrom city were invited to participate in the study. All participants signed an informed consent approved by the Institutional Ethical Committee after a detailed orientation of the study requirements, possible risks, and benefits. The information and data about the patients were extracted without name by using codes and were kept confidential. This study was approved by the Research Ethics Committee of Jahrom University of Medical Sciences (ethic code: JUMS.REC.1394.62.9).

Demographic information

Demographic information was collected from case and control groups. This study was conducted based on the declaration of Helsinki and approved by the ethics committee of Jahrom University of Medical Sciences. All individuals had consent to participate in study and based on the testimonial they could leave the study.

Extraction of DNA and PCR

Five ml of venous blood was taken and collected in tubes containing EDTA as an anticoagulant then stored in -20 °C in order to extract DNA. Extraction of DNA was done by commercial kit (Cinagen Co., Tehran, Iran).

Genotyping of rs1927911 polymorphism in TLR4 gene

Genotyping of rs1927911 polymorphism was performed using restriction fragment length polymorphism (RFLP).

Amplification of DNA was done by polymerase chain reaction (PCR) in premix pipes (Bioneer Co. Daejeon, Korea). Selection of forward and reverse primers was done according to related articles. Gene sequence accuracy was confirmed by gene bank information website (<http://ncbi.nlm.nih.com>). Also primers gene sequence was re-checked with Gene runner software and blast program primer sequences were F: TCACTTTGCTCAAGGGTCAA R: AAACCTGCATGCTCTGCAC

To detect the rs1927911 polymorphism, Styl restriction enzyme (Fremontase Co) was used. 3% Agarose gel electrophoresis was done for endorsement of the dissected sequence.

Statistical analysis

Correlation between occurrence of acute premature coronary syndrome and rs1927911 polymorphism TLR-4 gene in the case and the control groups was determined with Odds ratio (OR), Chi-square and Fisher exact tests. In the deductive part of the study, the differences in biochemical markers and demographic information were evaluated with T test (p value < 0.5 defined as significant). All analyses were done by SPSS version 15.

Results

Participants' ages were in the range of 30-50 years old. Mean of age in the case group was 41.5 ± 4.9 years and mean of age in the control group was 42.5 ± 6.6 years with no significant difference ($P=0.197$). Gender ($P=0.876$) and smoking ($P=0.323$) in case and control groups had no significant differences.

Results of study showed that 70% (70 people) of the case group had a family history of CAD and 91% of the control group had no family history of CAD. There was a noticeable difference between case and control group ($P=0.000$) that clarifies the obvious role of family history in occurrence of CAD. In the case group 25% of participants had hypertension (HTN), 23% had hyperlipidaemia (HLP) and 25% had diabetes mellitus (DM). There were significant differences between groups in cardiovascular risk factors: HTN (0.001), HLP (0.07), DM (0.010) (Table 1).

Table 1. Demographic data of both study groups

	NGT subjects	Premature Coronary Artery Disease	P
n (males/females)	30/70(%30/70)	32/68 (%32/68)	0.76
Age (y)	6.6 ± 42.5	4.9 ± 41.5	0.197
Smoking (n)	27	25	0.321
DM (n)	11	25	0.010
FHX (n)	0	2	0.000
HLP (n)	9	23	0.070
HTN (n)	8	25	0.001

FHX: family history of CAD, DM: diabetes mellitus, HLP: hyperlipidaemia, HTN: hypertension

According to the results of study there was no significant difference between CC genotype mutant of TLR-4 gene and occurrence of premature CAD (p value: 0.435) but in mix genotype CC+TC vs TT there was a significant difference between premature CAD and healthy subjects (p value: 0.021), and C-allele frequency distributions were not significantly different ($P;0.093$) (Table 2).

Difference between alleles of TLR-4 gene (C and T) and occurrence of premature CAD in case and control groups is shown in Table 2 (p value: 0.013).

Table 2: Frequencies of genotypes and alleles in participants

	Controls N =100	Premature Coronary Artery Disease N =100	Value of P*	OR
TT	67(67.0%)	50(50%)		Reference
TC	5(5.0%)	23(23.0%)	0.001	0.162(0.058-0.456)
CC	28(28%)	27(27%)	0.435	0.774(0.407-1.472)
TC+CC	33(33.0%)	50(50.0%)	0.021	2.030(1.146 -3.598)
TT	67(67.0%)	50(50%)		
Allele frequency				
allele T	123(62.5%)	139(%69.5)	0.093	0.701(0.463-1.061)
allele C	74(%37.6)	61(%30.5)		

Discussion

MI is the leading cause of mortality in developed countries and the second leading cause in developing countries (1). Expression of different inflammatory genes, specifically TLR4, has increased significantly in human atherosclerotic plaques (18). 1927911 SNP located on chromosome 9 is one of the polymorphisms that has always been investigated in CVDs (19).

According to the results found in this study, distribution of heterozygous genotype (TC) was meaningfully higher than that in the healthy group control but the mutated homozygous genotype did not show a meaningful difference. Besides that, when compared to TC state, the genotype carrying the mutated allele (TC+CC) did not show a meaningful difference.

Even though the distribution of the mutated C allele was higher in the healthy control group compared to the premature MI group, this difference was not meaningful.

The Logistic regression analysis of distribution of genotype in rs1927911 in both genders shows that there is no meaningful concomitance in men and women, even though the mutated C allele was meaningfully more in females than in males.

Results of a study conducted by Yanmin Song et al. in the southern Chinese province of Hunan in 2014 showed that for rs1927911 there is a meaningful difference between acute cardiac ischemia (ACI) patients and the control groups from a genotype and allele distribution but hypertension, fasting blood sugar and serum fat level with different genotypes in both ACI patients and control groups had no meaningful difference (20).

In a study done by Daniel A. Enquobahrie et al. sweeping changes of gene in PPARA (peroxisome proliferator activated receptor alpha) and TLR4 gene was accompanied by MI. A minor allele of PPARA SNP, rs4253623, was accompanied with an increased risk of MI and a minor allele of TLR4 SNP, rs1927911, with an increased risk of MI. rs1927911 minor allele, a part of TLR4-D haplotype, is accompanied with a 12% risk of MI (21).

Conclusion

According to the findings of this study, it seems like the presence of the carrying genotype of mutated allele (TC+CC) in rs1927911 single nucleotide polymorphism (SNP) of TLR4 gene is associated with an increase of premature MI.

Considering the breadth of polymorphisms of TLR4 gene and role of genetics in premature MI, in order to establish this polymorphism as a risk factor, further studies in larger populations in this area is proposed.

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References

1. Mann DL, Zipes DP, Libby P, Bonow RO. Braunwald's heart disease: a textbook of cardiovascular medicine: Elsevier Health Sciences; 2014.
2. Mayer B, Erdmann J, Schunkert H. Genetics and heritability of coronary artery disease and myocardial infarction. *Clinical Research in Cardiology*. 2007;96(1):1-7.
3. Kazemi T, Sharifzadeh G, Zarban A, Fesharakinia A. Comparison of components of metabolic syndrome in premature myocardial infarction in an Iranian population: a case-control study. *International journal of Preventive Medicine*. 2013;4(1).
4. Fick A, Hillegass E. Ischemic cardiovascular conditions and other vascular pathologies. *Essentials of Cardiopulmonary Physical Therapy*. 2016:42.
5. Abdi-Ali A, Shaheen A, Southern D, Zhang M, Knudtson M, White J, et al. Relation Between Family History of Premature Coronary Artery Disease and the Risk of Death in Patients With Coronary Artery Disease. *The American Journal of Cardiology*. 2016;117(3):353-8.
6. Nahrendorf M, Swirski FK. Neutrophil-macrophage communication in inflammation and atherosclerosis. *Science*. 2015;349(6245):237-8.
7. Slocum C, Kramer C, Genco C. Immune dysregulation mediated by the oral microbiome: potential link to chronic inflammation and atherosclerosis. *Journal of Internal Medicine*. 2016.
8. Braganza D, Bennett M. New insights into atherosclerotic plaque rupture. *Postgraduate medical journal*. 2001;77(904):94-8.
9. Sanjuan MA, Dillon CP, Tait SW, Moshiah S, Dorsey F, Connell S, et al. Toll-like receptor signalling in macrophages links the autophagy pathway to phagocytosis. *Nature*. 2007;450(7173):1253-7.
10. Bonizzi G, Karin M. The two NF- κ B activation pathways and their role in innate and adaptive immunity. *Trends in immunology*. 2004;25(6):280-8.
11. Cook DN, Pisetsky DS, Schwartz DA. Toll-like receptors in the pathogenesis of human disease. *Nature immunology*. 2004;5(10):975-9.
12. Kolek MJ, Carlquist JF, Muhlestein JB, Whiting BM, Horne BD, Bair TL, et al. Toll-like receptor 4 gene Asp299Gly polymorphism is associated with reductions in vascular inflammation, angiographic coronary artery disease, and clinical diabetes. *American Heart Journal*. 2004;148(6):1034-40.
13. Yang IA, Holloway JW, Ye S. TLR4 Asp299Gly polymorphism is not associated with coronary artery stenosis. *Atherosclerosis*. 2003;170(1):187-90.
14. Konstantinidou MK, Goutas N, Vlachodimitropoulos D, Chaidaroglou A, Stefanou D, Poupouridou N, et al. TLR4 and CD14 Genotypes and Soluble CD14: Could They Predispose to Coronary Atherosclerosis? *Journal of Cardiovascular Development and Disease*. 2016;3(1):9.

15. Cargill M, Altshuler D, Ireland J, Sklar P, Ardlie K, Patil N, et al. Characterization of single-nucleotide polymorphisms in coding regions of human genes. *Nature genetics*. 1999;22(3):231-8.
16. Schmitt C, Humeny A, Becker C-M, Brune K, Pahl A. Polymorphisms of TLR4: rapid genotyping and reduced response to lipopolysaccharide of TLR4 mutant alleles. *Clinical Chemistry*. 2002;48(10):1661-7.
17. Zhang K, Zhou B, Wang Y, Rao L, Zhang L. The TLR4 gene polymorphisms and susceptibility to cancer: a systematic review and meta-analysis. *European Journal of Cancer*. 2013;49(4):946-54.
18. Gargiulo S, Gamba P, Testa G, Rossin D, Biasi F, Poli G, et al. Relation between TLR4/NF- κ B signaling pathway activation by 27-hydroxycholesterol and 4-hydroxynonenal, and atherosclerotic plaque instability. *Aging cell*. 2015;14(4):569-81.
19. Davis ML, LeVan TD, Yu F, Sayles H, Sokolove J, Robinson W, et al. Associations of toll-like receptor (TLR)-4 single nucleotide polymorphisms and rheumatoid arthritis disease progression: An observational cohort study. *International immunopharmacology*. 2015;24(2):346-52.
20. Song Y, Liu H, Long L, Zhang N, Liu Y. TLR4 rs1927911, but Not TLR2 rs5743708, Is Associated With Atherosclerotic Cerebral Infarction in the Southern Han Population: A Case–Control Study. *Medicine*. 2015;94(2).
21. Enquobahrie DA, Smith NL, Bis JC, Carty CL, Rice KM, Lumley T, et al. Cholesterol ester transfer protein, interleukin-8, peroxisome proliferator activator receptor alpha, and Toll-like receptor 4 genetic variations and risk of incident nonfatal myocardial infarction and ischemic stroke. *The American Journal of Cardiology*. 2008;101(12):1683-8.

Comparison of postoperative bleeding in patients undergoing coronary artery bypass surgery in two groups taking aspirin and aspirin plus CLS clopidogrel

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Abstract

Introduction: Coronary Artery Bypass Grafting (CABG) is a surgical procedure that aims to ease symptoms and reduce the risk of death in patients with coronary artery occlusion. In this surgery, healthy blood vessels from other parts of the body replace occluded coronary arteries. This surgery is done to improve blood supply to the heart. Because of its invasive nature, this procedure is associated with complications including postoperative bleeding.

Methods: The study included 68 subjects in each group. The inclusion criteria were age of 40-80 years, serum creatinine under 1.5 mg/dl, platelet count above 100 thousand per microliter, hemoglobin above 8 g per deciliter, and normal PT and PTT. The patients underwent the procedure through the on-pump method. The study population included the patients undergoing CABG in Khorramabad Heart Hospital. The convenience, consecutive sampling method was applied, based on the inclusion criteria of the study.

Results: The mean age of the patients treated with aspirin was 60.9 ± 11.05 , and the mean age of the patients treated with aspirin plus clopidogrel was

60.48 ± 9.8 years. The mean FFP intake in the aspirin plus clopidogrel group during hospitalization was significantly higher than the mean in the aspirin group (PV= 0.0009). The mean cell pack intake in the aspirin plus clopidogrel group during hospitalization was higher than the mean in the aspirin group, but this difference was not statistically significant (PV=0.068).

Discussion: The rate of postoperative bleeding in the clopidogrel plus aspirin group was higher than the rate in the aspirin group, but this difference was not significant (PV=0.067). The rate of Hb, HCT, and platelets in the aspirin plus clopidogrel group at discharge was higher than the rate in the aspirin group, which was due to excess bleeding in the aspirin plus clopidogrel group compared to the aspirin group. The rate of FFP intake in the aspirin plus clopidogrel group was significantly higher than the rate in the aspirin group, which was due to excess bleeding in the aspirin plus clopidogrel group (PV=0.0009).

Key words: coronary artery bypass grafting, aspirin, clopidogrel

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Introduction

Coronary artery bypass grafting (CABG) is a surgical procedure that aims to ease symptoms and reduce the risk of death in patients with coronary artery occlusion. In these patients, healthy vessels of other parts of the body are grafted to replace the occluded coronary arteries and this improves blood flow to the heart. Due to the aggressive and invasive nature of this surgery, it is associated with complications. From among the complications of this surgery, bleeding after CABG can be cited. The prevalence of this complication is so high that 17% of patients need blood transfusions after surgery and approximately 3 to 5 percent of patients require re-exploration (1). The amount of bleeding after surgery varies based on factors such as platelet count and pre-operative fibrinogen concentrations (1). Also, it should be noted that patients undergoing CABG often use antiplatelet and anticoagulant drugs due to heart disease and this issue affects the occurrence and severity of postoperative bleeding. It is expected that various antiplatelet drugs have different effects on post-operative bleeding. One of the drugs that nowadays is used as an antiplatelet drug is clopidogrel. This medication irreversibly inhibits platelet activation and aggregation (2). Various studies conducted on the effects of this drug on CABG post-operative bleeding have reported mixed results. Several studies have reported that the use of this drug has no effect on the amount of post-operative bleeding (3). In contrast, some studies have reported that the use of this drug increases the rate of postoperative bleeding (4-6). In addition, it has been reported that the preoperative use of clopidogrel with a loading dose of 600 mg increases the risk of bleeding in comparison with a loading dose of 300 mg (7). On the other hand, the use of clopidogrel in patients undergoing CABG shows benefits, which include a decline in the rates of cardiovascular events (5) and a reduction in the likelihood of replaced vessel occlusion (3).

In this study, considering the benefits that have been proposed for the use of clopidogrel plus aspirin in patients undergoing CABG, and also given the mixed results obtained from different studies, we decided to compare postoperative bleeding in patients undergoing coronary artery bypass surgery in two groups taking aspirin and aspirin plus clopidogrel.

Materials and Methods

In this study, the number of subjects in each group was 68 patients. The inclusion criteria included an age of between 40 and 80 years, serum creatinine levels less than 1.5 mg/dl, a platelet count of over 100 thousand per microliter, hemoglobin levels of more than 8 g per dl, and normal PT and PTT, and the use of the on-pump CABG for the patients. The studied population included patients who had undergone CABG in the Specialist Cardiac Hospital of Khorramabad, Iran. The convenience and consecutive sampling methods were used based on the inclusion criteria of the study.

In this study, candidate patients for angiography underwent coronary angiography by two groups of cardiologists. One group were specialists who were able to perform angioplasty and the other group was not able to perform this operation. Cardiologists who were not able to perform angioplasty prescribed aspirin (325 mg daily) for patients scheduled to undergo angiography. In contrast, given the fact that patients who are scheduled to undergo coronary angiography may need angioplasty too, cardiologists who were able to perform angioplasty prescribed clopidogrel (with a dose of 600mg per day) in addition to aspirin (with a dose of 325mg) for the patients to be ready to undergo angioplasty, if necessary. The advantage of this strategy is that it spares the patient from another procedure to perform angioplasty.

In both groups, if the findings of angiography showed that some patients needed to undergo CABG, cardiac surgeons subsequently operated on them. Therefore, some of the patients who underwent CABG had taken aspirin before surgery and others had used clopidogrel (600 mg daily) in addition to aspirin. In this study, patients were divided into two group based on the use or non-use of clopidogrel. Inclusion criteria were an age of between 40 and 80 years, serum creatinine levels of less than 1.5 mg/dl, a platelet count of more than 100,000 per microliter, hemoglobin more than 8 g/dl, and normal PT and PTT .

Exclusion criteria included a history of hereditary bleeding disorders, use of anticoagulant drugs in the previous month, having undergone CABG surgery in the past, the use of clopidogrel before the start of the current study, a history of taking clopidogrel in the aspirin group, a history of allergy to clopidogrel and aspirin, a history of cerebrovascular disease, a history of severe hepatic disease, cancer, severe bleeding or cardiac tamponade after surgery which needed surgical intervention, the need for anticoagulant drugs after surgery, and gastrointestinal bleeding after surgery.

Demographic variables, laboratory indicators, signs and symptoms of the patients, the amount of postoperative bleeding, and the amount of blood transfused (during the first 24 hours), duration of ICU and hospital stays, and duration of drain use in patients were recorded in the data collection form of the study. This form was completed by executive colleagues of the project. To describe the data, descriptive statistical methods (mean, standard deviation, and frequency percentages) and, to compare the examined variables, analytical statistical methods, including the independent t-test, chi-square, and analysis of variance were used.

Results

The mean age of the patients treated with aspirin was 60.9 ± 11.05 , and the mean age of the patients treated with aspirin and clopidogrel was 60.48 ± 9.8 . According to t-test, the difference in age between the two groups was not statistically significant ($p=0.78$). In the aspirin group, 42.9% of the patients and, in the aspirin plus clopidogrel group, 45.7% of the patients were younger than 60 years old. The rest of the patients of the two groups were older than 60 years old. The difference in age distribution between the two groups was not statistically significant according to a chi-square test ($P=0.73$).

The mean BMI in the group treated with aspirin was 27.3 ± 4.2 and in the group treated with clopidogrel + aspirin, was 28.3 ± 10 . According to t-test, the difference in mean BMI was not statistically significant between the two groups ($p=0.46$). In the aspirin group, the mean EF of the patients was 46.5 ± 10.9 percent and, in the aspirin plus clopidogrel group, was 46.2 ± 9.2 percent, which difference was not found to be statistically significant ($p=0.86$). None of the patients in both groups were HIV positive or HCV positive.

Based on chi-square test, the difference in the need for blood transfusion in the studied groups during the first 24 hours after surgery was not statistically significant ($p=0.8$). (Table 1)

Table 1: The difference in the need for blood transfusion in the studied groups during the first 24 hours after surgery

		Need for blood transfusion during the first 24 hours after surgery		
		Has	Has not	Total
		N (%)	N (%)	N (%)
Groups	Aspirin	61 (87.1)	9 (12.9)	70 (100)
	Aspirin plus clopidogrel	60 (85.7)	10 (14.3)	70 (100)

* "N" represents the number of patients in each group

** Statistical test: Chi-Square test

Additionally, according to the above table, the difference in the need for blood transfusions during hospital stay was not statistically significant between the group receiving aspirin (91.4%) and the group receiving aspirin + clopidogrel (87.1%) ($p=0.41$) (Table 2).

Table 2: The difference in the need for blood transfusion in the studied groups during hospital stay

		Need for blood transfusion during hospital stay		
		Has	Has not	Total
		N (%)	N (%)	N (%)
Groups	Aspirin	64 (91.4)	6 (8.6)	70 (100)
	Aspirin plus clopidogrel	61 (87.1)	9 (12.9)	70 (100)

* "N" represents the number of patients in each group

** Statistical test: Chi-Square test

According to the results of a repeated measures, test differences in bleeding in each group over time was statistically significant (time effect). But the difference between the two groups was not statistically significant in any of the times (24 hours after surgery and until the removal of the drain) (group effect and the time-group interaction were not statistically significant either) ($p=0.9$). According to an independent t-test, the difference in the mean bleeding during the first 24 hours after surgery was not statistically significant in both groups receiving aspirin and clopidogrel + aspirin ($p=0.067$). Although the amount of bleeding in the group receiving aspirin + clopidogrel was more than the aspirin group, this difference was not statistically significant. Despite the fact that the group receiving aspirin + clopidogrel had more bleeding until the removal of the drain in comparison with the group receiving aspirin, this difference was not statistically significant as determined by a t-test ($p=0.27$).

The mean duration of ICU stay for the group receiving aspirin was 53.12 hours and in the group receiving aspirin + clopidogrel, it was 50.35 hours. This difference was not statistically significant ($p=0.51$).

The mean duration of drain use in the aspirin group was 106.2 hours and it was 107.4 hours in the group receiving aspirin + clopidogrel, but this difference was not statistically significant as determined by a t-test ($p>0.05$).

In the group receiving aspirin, 3 patients (4.3%) and, in the group receiving aspirin + clopidogrel, 6 patients (8.6%) needed reoperation, but this difference was not statistically significant, according to Fisher's exact test ($p=0.24$). (Table 3)

Table 3: The difference in the need for need for reoperation in the studied groups

		Need for reoperation			P-Value
		Has	Has not	Total	
		N (%)	N (%)	N (%)	0.24
Groups	Aspirin	3 (4.3)	67 (95.7)	70 (100)	
	Aspirin plus clopidogrel	6 (8.6)	64 (91.4)	70 (100)	

* "N" represents the number of patients in each group

** Statistical test: Fisher's exact test †

In both groups, the average number of days of hospital stay was 6.5 days and the t-test showed no statistically significant difference in the number of days of hospitalization in the two groups. Based on the obtained results, the difference in the mean values of blood parameters before the surgery was not statistically significant ($p > 0.05$). Additionally, based on the results of an independent t-test, the differences in values of lipid profile, renal function and CRP indexes were not statistically significant in the two groups before the surgery ($p > 0.05$). (Table 4)

Table 4: The Comparison of mean and standard deviation of laboratory indices before the surgery in studied groups

Indicator type		Hb (g/dl)	RBC (μ l)	Hct (%)	WBC ($\times 10^3 \mu$ l)	Plt ($\times 10^3 \mu$ l)	PT (Sec)
		$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$
Groups	Aspirin	13.6 \pm 2.2	4.6 \pm 0.87	41.14 \pm 6.3	8.6 \pm 3.3	223757 \pm 65.6	12.99 \pm 1.08
	Aspirin plus clopidogrel	14 \pm 2.07	4.7 \pm 0.72	42.07 \pm 5.5	7.8 \pm 2.9	233314 \pm 64.9	12.90 \pm 1.85
T statistics		-1.19	-0.62	-0.92	1.55	-0.86	0.34
P Value		0.23	0.53	0.35	0.12	0.38	0.74

PTT (Sec)	TG	Cholesterol	BUN	Cr	CRP
$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$	$\mu \pm SD$
27.79 \pm 6.2	178.9 \pm 81.7	182.2 \pm 49.2	45.2 \pm 16.4	1.17 \pm 0.25	1.74 \pm 0.44
29.40 \pm 7.91	166.6 \pm 93.4	180.5 \pm 44	42.5 \pm 14.2	1.19 \pm 0.27	1.81.5 \pm 0.39
-1.33	0.82	0.22	1.03	-0.38	-1.01
0.18	0.4	0.82	0.3	0.7	0.31

Table 5- The Comparison of mean and standard deviation of laboratory indices in studied groups at discharge

Indicator type		Hb (g/dl)	Hct (%)	Plt ($\times 10^3 \mu\text{l}$)	BUN	Cr
		$\mu \pm \text{SD}$	$\mu \pm \text{SD}$	$\mu \pm \text{SD}$	$\mu \pm \text{SD}$	$\mu \pm \text{SD}$
Groups	Aspirin	11.1 \pm 9.7	32.9 \pm 5.2	235800 \pm 81.25	41.5 \pm 11	1 \pm 0.22
	Aspirin plus clopidogrel	9.72 \pm 1.3	29.9 \pm 4	209914 \pm 67.7	38 \pm 9	1.04 \pm 0.24
T statistics		4.15	3.90	2.04	2.03	-1.04
P Value		<0.0001	<0.0001	0.043	0.044	0.290

According to a t- test, the mean values of Hb, HCT, PLT and BUN was significantly higher at discharge in the group receiving aspirin than in the group receiving aspirin + clopidogrel. (Table 5).

Based on a t-test, there was no significant difference between the mean injected platelet units for the studied groups during hospital stay ($p=0.47$). The mean FFP received during hospital stay was significantly higher in the group receiving aspirin + clopidogrel than in the group receiving aspirin ($p=0.0009$). Additionally, the mean amounts of the packed cells received during hospitalization was higher in the group receiving aspirin + clopidogrel than in the aspirin group. But this difference was not statistically significant ($p=0.068$). 75.7% of the patients receiving aspirin and 80% of the patients receiving aspirin + clopidogrel needed to receive FFP during hospitalization. According to a chi-square test, this difference was not statistically significant ($p=0.54$). None of the patients in either group needed receiving whole blood during hospitalization. The mean postoperative bleeding at various times after surgery and Hb and HCT amounts did not show any significant difference in the aspirin-receiving group in various age groups ($p > 0.05$). The need for blood transfusions in younger than 60 patients in the aspirin group was 83.4% and in the older than 60 patients was 97.5% and according to Fisher's exact test, this difference was statistically significant ($p=0.036$). Moreover, the difference in the amount of postoperative bleeding, hemoglobin and hematocrit in patients receiving aspirin + clopidogrel was not statistically significant in terms of age groups (under 60 and 60 years and older). 81.3% of the patients younger than 60 years and 92.1% of the patients 60 years and older who received aspirin + clopidogrel needed post-operative blood transfusions. Fisher's exact test did not show a significant difference between these groups ($p=0.17$).

Differences in the frequency distribution of the number of grafts in both groups was statistically significant ($p=0.022$), but the mean number of grafts was not statistically significant ($p=0.07$).

Discussion

Studies published in 1990 and 1991 indicated that the administration of aspirin preoperatively leads to further surgeries due to increased postoperative bleeding (6.6 vs. 1.7% and 6.3 vs. 2.4% in two studies) (8, 9). In subsequent studies, however, no increase in bleeding was observed. The administration of aspirin could even decrease mortalities in hospitals (10-12). In the past, concerns about bleeding lead physicians to advise patients undergoing CABG to discontinue taking aspirin three to five days before surgery. However, this general view is not recommended any more. ACCF/AHA2011 instructions recommend continuing to take aspirin or starting it before CABG surgery (13). Anemia is an independent risk factor predisposing complications and mortality after CABG. As a result, the transfer of red blood cells (RBC) is common. Blood transfusion rates have been reported to be between 40% and 90% (14). In the present study, this amount was 91.4% vs. 87.1% which was lower in the aspirin + clopidogrel group, but the difference was not statistically significant. As reported in 2010, among more than 82,000 patients from hospitals in the United States who had undergone CABG surgery with cardiopulmonary bypass in 2008, the rate of blood transfusions during surgery

was 56.1% (15). In addition, the bleeding which requires re-surgery was associated with a strong need for blood transfusions, and longer ICU and hospital stays. The re-surgery rates ranged from 4% to 6% (16). However, a study has shown that during 1995-1997, there has been a reduction in the rates of re-operation down to 2% (17). In the present study too, the need for repeated OR in the aspirin receiving group was less than half of the group receiving aspirin + clopidogrel. However, this difference was not statistically significant (3.4% vs. 6.8%).

Previous randomized trials have examined dual antiplatelet therapy with aspirin + clopidogrel in cardiovascular patients. There has been observed no clinical benefits in two studies that investigated combined antiplatelet treatment as compared with aspirin alone for patients with risk factors for atherosclerosis, cerebral, cardiac or peripheral vascular disease (18, 19). On the contrary, the combination of clopidogrel and aspirin as compared with aspirin alone has demonstrated significant improvements in the outcome of patients undergoing percutaneous vascular intervention (20), and in patients with acute coronary syndrome (21-23). In our study too, no benefits were observed in the group receiving aspirin + clopidogrel. Moreover, the aspirin group showed significantly lower

postoperative bleeding (834.67 ± 595.81 vs. 662 ± 506.39). Also, in the group receiving aspirin the mean values of Hb, HCT, BUN, and blood platelets at discharge were significantly higher than the group receiving aspirin + clopidogrel. Additionally, the mean amount of received FFP and the need for injections were lower in the aspirin group patients than the group receiving aspirin + clopidogrel (97.5 vs. 83.13%, $p=0.0009$). If the above criteria be considered as indicating a good prognosis, the group receiving aspirin had a better prognosis. Often surgeons prescribe clopidogrel commonly after CABG, believing that it prevents graft occlusion, and possibly improves clinical outcomes (24, 25). Although prospective randomized controlled trial data in this area is inadequate (24), previous studies cited in cardiac surgery literature have suggested that clopidogrel may improve postoperative outcomes (25-27). In a study of off-pump CABG patients, Ebrahimi et al demonstrated that adding clopidogrel to aspirin was accompanied with a tendency toward improvements in SVG remaining open up to 6 months after surgery (26). Recently, Gao et al have reported the results of a non-randomized trial in which 197 patients received 75 mg clopidogrel plus 100 mg aspirin the day after surgery based on a weekly replacement therapy. Within 7 days, the risk of life-threatening events or major bleeding after CABG surgery did not show a significant increase in patients receiving clopidogrel 5 days prior to CABG (9.6% vs 6.3% with placebo), but the same was not true for patients who had discontinued clopidogrel five days or more before CABG (4.4% vs. 5.3%) (29). These findings are supported by several other observational studies (30-37). In our study too, adding aspirin to clopidogrel did not lead to significant differences in life-threatening events, which confirms the cited studies. However, in a study by Wang et al, there was observed a good response to adding clopidogrel to aspirin after CABG (38).

Conclusion

Given the obtained results in the present study, the following conclusions can be drawn:

1. The amount of postoperative bleeding in the clopidogrel + aspirin was more than the aspirin group. However, its P Value is not significant, but it approaches the significance level ($p=0.067$).
2. The platelet, Hb, and HCT is lower at discharge in the clopidogrel + aspirin group than in the aspirin group, the cause of which is higher blood loss in the aspirin + clopidogrel group in comparison with the aspirin group.
3. FFP use in the aspirin + clopidogrel group was more than in the aspirin group which is due to increased blood loss in the first group ($p=0.000$).
4. To get more accurate results, further research is recommended with larger sample numbers.
5. Considering the importance of the drugs aspirin and clopidogrel in the prevention of heart attacks and their importance in the health system, it is recommended that the benefits of these drugs be not overlooked in comparison with their possible disadvantages.

References

1. Karlsson M, Ternström L, Hyllner M, Baghaei F, Nilsson S, Jeppsson A. Plasma fibrinogen level, bleeding, and transfusion after on-pump coronary artery bypass grafting surgery: a prospective observational study. *Transfusion*. 2008; 48 (10):2152-8.
2. Angiolillo DJ, Guzman LA, Bass TA. Current antiplatelet therapies: benefits and limitations. *Am Heart J*. 2008; 156 (Suppl 2): S3-9.
3. Sun JC, Teoh KH, Lamy A, Sheth T, Ellins ML, Jung H, Yusuf S, Anand S, Connolly S, Whitlock RP, Eikelboom JW. Randomized trial of aspirin and clopidogrel versus aspirin alone for the prevention of coronary artery bypass graft occlusion: the Preoperative Aspirin and Postoperative Anti-platelets in Coronary Artery Bypass Grafting study. *Am Heart J*. 2010; 160 (6): 1178-84.
4. Miceli A, Duggan SM, Aresu G, de Siena PM, Romeo F, Glauber M, Caputo M, Angelini GD. Combined clopidogrel and aspirin treatment up to surgery increases the risk of postoperative myocardial infarction, blood loss and reoperation for bleeding in patients undergoing coronary artery bypass grafting. *Eur J Cardiothorac Surg*. 2012 Jun 24. [Epub ahead of print].
5. Zhou YH, Wei X, Lu J, Ye XF, Wu MJ, Xu JF, Qin YY, He J. Effects of combined aspirin and clopidogrel therapy on cardiovascular outcomes: a systematic review and meta-analysis. *PLoS One*. 2012; 7 (2): e31642. Epub 2012 Feb 13.
6. Liu PS, Chen X, Shi KH, Xu M, Jiang YS. Impact of preoperative clopidogrel in coronary artery bypass grafting. *Zhonghua Wai Ke Za Zhi*. 2008; 46 (4): 252-5.
7. Cruden NL, Morch K, Wong DR, Klinke WP, Ofiesh J, Hilton JD. Clopidogrel loading dose and bleeding outcomes in patients undergoing urgent coronary artery bypass grafting. *Am Heart J*. 2011; 161 (2): 404-10.
8. Goldman S, Copeland J, Moritz T, et al. Starting aspirin therapy after operation. Effects on early graft patency. Department of Veterans Affairs Cooperative Study Group. *Circulation* 1991; 84:520.
9. Sethi GK, Copeland JG, Goldman S, et al. Implications of preoperative administration of aspirin in patients undergoing coronary artery bypass grafting. Department of Veterans Affairs Cooperative Study on Antiplatelet Therapy. *J Am Coll Cardiol* 1990; 15: 15.
10. Bybee KA, Powell BD, Valeti U, et al. Preoperative aspirin therapy is associated with improved postoperative outcomes in patients undergoing coronary artery bypass grafting. *Circulation* 2005; 112: 1286.
11. Dacey LJ, Munoz JJ, Johnson ER, et al. Effect of preoperative aspirin use on mortality in coronary artery bypass grafting patients. *Ann Thorac Surg* 2000; 70: 1986.
12. Mangano DT, Multicenter Study of Perioperative Ischemia Research Group. Aspirin and mortality from coronary bypass surgery. *N Engl J Med* 2002; 347: 1309.
13. Hillis LD, Smith PK, Anderson JL, et al. 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation* 2011; 124: 2610.

14. Hajjar LA, Vincent JL, Galas FR, et al. Transfusion requirements after cardiac surgery: the TRACS randomized controlled trial. *JAMA* 2010; 304: 1559.†
15. Bennett-Guerrero E, Zhao Y, O'Brien SM, et al. Variation in use of blood transfusion in coronary artery bypass graft surgery. *JAMA* 2010; 304: 1568.†
16. Sellman M, Intonti MA, Ivvert T. Reoperations for bleeding after coronary artery bypass procedures during 25 years. *Eur J Cardiothorac Surg* 1997; 11: 521.†
17. Munoz JJ, Birkmeyer NJ, Dacey LJ, et al. Trends in rates of reexploration for hemorrhage after coronary artery bypass surgery. Northern New England Cardiovascular Disease Study Group. *Ann Thorac Surg* 1999; 68: 1321.†
18. Diener HC, Bogousslavsky J, Brass LM, Cimminiello C, Csiba L, Kaste M, Leys D, Matias-Guiu J, Rupprecht HJ. Aspirin and clopidogrel compared with clopidogrel alone after recent ischemic stroke or transient ischemic attack in high-risk patients (MATCH): randomized, double-blind, placebo-controlled trial. *Lancet*. 2004; 364: 331–337.†
19. Bhatt DL, Fox KA, Hacke W, Berger PB, Black HR, Boden WE, Cacoub P, Cohen EA, Creager MA, Easton JD, Flather MD, Haffner SM, Hamm CW, Hankey GJ, Johnston SC, Mak KH, Mas JL, Montalescot G, Pearson TA, Steg PG, Steinhubl SR, Weber MA, Brennan DM, Fabry-Ribaud L, Booth J, Topol EJ. Clopidogrel and aspirin versus aspirin alone for the prevention of atherothrombotic events. *N Engl J Med*. 2006; 354: 1706–1717.†
20. Steinhubl SR, Berger PB, Mann JT III, Fry ET, DeLago A, Wilmer C, Topol EJ. Early and sustained dual oral antiplatelet therapy following percutaneous coronary intervention: a randomized controlled trial. *JAMA*. 2002; 288: 2411–2420.†
21. Yusuf S, Zhao F, Mehta SR, Chrolavicius S, Tognoni G, Fox KK. Effects of clopidogrel in addition to aspirin in patients with acute coronary syndromes without ST-segment elevation. *N Engl J Med*. 2001; 345: 494–502.†
22. Chen ZM, Jiang LX, Chen YP, Xie JX, Pan HC, Peto R, Collins R, Liu LS. Addition of clopidogrel to aspirin in 45,852 patients with acute myocardial infarction: randomized placebo-controlled trial. *Lancet*. 2005; 366: 1607–1621.†
23. Sabatine MS, Cannon CP, Gibson CM, Lopez-Sendon JL, Montalescot G, Theroux P, Claeys MJ, Cools F, Hill KA, Skene AM, McCabe CH, Braunwald E. Addition of clopidogrel to aspirin and fibrinolytic therapy for myocardial infarction with ST-segment elevation. *N Engl J Med*. 2005; 352: 1179–1187.†
24. Kulik A, Chan V, Ruel M. Antiplatelet therapy and coronary artery bypass graft surgery: perioperative safety and efficacy. *Expert Opin Drug Saf*. 2009; 8: 169–182.†
25. Kim DH, Daskalakis C, Silvestry SC, Sheth MP, Lee AN, Adams S, Hohmann S, Medvedev S, Whellan DJ. Aspirin and clopidogrel use in the early postoperative period following on-pump and off-pump coronary artery bypass grafting. *J Thorac Cardiovasc Surg*. 2009; 138: 1377–1384.†
26. Ibrahim K, Tjomslund O, Halvorsen D, Wiseth R, Wahba A, Karevold A, Haaverstad R. Effect of clopidogrel on midterm graft patency following off-pump coronary revascularization surgery. *Heart Surg Forum*. 2006; 9: E581–E586.†
27. Gurbuz AT, Zia AA, Vuran AC, Cui H, Aytac A. Postoperative clopidogrel improves mid-term outcome after off-pump coronary artery bypass graft surgery: a prospective study. *Eur J Cardiothorac Surg*. 2006; 29: 190–195.†
28. Gao C, Ren C, Li D, Li L. Clopidogrel and aspirin versus clopidogrel alone on graft patency after coronary artery bypass grafting. *Ann Thorac Surg*. 2009; 88:59–62.†
29. Fox KA, Mehta SR, Peters R, et al. Benefits and risks of the combination of clopidogrel and aspirin in patients undergoing surgical revascularization for non-ST-elevation acute coronary syndrome: the Clopidogrel in unstable angina to prevent recurrent ischemic Events (CURE) Trial. *Circulation* 2004; 110:1202.†
30. Chu MW, Wilson SR, Novick RJ, et al. Does clopidogrel increase blood loss following coronary artery bypass surgery? *Ann Thorac Surg* 2004; 78:1536.†
31. Mehta RH, Roe MT, Mulgund J, et al. Acute clopidogrel use and outcomes in patients with non-ST-segment elevation acute coronary syndromes undergoing coronary artery bypass surgery. *J Am Coll Cardiol* 2006; 48:281.†
32. Berger JS, Frye CB, Harshaw Q, et al. Impact of clopidogrel in patients with acute coronary syndromes requiring coronary artery bypass surgery: a multicenter analysis. *J Am Coll Cardiol* 2008; 52: 1693.†
33. Kim JH, Newby LK, Clare RM, et al. Clopidogrel use and bleeding after coronary artery bypass graft surgery. *Am Heart J* 2008; 156: 886.†
34. Bavry AA, Lincoff AM. Is clopidogrel cardiovascular medicine's double-edged sword? *Circulation* 2006; 113: 1638.†
35. Ebrahimi R, Dyke C, Mehran R, et al. Outcomes following pre-operative clopidogrel administration in patients with acute coronary syndromes undergoing coronary artery bypass surgery: the ACUITY (Acute Catheterization and Urgent Intervention Triage strategy) trial. *J Am Coll Cardiol* 2009; 53: 1965.†
36. Nijjer SS, Watson G, Athanasiou T, Malik IS. Safety of clopidogrel being continued until the time of coronary artery bypass grafting in patients with acute coronary syndrome: a meta-analysis of 34 studies. *Eur Heart J* 2011; 32: 2970.†
37. Vito Antonio Mannacio¹, Luigi Di Tommaso, Anita Antignan, Vincenzo De Amicis, Carlo Vosa. Aspirin plus clopidogrel for optimal platelet inhibition following off-pump coronary artery bypass surgery: results from the CRYSSA (prevention of Coronary artery bypass occlusion after off-pump procedures) randomized study. *Coronary revascularization*. 2012; (online)†
38. Wang X, Gong X, Zhu T, Zhang Q, Zhang Y, Wang, et al. Clopidogrel improves aspirin response after off-pump coronary artery bypass surgery. *J Biomed Res*. 2014; 28 (2): 108-13.†

Comparison of lower uterine segment thickness among nulliparous pregnant women without uterine scar and pregnant women with previous cesarean section: ultrasound study

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Abstract

Objective: To compare the Lower Uterine Segment (LUS) thickness among nulliparous pregnant women without uterine scar and pregnant women with previous cesarean section (CS) using trans-abdominal ultrasound in the third trimester.

Methods: Three groups were included as 20 nulliparous women (group 1), 31 pregnant women with a single previous CS, and 27 pregnant women with two or more previous CS at gestational weeks 36 to 40. LUS thickness was measured by transabdominal ultrasound. The measured thickness was compared between the three studied groups and the cut-off value was determined by Receiver Operating Characteristic (ROC) curve. Uterine dehiscence during delivery was also compared between the three groups.

Results: Mean (\pm SD) LUS thickness in groups 1, 2, and 3 was respectively 6.05 (\pm 2.5), 5.33 (\pm 1.33), and 4.49 (\pm 1.54) mm ($P= 0.01$). Three patients (9.7%) in group 2 has dehiscence during CS. Mean (\pm SD) LUS thickness in these three patients was 4.40 (\pm 0.36) mm. In group 3, two patients (7.4%) experienced dehiscence during CS with a mean (\pm SD) LUS thickness of 1.2 (\pm 0.6) mm. Cut-off value to predict uterine dehiscence and rupture was 1.7 mm with a sensitivity of 78% and specificity of 76%

Conclusions: LUS thickness was significantly lower in pregnant mothers with previous CS and this led to dehiscence in such patients. In case of LUS thickness of < 1.7 mm, the risk of dehiscence and rupture increases.

Key words: Ultrasonography; Cesarean section; lower uterine segment; scar

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Introduction

Cesarean section (CS) has faced a growing trend worldwide. During a 25-year period (1990 to 2014), the average CS rate has grown from 6.7% to 19.1% translated to an average rise of 12.4% (1).

One of its consequences may be cesarean scar defect (CSD) (2). This may cause dysmenorrhea and post menstrual bleeding in non-pregnant uterus and uterine rupture or dehiscence during labor or cesarean operation (3). Dehiscence represents separation of low uterine segment with intact serosa in contrast to uterine rupture (4). Many investigations are conducted for early diagnosis of uterine rupture during trial of labor (TOL) by LUS thickness measurement (4-5) either by Trans abdominal or Trans vaginal Ultrasonography (5,6).

Lower uterine segment (LUS) thickness is one of the factors suggested to have prognostic value for uterine rupture during delivery in women with previous CS surgery (7). Uterine rupture, though rare, is a grave complication with significant morbidity and mortality (7). Hence, ultrasound examination of the LUS thickness in the third trimester has gained attention to predict possible uterine rupture and to implement appropriate obstetrical decisions.

Thinning of the LUS has been significantly associated with uterine scar defect at week 37 in a way that a threshold of 2.5 mm for LUS thickness was proposed as a risk factor (8). LUS is thinner in the third trimester compared to the second trimester. Ultrasound examination of LUS is a simple and non-invasive method which can provide useful information about the thickness of the LUS as well as prognostic value for uterine rupture. Integrating LUS measurement by ultrasound has been shown to result in lower risk of uterine rupture (9).

Although most studies have proposed cut-off values of about 2.5 to 3.5 mm for LUS thickness, there is controversy in the literature about the exact thickness that can be used for prognostic objectives (10).

Most previous studies have included patients with previous CS and investigated the risk of thin LUS with VBAC and uterine rupture (11, 9, 12). It should be noted that some limited studies included patients with and without history of CS (13-15). However, we think that more studies are required to precisely answer the question as to if there is a real difference regarding LUS thickness between pregnant women with and without history of CS. Therefore, we conducted the current study to compare the LUS thickness among nulliparous pregnant women without uterine scar and pregnant women with previous cesarean section using trans-abdominal ultrasound in the third trimester.

Materials and Methods

From December 2014 to Dec 2016 this cross sectional descriptive-analytic study took place in Imam Reza hospital, Kermanshah Iran. The study sample consisted of 78 pregnant women divided into three groups: 20 nulliparous women without previous CS (group 1), 27 pregnant women with a single previous CS (group 2) and 31 pregnant women with two or more previous CSs (group 3). They were recruited consecutively in their 36th to 40th week of gestation when they presented for delivery or ultrasound examination to our university obstetric department.

The sample size was calculated using previous data about mean (SD) LUS thickness of 4.7 (1.2) mm and 6.6 (2) mm in patients with and without previous CS (9). Considering $\alpha=0.05$, power= 90%, the estimated sample size was calculated as at least 20 subjects in each group (a total of 60 cases).

Inclusion criteria were singleton pregnancy, gestational age of 36 to 40 weeks, according to LMP cephalic presentation, and normal volume of amniotic fluid.

Exclusion criteria were multiple pregnancy, active labor, abnormal amniotic fluid volume, previous uterine rupture, placenta previa, fetal congenital malformations, and uterine surgical interventions other than CS.

Gestational age was estimated using the LMP and the first-trimester ultrasound report. LUS thickness was measured by trans-abdominal ultrasound (VINNO, G80) with a 3.5 MHz convex probe. The examinations were done with the bladder half-full (bladder extension at sagittal plane was 6 to 7 cm) and in the absence of uterine contractions. The LUS thickness was measured as the distance between myometrium-urinary bladder wall interface and myometrium-chorioamniotic membrane interface. The thickness was measured successively for three times by a board-certified radiologist and the mean value was documented as the final mean LUS thickness. The measurements were made in a perpendicular plane to the uterine body.

The gathered data (maternal age, gestational age, parity, and LUS thickness) were entered into a checklist. In addition, the patients were followed and the following variables were recorded at the time of delivery: Apgar scores at minutes 1 and 5, birth weight, and dehiscence at delivery.

Statistical analyses

The data were gathered and entered into the SPSS software for Windows (ver. 21.0). Descriptive indices such as frequency, percentage, mean and its standard deviation (\pm SD) were used to express data. The Kolmogorov-Smirnov test was used to determine normal distribution of continuous variables. One-way ANOVA (analysis of variance) was used to compare continuous data with normal distribution (maternal age, BMI, birth weight, and LUS thickness) and the Kruskal-Wallis for non-normally distributed variables (gestational age). In order to compare LUS thickness of

patients in groups 2 and 3 who experienced dehiscence during CS, the Student's t test was applied. Significance level was set at 0.05.

Ethics

The study protocol was approved by the Ethics Committee of our medical university. The study objectives were explained for the patients prior to participation and if agreed, written informed consent was obtained from them.

Results

A total of 78 subjects were included. There were 20 nulliparous women (25.6%) with a mean (SD) age of 26.16 (1.33) years, 31 with one previous CS (39.7%) with a mean (SD) age of 31.46 (0.96) years, and 27 subjects (34.6%) who had undergone CS at least twice and had a mean (SD) age of 32.5 (0.99) years. A significant difference existed among the groups regarding age ($P < 0.001$). Mean gestational age in groups 1, 2, and 3 was respectively 38, 37.26, and 37 weeks ($P = 0.12$).

There was no significant difference regarding mean (\pm SD) birth weight among the three groups (3,400 (\pm 327.26) gr in group 1, 3,253.35 (\pm 379.81) in group 2, and 3,247.35 (\pm 388.25) in group 3); $P = 0.3$. Mean BMI values in groups 1, 2, and 3 were respectively 29.93, 29.89, and 29.25 kg/m² ($P = 0.79$).

Mean (\pm SD) LUS thickness in groups 1, 2, and 3 was respectively 6.05 (\pm 2.5), 5.33 (\pm 1.33), and 4.49 (\pm 1.54) mm ($P = 0.01$). Range of LUS thickness in groups 1, 2, and 3 was 1 to 11 mm, 3 to 8.5 mm, and 0.8 to 7.3 mm.

Three patients (9.7%) in group 2 has dehiscence during CS. Mean (\pm SD) LUS thickness in these three patients was 4.40 (\pm 0.36) mm. In group 3, two patients (7.4%) experienced dehiscence during CS with a mean (\pm SD) LUS thickness of 1.2 (\pm 0.6) mm. There was a significant difference regarding mean LUS thickness between groups 2 and 3 who experienced dehiscence ($P = 0.03$).

Paper-thin LUS was documented in 4 patients (12.9%) of group 2 with mean (\pm SD) LUS thickness of 4 (\pm 0.81) mm. This finding was seen in more patients of group 3 (11 cases, 40.7%) with a mean (\pm SD) LUS thickness of 3.44 (\pm 0.75) mm. Uterine rupture occurred in only one patient who was in group 3 whose LUS thickness was 2.5 mm. This was not observed by ultrasound and rupture was diagnosed during CS.

Ultrasound showed dehiscence in only one patient in the second group whose LUS thickness was 3 mm. However, three more patients in group 2 were diagnosed with rupture during CS with LUS thickness values of 4, 4.5, and 4.7 mm. In group 3, two patients were diagnosed to have rupture by ultrasound. LUS thicknesses of these two patients were 0.8 and 2.5 mm. These were confirmed during CS.

Cut-off value to predict uterine dehiscence and rupture was 1.7 mm with a sensitivity of 78% and specificity of 76% (Figure 1).

Discussion

Based on the obtained findings, those who had previous CS had significantly thinner LUS. This resulted in dehiscence and rupture in these patients. On the other hand, none of the nulliparous women with thicker LUS experienced dehiscence or rupture. The neonates' birth weight did not show difference among groups, so it is highly likely that dehiscence and rupture occurred due to thinner LUS. The obtained results are in agreement with some previous reports. In a study involving 106 patients with previous CS and 68 without, LUS was thinner in the first group with a mean value of 4.58 mm than in the second group (4.8 mm) (16).

Ultrasound can detect dehiscence by showing a defective area where no myometrial layer is seen (17). In this study, in patients with more than one previous CS, US findings were in agreement with findings during CS. The cut-off value we obtained here (1.7 mm) is very close to the reported value by a previous study (1.8 mm) (18). However, some studies have proposed higher values at 2.5 to 3.5 mm among patients with previous CS (11).

Although we observed dehiscence and rupture in patients with LUS thickness of more than 3 mm, one patient who experienced rupture had a LUS thickness of 2.5 mm. A previous study showed that none of the patients with LUS thickness of < 3 mm experienced dehiscence or rupture (9). In a former meta-analysis of about 2,700 patients, sensitivity and specificity for cut-off values for LUS thickness to predict uterine defects was 76% and 92% for values between 0.6 and 2 mm (19).

Ultrasound is a non-invasive method to measure LUS thickness and its ability to predict dehiscence and rupture has been investigated previously (9, 10). One of the limitations in this study was that we were not able to gather all details about previous CS. Although CS per se is considered a risk factor for scar formation and thinner LUS, other factors can also have a role in LUS thickness. In a previous study, maternal age of more than 35 years, single layer uterine closure, and non-elective CS were factors to be associated with LUS thickness (12). All these factors can affect healing of the LUS after CS and influence the integrity of LUS.

Limitations

We intended to determine the effect of multiple previous CS on LUS thickness, and it was found that LUS was thinner in those with multiple CSs, however as the rate of dehiscence and rupture was a secondary objective; the sample size was not large enough to achieve a conclusion in this regard. Future studies with larger sample size can answer the question of the effect of multiple CSs. Another limitation is that we were not able to perform transvaginal ultrasound as some studies have demonstrated that transvaginal ultrasound provides better information about myometrial thickness than transabdominal ultrasound (20). However, this may not be regarded as a significant limitation as there is evidence of more than 90% correlation between transabdominal and transvaginal ultrasonography and a cut-off value of 2.5 mm (21).

Table 1: Apgar scores at minutes 1 and 5 in the three studied groups

	Apgar score minute 1				Apgar score minute 5			
	7	8	9	10	7	8	9	10
Group 1	1 (5%)	3 (15%)	16 (80%)	0	0	1 (5%)	3 (15%)	16 (80%)
Group 2	1 (3.2%)	3 (9.7%)	27 (87.1%)	0	0	0	4 (12.9%)	27 (87.1%)
Group 3	2 (7.4%)	3 (11.1%)	21 (77.8%)	0	0	1 (3.7%)	4 (14.8%)	21 (77.8%)

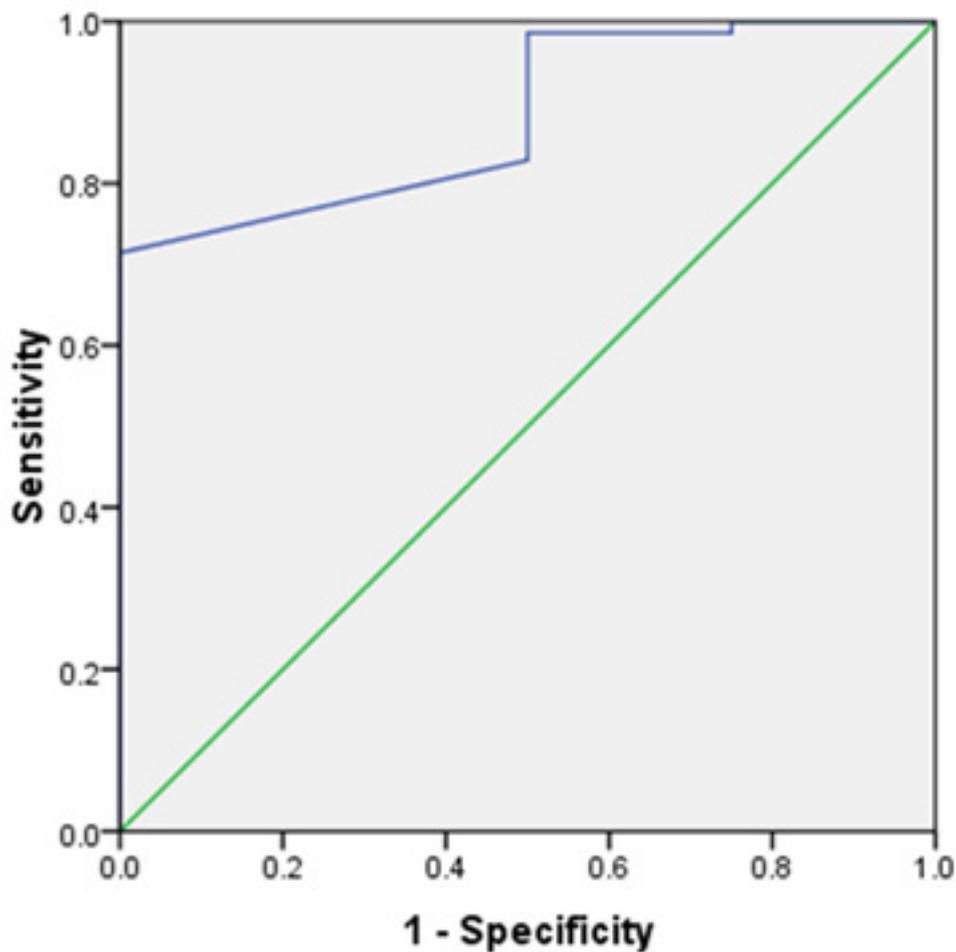
Group 1= nulliparous women without previous CS

Group 2= pregnant women with a single previous CS

Group 3= pregnant women with two or more previous CSs

Figure 1: Receiver operating curve for lower uterine segment thickness of 1.7 mm with sensitivity of 78% and specificity of 76% for predicting uterine dehiscence and rupture

ROC Curve



Diagonal segments are produced by ties.

Conclusion

LUS thickness was significantly lower in pregnant mothers with previous CS and this led to dehiscence in such patients. In case of LUS thickness of < 1.7 mm, the risk of dehiscence and rupture increases.

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References

- Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, et al. (2016). The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. *PLOS ONE* 11(2): e0148343. <https://doi.org/10.1371/journal.pone.0148343>.
- Wang CB, Chiu WW, Lee CY, Sun YL, Lin YH, Tseng CJ. Cesarean scar defect: correlation between Cesarean section number, defect size, clinical symptoms and uterine position. *Ultrasound Obstet Gynecol*. 2009 Jul;34(1):85-9. doi: 10.1002/uog.6405.
- Ushtagi P, Garepalli S. Sonographic assessment of lower uterine segment at term in women with previous cesarean delivery. *Arch Gynecol Obstet*. 2011 Mar;283(3):455-9. doi: 10.1007/s00404-010-1384-6. Epub 2010 Feb 10.
- Landon MB. Predicting uterine rupture in women undergoing trial of labor after prior cesarean delivery. *Semin Perinatol*. 2010 Aug;34(4):267-71.
- Abdel Baset F, Mohammed, Diaa A. Al-Moghazi, Mamdouh T. Hamdy, Enas M. Mohammed. *Middle East Fertility Society Journal*.2010;15:188-193.
- Cheung VY. Sonographic measurement of the lower uterine segment thickness: is it truly predictive of uterine rupture? *J Obstet Gynaecol Can*. 2008 Feb;30(2):148-51.
- Jastrow N, Chaillet N, Roberge S, Morency AM, Lacasse Y, Bujold E. Sonographic lower uterine segment thickness and risk of uterine scar defect: a systematic review. *J Obstet Gynaecol Can* 2010;32(4):321-7.
- Rozenberg P, Goffinet F, Phillippe HJ, Nisand I. Ultrasonographic measurement of lower uterine segment to assess risk of defects of scarred uterus. *Lancet* 1996;347(8997):281-4.
- Jastrow N, Demers S, Chaillet N, Girard M, Gauthier RJ, Pasquier JC, et al. Lower uterine segment thickness to prevent uterine rupture and adverse perinatal outcomes: a multicenter prospective study. *Am J Obstet Gynecol* 2016;215(5):604.e1-604.e6.
- Sharma C, Surya M, Soni A, Soni PK, Verma A, Verma S. Sonographic prediction of scar dehiscence in women with previous cesarean section. *J Obstet Gynaecol India* 2015;65(2):97-103.
- Uharcek P, Brestansky A, Ravinger J, Manova A, Zajacova M. Sonographic assessment of lower uterine segment thickness at term in women with previous cesarean delivery. *Arch Gynecol Obstet* 2015;292(3):609-12.
- Brahmalakshmy BL, Kushtagi P. Variables influencing the integrity of lower uterine segment in post-cesarean pregnancy. *Arch Gynecol Obstet* 2015;291(4):755-62.
- Barzilay E, Shay A, Lahav-Ezra H, Shina A, Perlman S, Achiron R, et al. Sonographic assessment of the lower uterine segment during active labor in women with or without a uterine scar - a prospective study. *J Matern Fetal Neonatal Med* 2017:1-4.
- Sambaziotis H, Conway C, Figueroa R, Elimian A, Garry D. Second-trimester sonographic comparison of the lower uterine segment in pregnant women with and without a previous cesarean delivery. *J Ultrasound Med* 2004;23(7):907-11; quiz 913-4.
- Fukuda M, Fukuda K, Shimizu T, Bujold E. Ultrasound Assessment of Lower Uterine Segment Thickness During Pregnancy, Labour, and the Postpartum Period. *J Obstet Gynaecol Can* 2016;38(2):134-40.
- Kushtagi P, Garepalli S. Sonographic assessment of lower uterine segment at term in women with previous cesarean delivery. *Arch Gynecol Obstet* 2011;283(3):455-9.
- Cheung VY, Constantinescu OC, Ahluwalia BS. Sonographic evaluation of the lower uterine segment in patients with previous cesarean delivery. *J Ultrasound Med* 2004;23(11):1441-7.
- Sanlorenzo O, Farina A, Pula G, Zanella M, Pedrazzi A, Martina T, et al. Sonographic evaluation of the lower uterine segment thickness in women with a single previous Cesarean section. *Minerva Ginecol* 2013;65(5):551-5.
- Kok N, Wiersma IC, Opmeer BC, de Graaf IM, Mol BW, Pajkrt E. Sonographic measurement of lower uterine segment thickness to predict uterine rupture during a trial of labor in women with previous Cesarean section: a meta-analysis. *Ultrasound Obstet Gynecol* 2013;42(2):132-9.
- Martins WP, Barra DA, Gallarreta FM, Nastro CO, Filho FM. Lower uterine segment thickness measurement in pregnant women with previous Cesarean section: reliability analysis using two- and three-dimensional transabdominal and transvaginal ultrasound. *Ultrasound Obstet Gynecol* 2009;33(3):301-6.
- Sen S, Malik S, Salhan S. Ultrasonographic evaluation of lower uterine segment thickness in patients of previous cesarean section. *Int J Gynaecol Obstet* 2004;87(3):215-9.

Effect of Environmental and Behavioral Interventions on Physiological and Behavioral Responses of Premature Neonate Candidates Admitted for Intravenous Catheter Insertion in Neonatal Intensive Care Units

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Abstract

Background and Objective: Many painful procedures including intravenous catheterization are performed in the ward without taking necessary pain-reducing measures. The present study was conducted with the aim to determine the effect of environmental and behavioral interventions on physiological and behavioral responses of preterm infants during intravenous catheterization.

Materials and Methods: In the present clinical trial, 82 infants with gestational age of 30-37 weeks were randomly divided into intervention and control groups. In the preliminary intervention stage, measures such as dimming light and noise, using eye patch and ear plugs, reducing nursing manipulations, and positioning the newborn in fetal position 30 minutes before and 30 minutes after venepuncture were performed for the intervention group, but the control group received only the routine care. Data were collected using NIPS & EDIN Scale, and analyzed in SPSS-20.

Results: No significant difference was observed between the two groups in behavioral responses to pain and stress prior to intravenous catheterization ($P>0.05$) ($P=0.13$), but these responses were significantly less in the intervention group compared to the control during and after this procedure ($P<0.05$). Moreover, no significant difference was observed between the two groups in the mean physiological responses ($P>0.05$).

Conclusion: Dimming light and noise, reducing nursing manipulations, and fetal positioning during intravenous catheterization effectively reduces neonatal pain.

Key words: Environmental and behavioral interventions, physiological and behavioral responses, intravenous catheterization, preterm infant.

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Introduction

The neonatal period includes the first moment of delivery to one month after birth. At this time, physical changes occur in the body and the infant learns how to respond to many forms of external stimuli (1). Over the past 25 years, the prevalence of premature babies has increased by 30 percent (2). More than 70% of preterm infants admitted to a special care nursery have spent time in a NICU (3). Many years ago, it was thought that babies and infants do not feel pain because of an immature nervous system or they feel less pain than adults. At present, it has been shown that the fiber nerves directing the pain stimulations are formed during embryonic development and in fact, term infants have the same sensitivity to pain as older infants and children do, and premature infants may be more sensitive to pain than full term infants (4). Pain as one of the defensive mechanisms of the body, indicates abnormal conditions in the body, so that relief from the pain is a basic requirement and the right of all people as well as the most important goals of medical science (5). The results of a study on neonates in the neonatal intensive care unit indicated that heel prick blood sampling was the most common procedure (56%), followed by endotracheal suction (26%) and intravenous cannula insertion (8%), and other procedures with fewer percentages included venepuncture, intubation, intramuscular injection, intravenous catheter insertion, peripheral artery catheter placement, infusion catheter, bladder urine sampling, cerebrospinal fluid sampling, and arterial sampling (6). Inadequately managed pain, for whatever reason, leads to long-term physiological, psychosocial and behavioral consequences, and through being aware of stressors that affect the ill child and their family as well as by designing and applying safe and effective interventions to eliminate or reduce stressors, caregivers should focus their attention on non-traumatic care (7). Stress and pain in newborns can lead to many complications such as such as increased hypoxia, elevated cortisol level (8), impaired nervous system development (9) and mental disorders and increased length of hospitalization (10). The infants' responses to pain and stress can be represented in three behavioral, physiological and nervous-chemical ways; however, the intensity and mode of occurrence of these responses depends upon factors such as maternal gestational age, severity of illness, and duration of admission to the neonatal intensive care unit. Behavioral responses to pain and stress in newborns include the following: crying, body movements, facial shrinkage, and decreased or impaired nutrition. Physiological responses to pain and stress in newborns include changes in blood pressure and heart rate, hypoxia, and increased oxygen intake (11). A high percentage of premature infants may experience problems that result in more than 20 days of stay in infants' care units (12). Since infants are unable to meet their needs by oral feeding, one of their basic care needs is to provide care by administering fluids, medicines and nutrition, and for this purpose, intravenous access is essential (13). Angiocath is considered to be the first choice in the newborn baby, which is ideally suited for short-term treatments (14). In this regard, many painful procedures, including intravenous

catheters placement, can be performed without the necessary measures to decrease pain (15). On the other hand, frequent intermittent catheterization puts the infant at risk of painful experiences, stress and the risk of infection and inability to control the pain caused by it, causing short and long-term complications for the baby's health (16), including increasing demand on the cardiovascular system, respiratory system, immunosuppression, increased intracranial pressure, which can lead to intravesical hemorrhage, long-term emotional, behavioral and learning disabilities (17). Pain in newborns can be controlled by non-pharmacological methods such as oral sucrose, non-nutritional sucking, breastfeeding, mother/infant skin-to-skin contact (kangaroo care), and music playback during the procedure (18). Furthermore, according to Stevens 2013, non-drug actions such as lactation, hugging, touching, massaging, cold and hot compress, the use of relaxation techniques, such as playing melodies, music and attention deviance, can effectively reduce the infant's pain (19, 20). Although the use of non-pharmacological measures in the control of anxiety is scientifically and culturally accepted, they have been forgotten due to lack of scientific advice in the pediatric wards (21). Nurses as the most important members in the treatment team, play an important role in maintaining the health and well-being of patients (22). Based on the evolutionary model, taking care of these babies allows the health care practitioner to identify the behavioral signs of the baby, such as when the baby needs sleep or is under stress due to manipulation and intervention and design a care plan adapted to his/her characteristics (23). Evolutionary care and support, integrates the evolutionary needs of newborns admitted to the intensive care unit for medical care. Key concepts in evolutionary care include the organized improvement of neuropsychological and physiological behaviors, modifying physical environment such as light, sound and heat to protect the sensory and vulnerable system, in a set of family-centered structures (24). Regarding the long-term hospitalization of premature infants in the neonatal intensive care unit and painful procedures such as intravenous catheter insertion which can cause pain and stress in the newborn, as well as the importance of evolutionary care in reducing pain in infants, this study was aimed to determine the effect of environmental and behavioral interventions on the physiological and behavioral responses of premature neonates during venepuncture procedure.

Method

The present study was a double-blind clinical trial (intervention and control group). The research population consisted of all preterm infants admitted to the neonatal intensive care unit of Alzahra hospital affiliated to Isfahan University of Medical Sciences. The babies who had the criteria for entering the research were identified. Having completed the consent form and being signed by parents, the biographical information form was completed using the medical records of the infant. Biographical data included infant's name, fetal age, birth weight, infant sex, 1 and 5 minutes Apgar score, type of delivery, number of

venepuncture attempts, and physiological information form including heart rate, respiratory rate and SpO₂. In order to measure pain in infants, a NIPS checklist consisting of 6 options (facial expression, crying pattern, breathing pattern, arm and leg movement and irritability type), was used. The lowest score of pain was zero and the highest score was 7. A score greater than 3 indicated pain (25). Validity and reliability of this tool were confirmed according to Dilli study (2009) (26) and Khodaie studies (2010) (28) ($r = 98$). To measure the neonatal stress and discomfort, EDIN scale containing 5 items (facial expression, body movements, sleep status, communication with the nurse, and relaxation) ranging from 0 to 15 was employed; its validity and reliability were confirmed by Debillon et al., (2001) ($\alpha = 0.92$) (28). In order to study the physiological criteria, Saadat Monitoring manufactured by Pooyandegan Rayan-Sanat, Tehran, Iran was used and the equipment was calibrated by medical equipment engineers prior to use. After confirmation by the Ethics Committee coded by IR.SBMU.RETECH.REC.1395.587 and obtaining written permission from the authorities, the researcher visited the Neonatal Intensive Care Unit of Al-Zahra Hospital in Isfahan to collect samples and by explaining the aims of the study for the authorities and staff of the neonatal intensive care unit, sampling was performed. According to the sample size formula, 41 neonates (in each group) were selected for participation in the study and were randomly assigned (colored beads) to two, intervention and control, groups.

Then, the environmental and behavioral interventions including closing the eyes of the newborns with an eye patch to decrease light, closing the ears of the newborns with ear plug to reduce the auditory stimuli and fetal positioning using the nests provided by the researcher, were implemented in the ward by the researcher. After 30 minutes of interventions, an intravenous catheter insertion was performed by an experienced nurse while interventions continued. At the same time, another nurse who had a work experience of at least one year in the neonatal ward and knowing how to fill out the measurement tools, completed the checklist 2 minutes prior to the venepuncture, during the venepuncture and 5 minutes later and 30 minutes after the venepuncture while interventions continued. Physiological data and related checklist were completed and samples were taken out after an hour of relevant study. For each studied neonate, no environmental and behavioral interventions were performed in the control group, but all the information gathering and checklists completing procedures were implemented and recorded as the first one. Data analysis was performed using SPSS version 20. In descriptive statistics, descriptive indicators such as mean and standard deviation were reported. The repeated measures analysis of variance was used to compare the two groups at different times. Also, for comparing demographic indices in two groups, independent t-test, Mann-Whitney and Chi-square test were used.

Findings

The results indicated that the mean gestational age of infants was 33.3 ± 2.2 weeks and the mean weight of newborns was 1871.2 ± 547.32 g. There was no statistically significant difference between the mean 1 and 5 minutes Apgar score and the mean number of venepuncture in the two groups [Table 1]. The fetal age of all subjects was 33 weeks.

Table 1: Frequency distribution of neonatal demographic variables in both intervention and control groups

Variable		Intervention group (n=41)	Control group (n=41)	P-value
Gestational age (week)		33.5 ± 2.2	33.1 ± 2.2	43%
Birth weight (g)		1974 ± 58.6	1768.94 ± 514.04	10%
Sex	Female	41.15 (n=17)	58.5 (n=24)	12%
	Male	58.5 (n=24)	41.5 (n = 17)	
1 minutes Apgar		6.04	6.4	37%
5 minutes Apgar		8.1	8.3	10%
Type of delivery	Cesarean section	90.2 (n = 37)	85.4 (n = 35)	50%
	Normal	9.8 (n = 4)	14.6 (n = 6)	
Number of venepuncture attempts		1.2	1.3	46%

The mean heart rate in both groups was initially found to be increased during venepuncture and then decreased over time ($P < 0.05$), but the results showed that there is no significant difference between the mean heart rate at different times between the two groups ($P > 0.05$) [Table 2]

Table 2: Comparison of mean heart rate at different times between the two groups

Time	Intervention group		Control group		P-value ¹
	Mean	Standard deviation	Mean	Standard deviation	
2 minutes before venepuncture	15.09	17.1	149.9	18.8	79%
During the venepuncture	153.5	17.8	155.7	17.9	57%
5 minutes after the venepuncture	148.3	16.5	147.3	16.3	79%
30 minutes after the venepuncture	145.2	17.2	141.8	16.4	35%
P-value	0.008		<0.001		

The mean of respiratory rate in the intervention group was 59 and in the control group 58. Although the mean respiratory rate was higher in the intervention group, the results showed that there was no statistically significant difference in the respiratory rate over time in both groups ($p > 0.05$) [Table 3]

Table 3: Comparison of mean respiratory rate at different times between the two groups

Time	Intervention group		Control group		P-value ²
	Mean	Standard deviation	Mean	Standard deviation	
2 minutes before venepuncture	59.07	7.1	58.6	4.9	75%
During the venepuncture	59.12	7.1	58.9	5.1	86%
5 minutes after the venepuncture	59.10	7.02	59.11	5.1	99%
30 minutes after the venepuncture	50.14	58.7	58.7	5.1	70%
P-value	0.93		0.51		

The mean of arterial oxygen saturation in the intervention group was 94.875 and 94.7 in the control group. Although the mean of arterial oxygen saturation in the intervention group was higher, the results showed that there was no statistically significant difference in the mean arterial oxygen saturation during venepuncture in both groups ($p > 0.05$) [Table 4].

Table 4: Comparison of mean SP02 at different times between the two groups

Time	Intervention group		Control group		P-value ³
	Mean	Standard deviation	Mean	Standard deviation	
2 minutes before venepuncture	95.1	2.3	94.7	3.5	50%
During the venepuncture	94.8	2.6	94.7	3.2	88%
5 minutes after the venepuncture	94.9	3.4	94.6	4.6	75%
30 minutes after the venepuncture	94.7	2.9	94.8	2.7	92%
P-value	0.81		0.51		

There was no statistically significant difference between the mean pain intensity score in the neonates two minutes before the venepuncture and 30 minutes after the venepuncture between the intervention and control groups ($p > 0.05$). However, the mean score of pain in the intervention group was significantly less than the control group during the venepuncture and 5 minutes after the venepuncture ($p < 0.05$) [Table 5].

Table 5: Comparison of mean pain intensity at different times between the two groups

Time	Intervention group		Control group		P-value ⁴
	Mean	Standard deviation	Mean	Standard deviation	
2 minutes before venepuncture	0.5	0.09	0.6	0.1	0.41
During the venepuncture	0.8	0.1	3.04	0.2	<0.001
5 minutes after the venepuncture	0.4	0.09	1.6	0.2	<0.001
30 minutes after the venepuncture	0.3	0.08	0.7	0.2	13%
P-value	0.12		<0.001		

There was no significant difference between the mean severity of stress and discomfort scores in the neonates two minutes before the venepuncture in two intervention and control groups ($p = 0.13$). However, the mean of stress and discomfort scores in the intervention group was significantly less than the control group during and 5 and 30 minutes after the venepuncture ($p < 0.05$) [Table 6].

Table 6: Comparison of mean stress score at different times between the two groups

Time	Intervention group		Control group		P-value ⁵
	Mean	Standard deviation	Mean	Standard deviation	
2 minutes before venepuncture	0.3	0.08	0.5	0.1	0.13
During the venepuncture	0.4	0.09	2.7	0.2	<0.001
5 minutes after the venepuncture	0.1	0.05	1.5	0.2	<0.001
30 minutes after the venepuncture	0.05	0.03	0.7	0.2	<0.001
P-value	0.10		<0.001		

Discussion

There are many studies worldwide about some of the environmental interventions (light and noise reduction), neonatal physiological and behavioral responses (heart rate, respiratory rate and arterial oxygen saturation) and various pain assessment methods, but no research has been found in relation to the effect of environmental and behavioral interventions on the physiological and behavioral responses of premature infants candidates for intravenous catheter insertion admitted to the neonatal intensive care unit. The results of this study showed that although the average heart rate in the two groups was different and was firstly increased during the venepuncture and was decreased over time, no significant difference was found between the mean heart rate at different times

between the two groups. The mean respiratory rate and arterial oxygen saturation were higher in the intervention group, but these changes did not show a statistically significant difference in any of the two groups over time. The results of this study are in line with Marilyn's study 2013 (29) in Canada as well as the study by Jacques Sizun (30) in France in 2002. The results of this study showed significant physiological changes (mean SpO₂ and heart rate) among newborns with evolutionary care before and after weighing compared with the control group, but the rate of hypoxic attacks was decreased significantly, which was in line with the results of studies by Johnston et al. (31) and Taheri et al. (32) in 2007-2008. In terms of heart rate and respiratory rate, the results of this study were consistent with the study of Taheri et al., but did not have an agreement on the amount of arterial oxygen saturation. This discrepancy can be due to the difference between

the procedures conducted in the study. The results of this study are consistent with the results of the study by Slevin et al. (33) in 2000. In addition, the results of this study are consistent with the results of the research by Abdeyazdan et al. (34) (2013), for the respiratory rate, but are inconsistent in terms of oxygenation rate. This discrepancy in outcomes can be attributed to the difference between the interventions in the study. The results of this study are not consistent with the results of the study by Celine Catelin and colleagues (35) in France in 2005. Their study showed that the implementation of environmental and behavioral interventions such as (closing baby's eyes and ears, non-nutritious diet, kangaroo and family-centered care, shaking the baby and putting the baby in a fetal position) during the weighing process resulted in significant changes in physiological criteria; it suggests that these interventions have led to a decrease in respiratory rate and a decrease in heart rate, and an increase in arterial oxygen saturation, which can be due to the low number of samples in each group (15 neonates for each group). However in the recent study, increasing the number of neonates in each group ($n = 41$) as well as different procedures in the study could be the reasons for discrepancy in the results. Regarding the embryo's position, the results of this study are not consistent with the results of the study by Reyhani et al. (2011) in Mashhad (36). This discrepancy can be attributed to individual differences, demographic characteristics of infants, providing different nursing care in infants' intensive care units and different fetal age. Moreover, the results of this study are not consistent with the results of the study by Nasimi et al. (2014) in Mashhad (37). This discrepancy can be due to the different procedures conducted in the study; these studies have been done using an invasive procedure during a venepuncture, while the study by Nasimi et al., has been conducted with normal procedures in the ward. Other results obtained from this study also showed that there was no significant difference between the mean score of pain in newborns 2 minutes before venepuncture and 30 minutes after venepuncture between the intervention and control groups ($p > 0.05$); but the mean score of pain in the intervention group was significantly less than that of the control group during and 5 minutes after the venepuncture ($p < 0.05$). Additionally, there was no significant difference between the mean stress intensity and discomfort in the neonates 2 minutes before the venepuncture between the intervention and control groups ($p = 0.13$), but the mean score of stress and discomfort in the intervention group was significantly less than that of the control group during as well as 5 and 30 minutes after the venepuncture. The results of this study were in line with the results of the study by Celine Kathleen et al. (2005). Also, the results of this study are consistent with the results of the study of Reyhani et al. (2011) implying that the fetal position decreased the pain intensity of newborns in the intervention group compared to the control group.

Conclusion

According to the results, we can conclude that there are no environmental and behavioral interventions that affect the physiological and behavioral responses of the premature infant, so further research is recommended.

Given the advantages of reducing pain and stress during the intravenous catheters insertion in premature infants, their low cost, the lack of specific equipment and the need for evolutionary care, it is recommended to use these interventions in order to decrease the pain of premature neonates during painful procedures including venepuncture.

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References

- 1- Behrman RE, Jenson HB, Kligman MR, Stanton BF, 2007. Nelson Text Book Of Pediatrics, 18th, p: 23-29.
- 2- Tramo M, Koh C, Lense M, Ness C, Krishnamoorthy K, Kagan J, et al. Effect of auditory stimulation with vocal music on neurophysiological responses to acute pain in premature infants. The Institute for Music & Brain Science. 2006. Available from: www.BrainMusic.org. Accessed 2009.
- 3- Kellam B & Bhatia J. 2008, "Sound spectral analysis in the intensive care nursery: measuring high-frequency sound", Journal of Pediatric Nursing, Vol.23, No. 4, p.317-328.
- 4- Sheikh Baha'addin Zadeh A, Dr. Rai V. NICU Nursing, Neonatal Care Unit, Boshra Publishing (Medical Science Publication Center), Collaborating with Publishing House, 2011, pp: 69-46.(Persian)
- 5- Motahedian.A. Movahedi Rad. S. Hagizadeh. A, Lake. M. Evaluation Effect of music therapy on postoperative pain in patients undergoing spinal surgery, Journal of Nursing Care, 5 (3) : 144-139.(Persian)
- 6- Whipple J 2008.The effect of music-reinforced nonnutritive sucking on state of preterm, low birthweight infants experiencing heelstick. Charleston Southern University Fall; 45(3):227-72.
- 7- Hockenberry, Marilyn J and Wilson, D 2011, Wong, essentials of pediatric nursing, 8th edn.
- 8- J Sizun, B Westrup, and the ESF Network Coordination Committee. Early developmental care for preterm neonates. Arch Dis Child Fetal Neonatal Ed 2004; 89:F384-F389.
- 9- Ruthe. Grunau, David W. Haley, Michael F. Whitfield, Joanne Weinberg, Wayne Yu, and Paul Thiessen. Altered Basal Cortisol Levels at 3, 6, 8 and 18 Months in Infants Born at Extremely Low Gestational Age. J Pediatr 2007; 150:151-6.
- 10- Marofi M, Nikobakht F, Badiie Z, Golchin M. The effect of melody on the physiological responses of heel sticks pain in neonates. Iranian Journal of Nursing and Midwifery Research | May-June 2015 | Vol. 20 | Issue 3.(Persian)
- 11- Rohrmeister K, Kretzer V, Berger A, Haiden N, Kohlhauser C, Pollak A. Pain and stress management in the Neonatal Intensive Care Unit --a national survey in Austria. Wiener Klinische Wochenschrift. 2003 ; 115(19):715-9.

- 13- Sharp, EL 2006,"Developing a nurse-directed peripherally inserted central catheter team in the neonatal intensive care unit", *Newborn and Infant Nursing Reviews*, Vol. 6, NO. 4, PP.225-229.
- 14- Sundquist Beauman, S & Swanson, A 2006. "Neonatal infusion therapy: preventing Complications and improving outcomes", *Newborn and Infant Nursing Reviews*, Vol. 6, NO. 4, PP. 193-201.
- 15- Verklan & Walden, M Terese 2010. *Pain Assessment and Management: Core curriculum for neonatal intensive care nursing*, 4 thed.PP.333.
- 16- Dalal, ss, chawla, D, Singh, J, Agarwal, RK, Deorari, AK & Paul, VK 2009. "Limb splinting for intravenous cannulae in neonates : a randomized controlled trial", *Archives of Disease Childhood. Fetal. Neonatal Edition*, Vol. 94, pp.394-396.
- 17- Byrd, PJ, Gonzales, I & Parsons, V 2009,"Exploring barriers to pain management in newborn intensive care units, a pilot survey of NICU nurses," *Advances in Neonatal Care*, Vol. 9, NO. 6, PP. 299-306.
- 18- Campbell-Yeo ML, Johnston CC, Joseph K, Feeley NL, Chambers CT, Barrington KJ 2009; Co-bedding as a Comfort measure For Twins undergoing painful procedures (CComForT Trial). Vol 9, pp.76.
- 20- Stevens B, Yamada J, Lee GY, Ohlsson A 2013. *Sucrose for analgesia in newborn infants undergoing painful procedures*. Vol 1, PP: 1069.
- 21- Modiri M, Dr. Zargham A, Marofi M. Familiarity with "The Impact of Nursing Contravention Team on the Anxiety Severity of Children Admitted to the Pediatric Department of Dezful Hospital in 2014". Master's thesis, Isfahan University of Medical Sciences.(Persian)
- 22- Potter PA, Perry AG. *Fundamentals of nursing*.2013. 6thed. St. Louis: Elsevier Health Sciences, p.315.
- 23- Moults T, Ramsay J 2008, *Children's and young people's nursing*, 2dn ed, Blackwell.UK.
- 24- *Early care guidelines for neonatal intensive care units, Future changes in infants admitted to intensive care units*, Neonatal Health Department, Spring2014.
- 25-Taddio, A, Appleton, M, Bortolussi, R, Chambers, C & Dubey, V 2010. Reducing the pain of child hood vaccination, *Journal of Canadian Medical*, Vol. 18, pp. 1-7.
- 26- Dilli D, Kukuk IG, Dallar Y.2009. Interventions to reduce pain during vaccination in infancy, *Journal of Pediatrics*, Vol. 154, pp.385-390.
- 27- Khodaei.F.Boroomandfar. KH.Abdeyazdan. Z. Marofi. M. 2010. "A comparative study of the pain caused by vaccination in cold water spraying and mother feeding during infusion in infants who referred to Ibne Sina Health Center in Isfahan." Master's thesis, Isfahan University of Medical Sciences.(Persian)
- 28- Debillon T, Zupan V, Ravault N, Magny JF, Dehan M: Development and initial validation of the EDIN scale. *Arch Dis Child Fetal Neonatal Ed* 85:F36-41, 2001.
- 29- Marilyn A, Celeste J, Céline Goulet. Tim F. Oberlander, FRCPC3, and Laurie Snider. Intervention Minimizing Preterm Infants' Exposure to NICU Light and Noise. *Clin Nurs Res* 2013 22: 337 originally published online 28 December 2012.
- 30- Jacques Sizun.Clinical, Physiologic, and Biologic Impact of Environmental and Behavioral Interventions in Neonates During a Routine Nursing Procedure. *The Journal of Pain*, Vol 6, No 12 (December), 2005: pp 791-797.
- 31- Johnston C C, Stevens B, Givvins S, Frank LS .Treatment of Pain in NICU. *Pediatr Clin North Am* 2000 47(3): 633-650.
- 32- Abbasi. A. Taheri. P. Dr. Abdeyazdan. Z. Fathi Zadeh. N. Investigating the Effectiveness of the Program Designed on the Physiological and Motor Responses of Premature Infants Admitted to the Alzahra Neonatal Intensive Care Unit. Master's thesis, Isfahan University of Medical Science.(Persian)
- 33- Slevin M, Farrington N, Duffy G, Daly L and Murphy JFA. Altering the NICU and Measuring Infants' Responses. *Acta Paediatr*. 2000; 8(9):577-81.
- 34- Abdeyazdan.Z. Taheri.P. Abbasi.E. Fathizadeh.N. Effects of a quietness program in NICU on body movements, oxygenation, and respiratory rate in preterm infants. *New Care, Journal of Nursing and Midwifery*, Birjand University of Medical Sciences, Vol 10, Issue 4, 2013.(Persian)
- 35- Céline Catelin, Sylvie Tordjman, Vincent Morin, Emmanuel Oger, and Jacques Sizun. Clinical, Physiologic, and Biologic Impact of Environmental and Behavioral Interventions in Neonates During a Routine Nursing Procedure. *The Journal of Pain*, Vol 6, No 12 (December), 2005: pp 791-797.
- 36- Reyhani T. Mohebbi T. Boskabadi H. Gholami H. Ghavami Ghanbarabadi V. The Effect of Facilitated Tucking During Venipuncture on Pain and Physiological Parameters in Preterm Infants, *Quarterly Journal of Evidence-Based Care / Vol 2, Issue 2, 2013.(Persian)*
- 37- Nasimi. F. Behnam Vashani. H. Boskabadi. H. Ketabi. D. Study the Effect of Quiet Time Protocol on Physiological Characteristics of Preterm Infants. *Quarterly Journal of Evidence-Based Care*, Vol. 5, No. 14, Spring 94.(Persian)

Effect of 8 weeks Rhythmic aerobic exercise on serum Resistin and Body Mass Index of overweight and obese women

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Abstract

Resistin plays an important role in obesity-related diseases through metabolic processes and the immune system. The purpose of this study was to evaluate the effect of 8 weeks aerobic exercise on the amount of resistin and the Body Mass Index (BMI) of overweight women. This study was carried out through semi-experimental method. To this end, 34 overweight and obese women (aged 40 ± 10 , $BMI \geq 25$) participated in the study voluntarily and were randomly divided into experimental (17) and control (17) groups. The experimental group started the 8-week exercise program performed in three sessions a week (51 minutes per session) with 66% of the maximum heart rate in the first week which gradually and along with the exercise progression increased to 86%. Training sessions began with warming up then continued with the main part of the exercise including low impact and high impact aerobic moves in the standing positions and then back to the sitting initial position. The exercise (experimental) group participated in an 8-week training program (3 sessions a week) while the control group was asked to keep their normal life during the study period as it was before. Blood samples were taken in two stages, first 48 hours before the tests and second 48 hours after the last aerobic training session. Serum resistin concentration was calculated through ELISA (enzyme-linked immunosorbent

assay) method using its special kit. The Shapiro-Wilk test was used to determine the consistency and nature of information about the subjects in the research groups. In order to analyze the data, the paired t-test was used to examine the intra-group differences and covariance test at a significant level of $P \leq 0.05$ was performed to measure the inter-group differences. SPSS21 software was also used to conduct statistical calculations. Data analysis indicated that the 8-week exercise program had a significant effect on BMI ($P=0/001$), body weight ($P=0/000$), and resistin ($P=0/001$). In addition to reducing weight and lowering BMI, aerobic exercise can also decrease resistin levels in overweight and obese women which can be indicative of a lower risk of developing metabolic and cardiovascular diseases.

Key words: aerobic exercise, resistin, body mass index, overweight

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Introduction

Today, both developed and developing countries are facing a lifestyle of low physical activity spreading among people, which is normally followed by some side effects such as increased prevalence of cardiovascular diseases and early mortality (1). In most cases, premature coronary artery diseases are directly associated with the number, severity and acquiring of atherosclerosis factors (2). Adipose tissue is not just an energy saver, but can also play an important role in insulin resistance through production and irregular discharge of a number of proteins called adipocytokines (3).

Adipocytokine resistin weighs 11.3 kDa (4) and belongs to the cysteine-rich protein (CRP) family called resistin-like molecules also known as and found in inflammatory zone-2 (FIZZ-2) (5,6). This hormone is also directly related to atherosclerosis risk (7). Increasing level of resistin occurs mainly in inflammatory conditions which stimulate and relieve proinflammatory cytokines (8). Little research has been done on the effect of physical activity on resistin levels. Jamurat et al (2006) reported that a sub-intensive aerobic exercise session in healthy and overweight men did not make any significant changes in resistin levels (9). In their study, Jones et al (2009) examined the effect of 8 months of aerobic exercise on resistin levels and lipid profile and suggested that the exercise lowered resistin levels (10). Balducci et al (2009) indicated that resistin decreases in diabetic and overweight patients after 12 months of regular physical activity (11). In another study, Juan et al (2007) revealed that 8 weeks of aerobic exercise had no significant impact on serum resistin of obese people. Resistin expression in adipocytes decreases in fasting condition and increases with nutrition. They also declared that exercise would not reduce resistin in the absence of weight loss (12). Dastani and colleagues reported that 8 weeks of aerobic exercises with an intensity of 50-60% of maximum heart rate resulted in a significant decrease in body composition and a significant increase in serum resistin of subjects (13). While Rashid Lamir et al (2013) found that 8 weeks of aerobic exercises with an intensity of 70-80% of maximum heart rate in active women led to a significant increase in resistin and a significant reduction of their body composition (14). Such contradictions in research results can be influenced by various factors such as amount of fat and its distribution, inflammatory conditions, hormones and other factors including the type and intensity of exercise. Therefore, there is a need for further research to better understand the factors controlling the synthesis and release of resistin and to clarify its role. It is also not clear whether changes made in adipose tissue by exercise can reduce resistin or not. Given little research conducted on the effect of long-term exercise on serum resistin levels and the importance of examining this new adipokine in obese people as well as increasing interest of women in aerobic exercises, this study aims to investigate the effect of 8 weeks aerobic training on resting levels of resistin and some metabolic risk factors in obese women.

Materials and Methods

After recall papers were distributed among women of the population from Zahedan, 34 overweight and obese women were selected voluntarily and through convenience sampling method on the basis of inclusion/exclusion criteria. Inclusion criteria were 1) being overweight or obese ($BMI \leq 25$), 2) a minimum age of 30 and a maximum age of 50.

Research exclusion criteria were 1) having cardiovascular diseases, severe hypertension, type 1 and 2 diabetes, thyroid-related diseases, 2) taking medicine, 3) smoking and alcohol use, 4) lack of participation in any regular exercise program during the past 6 months. Subjects had no particular diet during the research period. Because of the experimental nature of research and observance of ethical principles, the consent form for participation in the study and medical record questionnaire were completed by subjects. Then, subjects were randomly divided into two exercise (experimental) (17) and control (17) groups. The exercise group participated in an 8-week training program (3 sessions a week) while the control group was asked to follow their normal life routine during the study.

The exercise program included 8 weeks of aerobic training consisting of 3 sessions per week, 51 minutes per session which started with 66% of the maximum heart rate during the first week and gradually increased up to 86% as the training process progressed. Each training session consisted of warming up (stretching and running slowly for 11 minutes), the main part including low impact and high impact aerobic moves in standing position (41 min) and returning to the initial seated state (11 min). It should be noted that the control group did not attend any regular exercise activity during the research. The maximum heart rate of participants was calculated using Polar heart rate monitor. The exercise protocol was performed in an indoor sport hall with suitable ventilation system at the same temperature and for the same hours all 8 weeks.

Blood samples were taken from participants at the laboratory between 5 to 8 in the morning while fasting over two stages, first 48 hours before the tests and second 48 hours after the last aerobic session in order to exclude the effect of the exercise. Resistin serum concentration and lipid profile were measured using Human resistin ELISA kit made by EASTBIOPHARM Co., and Pars Azmoon kit according to the manufacturer's instructions.

The Shapiro-Wilk test was employed to determine the consistency and naturalness of information about the subjects in the research groups. In order to analyze the data, the paired t-test was used to examine the intra-group differences and covariance test at a significant level of $P \leq 0.05$ was employed to measure the inter-group differences. SPSS21 was also used to perform statistical calculations.

Findings

As shown in Table (1), there was no significant differences between subjects in terms of age, weight and body composition before the research protocol was implemented. Data analysis implied that the 8-week exercise program had a significant effect on BMI ($P=0/001$), body weight ($P=0/000$), and resistin ($P=0/001$).

Table 1. The average variables for the control and experimental groups in the pre and post-test			
Variable	phase	control group	experimental group
Height (cm)	Pre-test	161.1±5.1	160.2±6.6#
Age (year)	Pre-test	39.7±6.2	37.1±7.3
Weight (kg)	Pre-test	75.6±9.2	80.7±9.7
	Post-test	75.6±8.9	78.8±9.7#*
BMI (2kg / m)	Pre-test	29.1±2.4	31.4±2.8
	Post-test	29.1±2.3	30.7±2.9#*
resistin (mg / dl)	Pre-test	8.38±0.84	8.09±0.75
	Post-test	8.34±0.81	7.22±0.5#*
a Data are shown as mean ± standard deviation.			
# T test for dependent samples is significant (significant difference in the experimental group before and after 8 sessions) ($p < 0.05$).			
* Covariance test is significant (significant difference of groups' post-test after eliminating the effect of pre-test) ($p < 0.05$).			

Discussion and Conclusion

The results of this study revealed that BMI and serum resistin levels decreased significantly after 8 weeks of aerobic exercise. Such change made in resistin levels has also been reported in many previous studies. In one of them, 16 weeks of regular aerobic exercise at 50% to 85% VO₂MAX intensities in overweight patients with type 2 diabetes resulted in a significant reduction of resistin (15). Further, 8 months of regular aerobic exercise of overweight adolescents led to a significant reduction of resistin level (16). The results of the present research was not consistent with Persephin et al (18) and Juan et al (12). Thus, it can be stated that changes in resistin amounts result from physical exercises. Contradiction between the present article and other studies can be attributed to differences among exercise interventions (duration, type, intensity) as well as subjects. In the present study, body weight changes of the training group were directly related to resistin changes. As a matter of fact, a significant reduction of body weight after exercise was associated with a decrease in resistin level. In some other studies, it was confirmed that aerobic exercise affects weight loss and subsequent resistin decrease as factors contributing to increased insulin function and reduced insulin resistance (18,19). Youn et al (2004) reported that 2 months aerobic

exercise resulted in weight loss which caused a significant decrease in resistin (18). As can be seen, none of the studies mentioned above have been similar in terms of exercise intensity and duration.

Increasing resistin gene expression disrupts the muscle's glucose metabolism and raises glucose intolerance. Therefore, resistin may have a crucial role in insulin resistance or glucose homeostasis (20). However, the physiological effect of resistin on resistance and obesity has not been clarified yet (21). Moreover, some researchers have suggested that resistin is directly correlated with body mass index, body fat and glucose and insulin in obese people (21,22). Some previous studies have pointed to the impact of a healthy, balanced diet along with a regular exercise program on reducing blood resistin levels as well as lowering fat mass due to weight loss in response to the diet and physical training which ultimately results in a decrease in serum resistin (23). Generally speaking, long-term physical exercise seems to reduce the amount of resistin as it decreases body fat percentage and BMI. All controversies in articles may be caused by failure to significantly lose weight, people's different and uncontrollable genetic backgrounds, differences in type, intensity and duration of exercises or subjects participating in the studies.

The findings indicate that serum resistin concentrations are improved after 8 weeks of aerobic exercise which result in reduction of body mass index. Adipokine ideal levels can play an important role in preventing cardiovascular and metabolic diseases. Overall, the results of this study bring us to the conclusion that continuous aerobic exercise not only results in weight loss but also reduces serum resistin of overweight women which can help us reach a better understanding of the role of regular physical activity in lowering the risk of developing cardiovascular diseases and diabetes, although, more research is needed to be conducted on its long-term effect.

References

- Cinteza M, Pana B, Cochino E, Florescu M, Margulescu A, Florian A, et al. Prevalence and control of cardiovascular risk factors in Romania cardio-zone national study. *Mædica J Clin Med* 2007;2(4):277-88.
- Kuulasmaa K, Tunstall-Pedoe H, Dobson A, Fortmann S, Tolonen H, Sans S, et al. Estimation of contribution of changes in classic risk factors to trends in coronary-event rates across the WHO MONICA project populations. *Lancet* 2000;355(9205):675-87.
- Pittas A, Joseph N, Greenberg A. Adipocytokines and insulin resistance. *The journal of clinical endocrinology and metabolism* 2003; 89 (2):447-452.
- Aruna B, Ghosh S, Singh AK, Mande SC, Srinivas V, Chauhan R, Ehtesham NZ, et al. Human recombinant resistin protein displays a tendency to aggregate by forming intermolecular disulfide linkages. *Biochemistry* 2003;42(36):10554-10559.
- Steppan CM, Bailey ST, Bhat S, Brown EJ, Banerjee R, Wright CM, et al. The hormone resistin links obesity to diabetes. *Nature* 2001; 409: 307-312.
- Steppan CM, Brown EJ, Wright CM, Bhat S, Banerjee R, Dai CY, et al. A family of tissue-specific resistin-like molecules. *Proc Natl Acad Sci U.S.A* 2001; 98: 502-506.
- Hoefle G, Saely CH, Risch L, Koch L, Schmid F, Rein P, et al. Relationship between the adipose-tissue hormone resistin and coronary artery disease. *Clin Chim Acta* 2007;386(1-2):1-6.
- Silswal N, Singh AK, Aruna B, Mukhopadhyay S, Ghosh S, Ehtesham NZ. Human resistin stimulates the pro-inflammatory cytokines TNF-alpha and IL-12 in macrophages by NFkappa B-dependent pathway. *Biochem Biophys Res Commun* 2005; 334(4): 1092-1101.
- Jamurtas AZ, Theocharis V, Koukoulis G, Stakias N, Fatouros IG, Kouretas D, et al. The effects of acute exercise on serum. Adiponectin and resistin levels and their relation to insulin sensitivity in overweight males. *Eur J Appl Physiol* 2006;97(1):122-6.
- Jones TE, Basilio JL, Brophy PM, McCammon MR, Hickner RC. Long-term exercise training in overweight adolescents improves plasma peptide YY and resistin. *Obesity (Silver Spring)* 2009;17(6):1189-95.
- Balducci S, Zanuso S, Nicolucci A, Fernando F, Cavallo S, Cardelli P, et al. Anti-inflammatory effect of exercise training in subjects with type 2 diabetes and the metabolic syndrome is dependent on exercise modalities and independent of weight loss. *Nutr Metabol Cardiovasc Dis* 2010;20(8):608-17.
- Juan CC, Au LC, Fang VS, Kang SF, Ko YH, Kuo SF, et al. Suppressed gene expression of adipocyte resistin in an insulin-resistant rat model probably by elevated free fatty acids. *Biochem Biophys Res Commun* 2001;289(5):1328-33.
- Mostafa Dastani, Amir Rashid Lamir, Shima Rashid Lamir, Arash Saadatnia and Mahdiyeh Ebrahim-nia., The effect of eight weeks of aerobic training on hsCRP and resistin levels in menopause women, *European Journal of Experimental Biology*, 2013, 3(4):43-47.
- Amir Rashid Lamir, Samira Gholamian, Ahmad Ebrahimi Atri, Mehdi Seyyedalhoseyni, Mahmood Hesar Kooshki, Effect of Regular Aerobic Exercise on Plasma Levels of Resistin and Adiponectin in Active Young Females, *J Mazand Univ Med Sci* 2013; 23(101): 67-76 (Persian).
- Kadoglou NP, Perrea D, Iliadis F, Angelopoulou N, Liapis C, Alevizos M. Exercise Reduces Resistin and Inflammatory Cytokines in Patients With Type 2 Diabetes. *Diabetes Care*. 2007; 30 (3): 719-721.
- Shahgholi Abasi R, Soheili SH, Imanzadeh R. Serum Resistin and Insulin Resistance Responses to Long-Term Physical Exercise in the Absence of Diet Control in Middle-Aged Obese Men. *J Mazand Univ Med Sci* 2011; 21(86): 126-130 (Persian).
- Perseghin G, Burska A, Lattuada G, Alberti G, Costantino F, Ragogna F, et al. Increased serum resistin in elite endurance athlete with height insulin sensitivity. *Diabetologia* 2006;49(8):1893-900.
- Youn BS, Yu KY, Park HJ, Lee NS, Min SS, Youn MY, et al. Plasma resistin concentrations measured by enzyme linked immunosorbent assay using a newly developed monoclonal antibody are elevated in individuals with type 2 diabetes mellitus. *J Clin Endocrinol Metab* 2004;89(1):150-6.
- Azuma K, Katsukawa F, Oguchi S, Murata M, Yamazaki H, Shimada A, et al. Correlation between serum resistin level and adiposity in obese individuals. *Obes Res* 2003;11(8):997-1001.
- Jung SH, Park HS, Kim KS, Choi WH, Ahn CW, Kim BT, et al. Effect of weight loss on some serum cytokines in human obesity: increase in IL-10 after weight loss. *J Nutr Biochem* 2008; 19(6): 371-375.
- Fujinami AH, Obayashi K, Ohta T, Ichimura M, Nishimura M, Matsui H, et al. Enzyme linked immunosorbent assay for circulating human resistin: resistin concentration in normal subjects and patients with type 2 diabetes. *Clin Chim Acta* 2004; 339(1-2): 57-63.
- Pravenec M, Kazdova L, Landa V, Zidek V, Mlejnek P, Jansa P, et al. Transgenic and recombinant resistin impair skeletal muscle glucose metabolism in the spontaneously hypertensive rat. *J Biol Chem* 2003; 278(46): 45209-45215.
- Lim S, Choi SH, Jeong IK, Kim JH, Moon MK, Park KS, et al. Insulin-sensitizing effects of exercise on adiponectin and retinol binding protein-4 concentrations in young and middle-aged women. *J Clin Endocrinol Metab* 2008; 93(6): 2263-2268.

Study of changes in leptin and body mass composition with overweight and obesity following 8 weeks of Aerobic exercise

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Abstract

Introduction:

Obesity causes diseases such as coronary artery disease, mellitus diabetes, hypertension, cancer and stroke. The purpose of this study is to investigate changes in leptin and body mass composition in women with overweight and obesity after 8 weeks of aerobic exercise.

Method: The research method is semi-experimental. 34 women with overweight and obesity (40 ± 10 years, $25 \leq$ BMI) volunteered and were randomly divided into experimental (17) and control ($n = 17$) groups. The training group started an 8-week training session with three sessions per week (51 minutes for each session) with 66% maximum heart rate in the first week and gradually reached 86% of the maximum heart rate with the progression of the training program. Each training session included warming up; the main part of the exercise included the implementation of low impact and high impact aerobic movements, in the standing position and back to the original sitting position. The control group was asked to maintain their normal life during the study period. Blood samples were taken in two phases: one was taken 48 hours before the tests and the other was taken 48 hours after the last aerobic training session. Serum leptin concentration

was calculated using ELISA method using special kit. Shapiro-Wilk test was used to determine the consistency and normality of the information about the subjects in the research groups. For analyzing the data and considering the intra-group differences, the paired t-test was used and covariance test was used at the significance level of $P \leq 0.05$ to investigate the inter-group differences between the groups. SPSS 21 was used to perform statistical calculations.

Results: Data analysis showed that 8-weekly sport exercises had a significant effect on BMI ($P = 0.001$), body weight ($P = 0.000$), and leptin ($P = 0.001$).

Conclusion: Aerobic exercise can lead to weight loss and leptin. This exercise can be used as a non-invasive way to treat obesity and prevent its complications.

Key words: Leptin, Body Mass Index, Aerobic exercise, overweight

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Introduction

The global spread of obesity is seen in all age groups, so that about 250 million people who are about 7% of the world's current population are obese and two to three times of this amount are overweight (1). According to the World Health Organization reports, the number of obese and overweight people will increase by about 1.5 billion in 2015 (2). The prevalence of abdominal obesity in Brazil, France and the United States is reported to be 39.2%, 33.3% and more than 50 % respectively (3.1). Studies in different cities of Iran indicate a high prevalence of abdominal obesity in the population, so that the prevalence of abdominal obesity in these cities is as below: Tehran (over 76%), Rafsanjan (54.7%), Isfahan (84.6%), Arak (66.8%), Najaf Abad (82.2%) and Mazandaran province (82.2%) (4-6). Published statistics by the Institute for Endocrine Sciences and Metabolism of Shahid Beheshti University of Medical Sciences and Health Services showed that the prevalence of abdominal obesity increased from 67.1% to 83.1% in the years 2002- 2009 (7).

The discovery of leptin hormone in 1995 has led to advances in obesity research. Leptin that is produced by the ob-gene is a protein hormone that is composed of 129 amino acids with a molecular weight of 16 kDa (8-9). This hormone is mainly secreted from adipose tissue and plays an important role in regulating body weight and energy homeostasis in the body. Leptin is actually an alert mechanism for regulating body fat. The higher adipose tissue contains more leptin and the lower adipose tissue secretes less leptin (8).

Laboratory studies are under way to better understand the function of leptin. Part of this research is the study of the effects of exercise on leptin levels. Several studies have shown that low-fat diet and physical exercise lower blood levels of leptin (9) and since regular body exercises play a crucial role in losing weight and body fat, if leptin levels are affected by exercise, it can explain how exercise affects obesity. Also, those who exercise regularly achieve better weight stability and metabolic fitness (1). Individuals who perform a particular exercise receive better results in reducing bodily mass than those who do not follow specific exercise (11). Leptin is associated with increased energy intake, reduced appetite and increased body temperature (12). In addition, leptin density significantly correlates with body mass index (BMI) and body fat percentage (12).

Limited studies have been conducted on leptin and have reported different outcomes. Azizi (2011) examined 8 weeks of running on a treadmill with an intensity of 65-85% maximum heart rate and reported that the leptin level significantly decreased in the training group but this decrease was not significant in comparison with the control group (13). Also, Akbarpour (2013) showed that 12 weeks of aerobic training on obese men with cardiovascular disease resulted in a significant decrease in leptin in the experimental group compared to the control group (14). Hejazi et al. (2014) investigated the effects of leptin changes after 12 weeks of aerobic training, which

was performed 3 days a week and with an intensity of 75-65% of the heart rate in obese middle-aged women. They reported that exercise significantly decreased leptin (15). While Weltman et al. (2000) noted that a high intensity exercise session does not change the amount of leptin in the blood (16).

This contradiction in research results can be influenced by various factors such as the amount of fat and its distribution, inflammatory conditions, hormones and other factors, including the type and intensity of exercise. Therefore, more research is needed for understanding the mechanisms that control the synthesis and release of leptin and in clarifying the role of leptin better. Thus, according to little research done on the effect of long-term exercise on serum leptin levels and also given the importance of examining this new adipokin in obese people and the increasing interest of women in aerobic exercise, the aim of this study is to evaluate the effect of 8 weeks of aerobic exercise on resting levels of leptin and lipid profiles in overweight and obese women.

Materials and Methods

After distributing recall papers, among women, 34 overweight and obese women were selected voluntarily and available from Zahedan on the basis of entry and exit criteria. The criteria for entering the study were: having overweight and obesity of BMI $25 \geq$ and a minimum age of 30 years and a maximum age of 50 years. Also, the criteria for leaving the research were: 1- Cardiovascular disease, severe hypertension, type 1 diabetes mellitus, thyroid-related diseases, 2- drug use, 3- smoking and alcohol consumption 4. Non-participation in any regular exercise during past 6 months. Samples should not have any particular diet at the time of the research. Due to the experimental nature of research and observance of ethical issues, at first, the consent form of participation in the research and the medical records questionnaire were completed by the subjects. Then subjects were randomly divided into two groups of training (17 people) and control (17 people). The training group participated in an 8-week training program and three sessions per week, while the control group was asked to maintain their normal life during the study period.

Aerobic exercise program included 8 weeks aerobic training, 3 sessions per week and 51 minutes each session which started with 66% of maximum heart rate in the first week and gradually increased to 86% of the heart rate with the progression of the exercise program. Each training session consisted of warming up (stretching and running slowly for 11 minutes), the main part of the exercise included performing low impact and high-impact aerobic exercises (41 minutes) in standing position and returning to the initial state in sitting position (11 minutes). It should be noted that the control group did not attend any regular exercise at any time during the course of the research. The maximum heart rate of the participants in the exercise group was calculated using the Pollard pulse rate. The exercise protocol was carried out in a covered

sports hall with proper ventilation and it was the same for all 8 weeks in terms of temperature and operating hours.

Blood samples were taken in two stages; one was taken 48 hours before the tests, and the other was taken 48 hours after the last aerobic exercise session in order to eliminate the effect of the exercise, in the laboratory between 5:00 and 8:00 am in a fasting state. Serum vaspin concentration and lipid profile was measured by ELISA method and by using a special kit of Human LEPTIN of EASTBIOPHARM Company according to the manufacturer's instructions.

Shapiro-Wilk's test was used to determine the consistency and normality of the information about the subjects of the research groups. In order to analyze the data, paired t-test was used to examine the intra-group differences and to examine the inter-group differences between research groups; covariance test was used at a significant level of $P \leq 0.05$. SPSS 21 was used to perform statistical calculations.

Findings

As shown in Table 1, subjects prior to the implementation of the research protocol did not have a significant difference in terms of age, weight, and composition of the body. Data analysis showed that 8-weekly exercise had a significant effect on BMI ($P = 0.001$), body weight ($P = 0/000$), and leptin ($P = 0.001$).

Discussion and Conclusion

The main findings of this study were significant reduction in serum leptin levels, BMI and weight in overweight and obese women. Exercise affects body composition, and carbohydrate and fat metabolism, and considering the effect of exercise activities on serum leptin levels in energy balance and glucose hemostasis is very important (17). In confirmation of the present study findings, some studies that have improved body readiness level and have an effect on body composition, have reduced serum leptin (17). The size of the fat mass, especially the abdominal fat, plays a special role in the level of blood leptin. In obese people, elevation of adipose tissue was associated with increased leptin and increased leptin resistance (18). Of course, in one study, after 60 minutes of aerobic exercise activity for 7 weeks, no significant changes were observed in the level of blood leptin (19). These findings were also observed in some other studies with different intensity and duration of training periods (16). Fataru et al. (2005) stated that 6 months of exercise (3 days a week) would lead to a decrease in blood leptin, with a decrease in subcutaneous fat and body mass index which is consistent with the findings of the present study (18). Gökbel et al. (2009) indicated that leptin concentration significantly decreased in long term aerobic exercise immediately after exercise, 24 and 48 hours after exercise, and in the re-initiation period (20). Ozaki et al. (2010) also investigated the effect of moderate-intensity aerobic exercise (50% maximal oxygen consumption) and diet for 1 week on fat loss and leptin concentrations in non-active obese and non-obese middle-aged women. Based on these findings,

Table 1: The average variables for the control and experimental groups in the pre and post-test

Variable	Phase	control group	experimental group
Height (cm)	Pre-test	161.1±5.1	160.2±6.6#
Age (year)	Pre-test	39.7±6.2	37.1±7.3
Weight (kg)	Pre-test	75.6±9.2	80.7±9.7
	Post-test	75.6±8.9	78.8±9.7#*
BMI (2kg / m)	Pre-test	29.1±2.4	31.4±2.8
	Post-test	29.1±2.3	30.7±2.9#*
LEPTIN (ng / dl)	Pre-test	35.83±26.74	39.53±23.89
	Post-test	38.12±25.25	28.21±21.65#*

g Data are shown as mean ± standard deviation.

T test for dependent samples is significant (significant difference in the experimental group before and after 8 sessions) ($p < 0.05$).

* Covariance test is significant (significant difference of groups' post-test after eliminating the effect of pre-test) ($p < 0.05$).

leptin concentration and fat mass decreased, but decrease in leptin concentration was not associated with weight loss (21).

However, Bijeh et al. (2009) did not observe significant changes in body weight and body mass index and blood leptin levels by assessing the effect of 6 months of aerobic exercise on leptin level, cortisol, and insulin and serum glucose in middle-aged lean women. The reason for this discrepancy can be that regular physical activity is likely to reduce serum leptin levels if the body mass index is significantly reduced. In short, the decrease in the concentration of leptin after long-term exercises (more than 60 minutes) is assigned to overnight leptin reduction and hormonal changes due to exercise. Extremely long exercises that caused significant energy imbalances, affected periodical and overnight Leptin changes (23). However, the effect of leptin on physical activity and the return period to initial state is still unknown. There are some reasons that can explain the changes in the response of leptin to physical activity (17). Regarding all of these, it is believed that sports activities can play an important role in energy costs due to several factors, including weight loss and also can alter the response of leptin by effecting on hormonal concentrations (insulin, cortisol, growth hormone, catecholamine and testosterone) and metabolites (free fatty acid, lactic acid, and triglycerides)

Type of exercise is one of the factors influencing leptin levels (24). Long-term mild activity that consumes 900 kilocalories of energy, reduces leptin concentrations for more than 2 days after exercise, while high-intensity short-term activity with an energy consumption of approximately 200 kcal has no effect on leptin levels (24). The amount of exercise activity can have a significant effect on the levels of leptin, which is independent of the effects of exercise on the balance of energy (24).

The duration of exercise is one of the important determinants of severity that affects serum leptin levels (25). Studies are focused on leptin and short-term exercise. The severity and duration of activity, the nutritional status of individuals, the hours of blood transfusion, the caloric imbalance, the cyclic rhythm of leptin, etc. are affected by exercise (26). People with higher degrees of obesity are more resistant against leptin and therefore require a greater amount of exercise to affect leptin levels (27).

In summary, it may be said that aerobic exercise may be a suitable treatment for obesity and additionally if diet is used properly, it will have more beneficial effects.

References

1. Speiser PW, Rudolf MC, Anhalt H, Hubner CC. On Behalf of the Obesity Consensus Working Group: Childhood Obesity. *J Clin Endoc Metab* 2005;90:1871-7.
2. Kumanyika SK, Obarzanek E, Stettler N, Bell R, Field AE, Fortmann SP et al. Population based prevention of obesity the need for comprehensive promotion of healthful eating, physical activity, and energy balance. A scientific statement from American Heart Association council on epidemiology and prevention, interdisciplinary committee for prevention. *Circulation* 2008;118:428-64.
3. Holcomb CA, Heim DL, Loughin TM. Physical activity minimizes the association of body fatness with abdominal obesity in white, premenopausal women. Results from the Third National Health and Nutrition Examination Survey. *J Am Diet Assoc* 2004; 104:1859-62.
4. Heshmat R, Fakhrzadeh H, Pourebrahim R, Nouri M, Pajouhi M. [Evaluation of Obesity and Overweight and Their Changes Pattern Among 25-64 Aged Inhabitants of Tehran University of Medical Sciences Population LAB Region.] *Iran J Diabetes Lipid Disord* 2004; 3: 63-70. (Persian)
5. Akhavan Tabib A, Kelishadie R, Sadri G, Sabet B, Toluei HR, Baghaei A. [Heathy heart program: obesity in center of Iran.] *J Qazvin Uni Med Sci* 2003; 7: 27-35. (Persian)
6. Hajian K, Hiedari B. [Prevalence of abdominal obesity in a population aged 20 to 70 years in urban Mazandaran (Northern Iran, 2004).] *J Clin Endoc Metab* 2006; 8:147-56. (Persian)
7. Azizi F, Azadbakht L, Mirmiran P. [Trends in overweight, obesity, and central obesity among adults residing in district 13 of Tehran: Tehran Lipid and Glucose Study.] *J Facult Med* 2005; 29: 129-32. (Persian).
8. Pérusse L, Collier G, Gagnon J, Leon AS, Rao D, Skinner JS, et al. Acute and chronic effects of exercise on leptin levels in humans. *Journal of Applied Physiology* 1997;83(1):5-10.
9. Kraemer RR, Durand RJ, Acevedo EO, Johnson LG, Synovitz LB, Kraemer GR, et al. Effects of high-intensity exercise on leptin and testosterone concentrations in well-trained males. *Endocrine*. 2003;21(3):261-5.
10. Volpe SL, Kobusingye H, Bailur S, Stanek E. Effect of diet and exercise on body composition, energy intake and leptin levels in overweight women and men. *J Am Coll Nutr* 2008; 27(2): 195-208.
11. Olive JL, Miller GD. Differential effects of maximal- and moderate-intensity runs on plasma leptin in healthy trained subjects. *Nutrition* 2001; 17(5): 365-9.
12. Irandoost KH, Rahmaninia F, Mohebi H, Mirzaei B, Hassannia S. The effect of aerobic exercise on plasma gherlin and leptin in obese and with normal weight women. *Olympic J* 2010; 18(2): 87-99.
13. Masoumeh Azizi, The effect of 8-weeks aerobic exercise training on serum LEPTIN in un-trained females. *Procedia Social and Behavioral Sciences* 15 (2011) 1630–1634.
14. M. Akbarpour, THE EFFECT OF AEROBIC TRAINING ON SERUM ADIPONECTIN AND LEPTIN LEVELS AND INFLAMMATORY MARKERS OF CORONARY HEART DISEASE IN OBESE MEN, *Biol Sport*. 2013 Mar; 30(1): 21–27.

15. Mahmdou Hejazi, Zeynab Nezamdoost, Dr Marziyeh Saghebjo, Effect of Twelve Weeks of Aerobic Training on Serum Levels of Leptin, Vaspin and Some Indicators of Oxidative Stress in Obese Middle-Aged Women, *IJEM*, Volume 16, Number 2 (7-2014).
16. Weltman A., Pritzlaff C.J., Wideman L., Considine R.V., Fryburg D.A., Gutgesell M.E., Hartman M.L., Veldhuis J.D. (2000) Intensity of acute exercise does not affect serum leptin concentrations in young men. *Medicine and Science in Sports and Exercise* 32, 1556-1561.
17. Bouassida A, Zalleg D, Bouassida S, Zaouali M, Feki Y, Zbidi A, et al. Leptin, its implication in physical exercise and training: a short review. *J Sports Sci Med* 2006; 5: 172-81.
18. Fatouros IG, Tournis S, Leontsini D, Jamutas A, Sxina M, Thomakos P. Leptin and adiponectin responses in overweight inactive elderly following resistance training and detraining are intensity related. *J Clin Endocrinol Metab* 2005; 90: 5970-7.
19. Essig D, Alderson N, Ferguson M, Burtoli W, Durstine L. Delayed effects of exercise on the plasma leptin concentration. *Metabolism* 2000; 49: 395-9.
20. Gökbel H, Baltacı AK, Uçok K, Okudan N, Mogulkoç R. Changes in serum leptin levels in strenuous exercise and its relation to zinc deficiency in rats. *Biol Trace Elem Res* 2005; 106: 47-52.
21. Okazaki T, Himeno H, Nanri H, Ogata M, Ikeda M. Effects of mild aerobic exercise and a mild hypocaloric diet on plasma leptin in sedentary women. *Clin Exp Pharmacol Physiol* 1999; 26: 415-20.
22. Bijeh N, Moazami M, Ahmadi A, Samadpour F, Zabihi A. Effect of 6 months of aerobic exercise training on serum leptin, cortisol, insulin and glucose levels in thin middle-aged women. *Olympic* 2012; 16: 53-9.
23. Fisher JS, Van Pelt RE, Zinder O, Landt M, Kohrt WM. Acute exercise effect on post absorptive serum leptin. *J Appl Physiol* (1985) 2001; 91: 680-6.
24. Lowndes J, Zoeller RF, Caplan JD, Kyriazis GA, Moyna NM, Seip RL, et al. Leptin responses to long-term cardiorespiratory exercise training without concomitant weight loss: A prospective study. *J Sports Med Phys Fitness*. 2008;48:391-7.
25. Kohrt WM, Landt M, Birge SJ. Serum leptin levels are reduced in response to exercise training, but not hormone replacement therapy, in older women. *J Clin Endocrinol Metab*. 1996;81:3980-5.
26. Hayase H, Nomura S, Abe T, Isawa T. Relation between fat distribution and several plasma adipocytokines after exercise training in premenopausal and postmenopausal women. *J Physiol Anthropol Appl Human Sci*. 2002;21:105-13.
27. Hickey MS, Considine RV, Israel RG, Mahar TL, Mc Cammon MR, Tyndall GL, et al. Leptin is related to body fat content in male distance runners. *Am J Physiol Endocrinol Metab*. 1996;271:938-40.

A reassessment of factor structure of the Short Form Health Survey (SF-36): A comparative approach

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Abstract

Background: The factor structure of the Short Form Health Survey (SF-36) and its application to older people in Eastern countries has been the focus of limited research. Four theoretical and experimental factor structures of the SF-36 were tested and compared here to establish a best-fitting model for Iranian older people.

Methods: A sample of 391 participants (60 -89 years) years completed the Farsi SF-36. A confirmatory factor analysis assessed the fit and viability of the measurement model. Three theoretical and experimental factor structures of the SF-36 were tested using an exploratory principal component analysis to explore the factor solution of the Farsi SF-36.

Results: An exploratory factor analysis identified the two factor solutions (mental and physical) to be the same as the original US model, but the fit indices of the confirmatory factor analysis identified the two and three factor model (mental, physical and well-being) to be the same, making the latter more extensive for use with older people.

Conclusion: This study provides strong evidence that the Farsi SF-36 has the potential to measure well-being status of older people. Such an application is valid if the Vitality items are modified and new items are developed for the Well-being scale.

Key words: Health-related Quality of life, SF-36 Health Survey, older people

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Introduction

Measuring the health-related quality of life (HRQoL) of older people has a prominent position in gerontology as an indicator for monitoring the health status of older people. Such monitoring forms the basis for clinical decision-making and gerontological research outcome measures. Of the several instruments for measuring HRQoL, the SF-36 Health Survey is the most widely used in health research (1, 2) and is known for its high standard of reliability and validity (3, 4). The SF-36 accentuates both the practical and popular nature of the questionnaire in both clinical settings and research. It has been translated into more than 20 languages (5). The SF-36 enables policy makers to involve older people in the decision making process about their own health with a comprehensive and short instrument (6). The SF-36 has been validated for use with older people, and its applicability and suitability are well documented (5, 7, 8), however, those versions cannot be used with Iranian older people due to lack of cultural equivalence. The existing Farsi SF-36 was translated and validated for use with a general population by an Iranian research team in 2005 (9), however, it cannot be used directly with older people owing to their heterogeneous characteristics (6). There is also controversy surrounding the numbers of underlying dimensions measured by the different translated versions of the SF-36 compared to the US original SF-36 (10-12). Therefore, a lack of a validated Farsi SF-36 for elderly and controversy about the number of underlying dimensions measured by the SF-36 highlights the need to conduct a new psychometric analysis. This study therefore investigates the factor structure of the Farsi version of the SF-36 in older people to find the best-fitting model for this population group.

Materials and Methods

Participants: A sample of 391 participants (197 males and 194 females) were randomly selected from the Tehran population and they ranged in age from 60-89 years. The inclusion criteria were age of 60 years and older and Abbreviated Mental test score ≥ 6 . The participants were asked to complete the existing Farsi SF-36 (9), which took about 20 to 30 minutes. The research was approved by the ethics committee of the University of Social Welfare and Rehabilitation Sciences (USWR.REC.7393.162). Written informed consent was obtained from each participant.

Instrument: The SF-36 Health Survey assesses the mental and physical health status and eight generic health concepts including Physical Functioning (PF); Role Limitations due to Physical Health (RP); Bodily Pain (BP); General Health (GH); Vitality (VI); Social Functioning (SF); Role limitations due to Emotional Health (RE); and Mental Health (MH). The SF-36 has been translated for use in several countries as part of the International Quality of Life Assessment (IQOLA) project (13, 14), and has demonstrated reliability and validity across diverse samples (3). The scale has 36 items that are scored and summed according to a standardized protocol and expressed as a score on a 0-100 scale for each of the eight health concepts,

with higher scores representing a better health status (15). The psychometric testing of the Farsi version of the SF-36 followed the procedure of the IQOLA project (9).

Data analysis: A confirmatory factor analysis (CFA) on item level using LISREL 8.4 (16) assessed the fit and viability of the measurement model which was developed from the original US model (Model A) (15). The chi-square is significant at $p < .001$ and an adequate fit is < 2.0 . The point estimate of the Root Mean Square Error of Approximation (RMSEA) and its upper confidence limit for the model should be less than 0.05 (17). The Expected Cross-Validation Index (ECVI) (6.08) should be less than the ECVI for the saturated model (3.23) (16). An exploratory principal component analysis (PCA) was conducted to explore the factor solution of the Farsi SF-36 with both orthogonal and oblique rotations. In this analysis, three alternative models were examined to explore the best fitting model. These alternative models were a one-factor model (model B), a three uncorrelated second order factor model (model C) based on previous studies (18), and an eight-factor model (model D). Figure 1 depicts the diagrams of these three models and the original US model (Model A).

Results

Descriptive statistics

The test of normality of the scale scores showed the distributions of all study variables were negatively skewed (Table 1 - page 48). The α -coefficient for the VI was very low, and for SF and MH were also below typically accepted standards. On the other hand, Cronbach's alphas were adequate for the GH, RE, Physical and Mental components, and good for PF, RP and BP.

Testing the Sf-36 factor structure models

Four CFA models were developed to confirm the factor structure of the Farsi SF-36. This analysis served to confirm Model A, the original US model, which is a comparison of the three competing models to ascertain the extent to which the Model A would demonstrate a superior fit to the three alternative models. Model B, the first alternative model was developed to load all items of the SF-36 into a single health construct. The second alternative model, Model C, was developed from the three summary measures of mental, physical and well-being (18). The third alternative model, Model D was then developed based on the eight factors that aggregate the 36 items of the SF-36.

Table 2 indicates how Model B provided a poor fit for this data. While a significantly greater model fit was observed for the original US model (Model A) and Model C and D; when compared to Model B, these models did not demonstrate a good fit. Models A, C and D however, provided a relatively better fit for this data. An examination of model fit statistics revealed mixed evidence for a good model fit, where all models did not fit the data well, according to the significant chi-square index, the relative chi-square per degrees of freedom and the RMSEA (17). The Comparative goodness-of-fit and Incremental Fit Index for these models indicated more than an acceptable model fit, but the goodness-of-fit

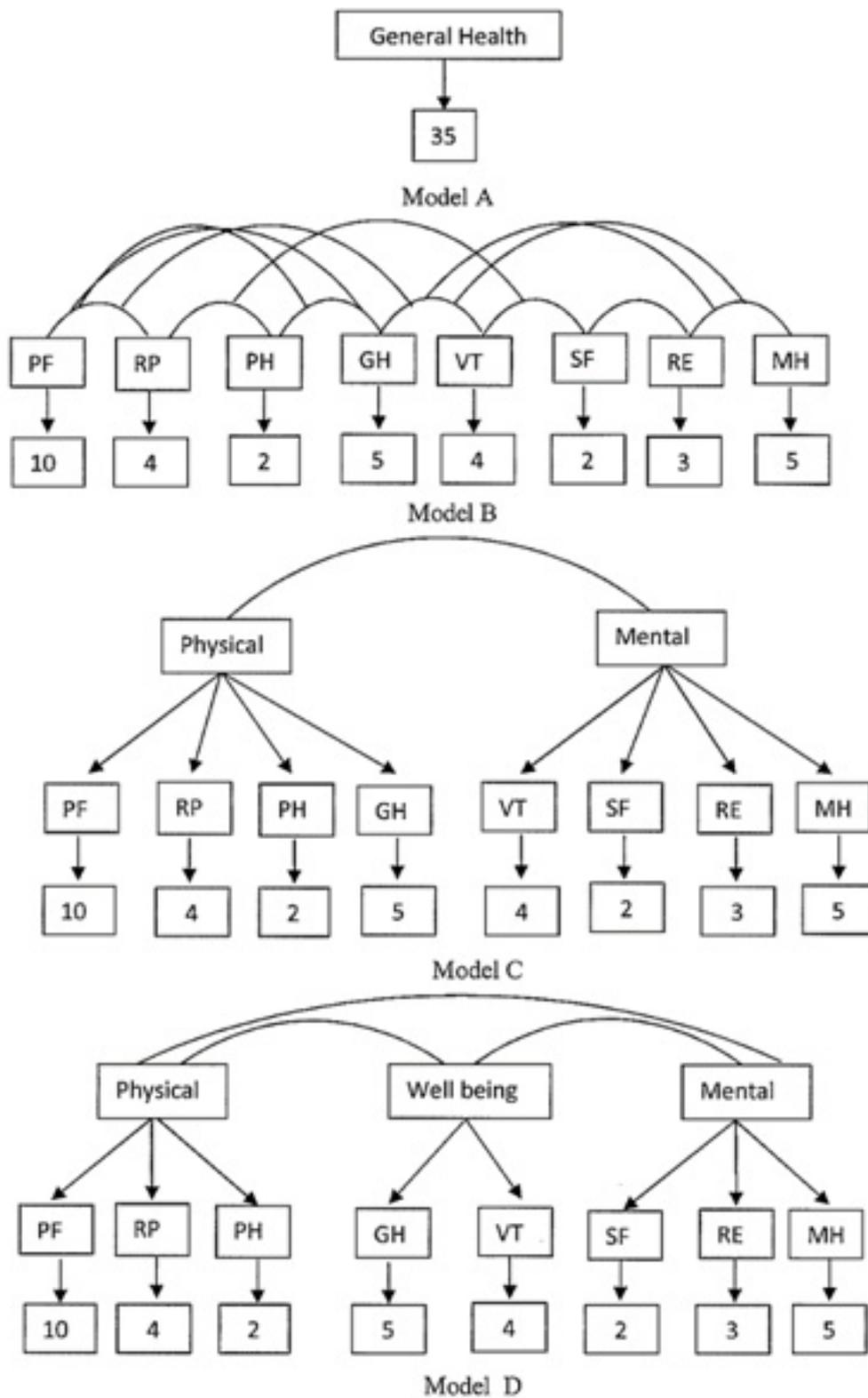


Figure 1. Path diagrams of models A, B and C of the Farsi version of the SF-36. Note: Digits in the squares indicate the number of items (indicators). Model A, included the items belonging to one general factor (General Health), Model B included items placed in the eight factors (first order CFA), Model C included a hierarchy CFA model based on the original taxonomy model.

Table 1: Descriptive statistics and K-S test of normality of Persian SF-36 scales and summary measures

subscales	M	SD	skewness	kurtosis	D	α
PF	60.3	31.6	-0.48	-1.00	2.5**	0.93
RP	62.1	39.5	-0.49	-1.30	4.9**	0.83
BP	65.3	30.0	-0.32	-1.07	3.7**	0.83
GH	58.9	21.7	-0.29	-0.39	1.28	0.74
VI	59.1	22.7	-0.13	-0.43	1.27	0.49
SF	76.4	28.4	-0.84	-0.05	4.4**	0.69
RE	63.9	39.5	-0.58	-1.22	5.4**	0.76
MH	66.4	21.0	-0.47	-0.20	1.5*	0.66
Physical	61.3	21.7	-0.28	-0.74	1.3	0.74
Mental	64.8	19.7	-0.47	-0.15	1.4*	0.72

PF= Physical Functioning; RP=Role-Physical; BP= Bodily Pain; GH= General Health; VT= Vitality; SF= Social Functioning; RE = Role-Emotion; MH= Mental Health. D = Kolmogorov-Smirnov (K-S) test of normality. α = Cronbach's alpha. ** P<.01. * P<.05

Table 2: Factor loadings, communalities, mean and standard deviation of the scales of the Farsi SF-36, a two factor solution

Scales	Factors				Descriptive statistics		
	varimax		oblimin		M	SD	h ²
	I	II	I	II			
PF	.818		.774		60.3	31.6	.67
BP	.700		.768		65.4	30.1	.51
GH	.666		.755		58.9	21.7	.59
RP	.563	.433	.663		62.0	39.4	.61
RE		.807		.796	63.9	39.5	.66
SF		.751		.774	76.5	28.4	.60
MH		.587		.668	66.4	21.0	.49
VT	.441	.478		.581	63.9	22.7	.42
Eigenvalue	3.59	.945					
% variance	44.8	11.8					

Note. PF= Physical Functioning; BP= Bodily Pain; GH= General Health; RP=Role-Physical; RE = Role-Emotion; SF= Social Functioning, MH= Mental Health, VT= Vitality. h²= communality. Factor loading > 0.4. Cross-loaded items > 0.4.

Table 3: The Goodness of Fit Statistics for CFA Modified and non-modified two and three summary measure models of the Farsi SF-36

Models	χ ²	df	χ ² / df	CFI	GFI	IFI	NFI	RMSEA	ECVI
First order									
Model A	1258.09**	551	2.33	0.91	0.75	0.91	0.89	0.057	3.63
Model B	5057.67**	560	9.03	0.80	0.45	0.80	0.78	0.144	6.08
Model C	1256.99**	548	2.29	0.91	0.75	0.91	0.89	0.058	3.64
Model D	1189.72**	531	2.24	0.92	0.76	0.92	0.90	0.056	3.56
Higher order									
Before modification									
Model E	99.2 **	19	5.2	0.95	0.94	0.94	0.94	0.104	0.34
Model F	103.5**	17	6.08	0.95	0.94	0.95	0.94	0.114	0.36
After modification									
Model E	22.3	15	1.48	0.99	0.98	0.99	0.99	0.035	0.16
Model F	24.7*	13	1.90	0.99	0.98	0.99	0.97	0.048	0.18

Note: Model E included the two summary measures belonging to one general factor (General Health), Model F included the three summary measures belonging to one general factor. CFI= Comparative Fit Index, GFI=goodness of fit index, IFI= Incremental Fit Index, NFI= Non Normed Fit Index, RMSEA=Root Mean Square Error of Approximation, ECVI= Expected Cross-Validation Index. ECVI for Saturated Model=0.18. * P< .05. ** P< .001

index for all models was lower than the accepted criteria. Together, these results indicate that the one-factor did not provide a good fit for this data, and the three alternative models are the same, according to the fit indices, along with the fact that their overall fit did not appear across the model fit statistics.

Farsi SF-36 factor structure

A PCA of the eight scales was conducted with orthogonal and oblique rotations to explore the factor structure of the Farsi SF-36, and examined how many summary measures were extracted in the Iranian sample. The analyses demonstrated only one factor could be extracted with eigenvalues over 1, and explained a total 44.9% of the observed variance. The original two measure model and the three uncorrelated measures were examined and a scree-test was used to determine the proper number of several factor solutions. The results showed that the first two factors represented the main sources of variance in the data matrix. However, the results of orthogonal rotation

showed the RP and VT had high factor loadings on both factors. The results of the oblimin rotation however, showed a better fit of the original measurement model because all eight scales were loaded on their appropriate factors. The explained variance by the two extracted factors was 56.7%.

The communality, eigenvalues and factor loadings for the two rotated factors using varimax and oblimin rotations are presented in Table 2, along with the means, and standard deviations for all eight scales.

One General Health Construct

A second order CFA based on the two factor model (Physical and Mental) and three factor model of adding General well-being, were loaded on a one general health conception. This analysis served to explore and determine the underlying latent trait in the SF-36 that aggregates the summary measures (Figure 2).

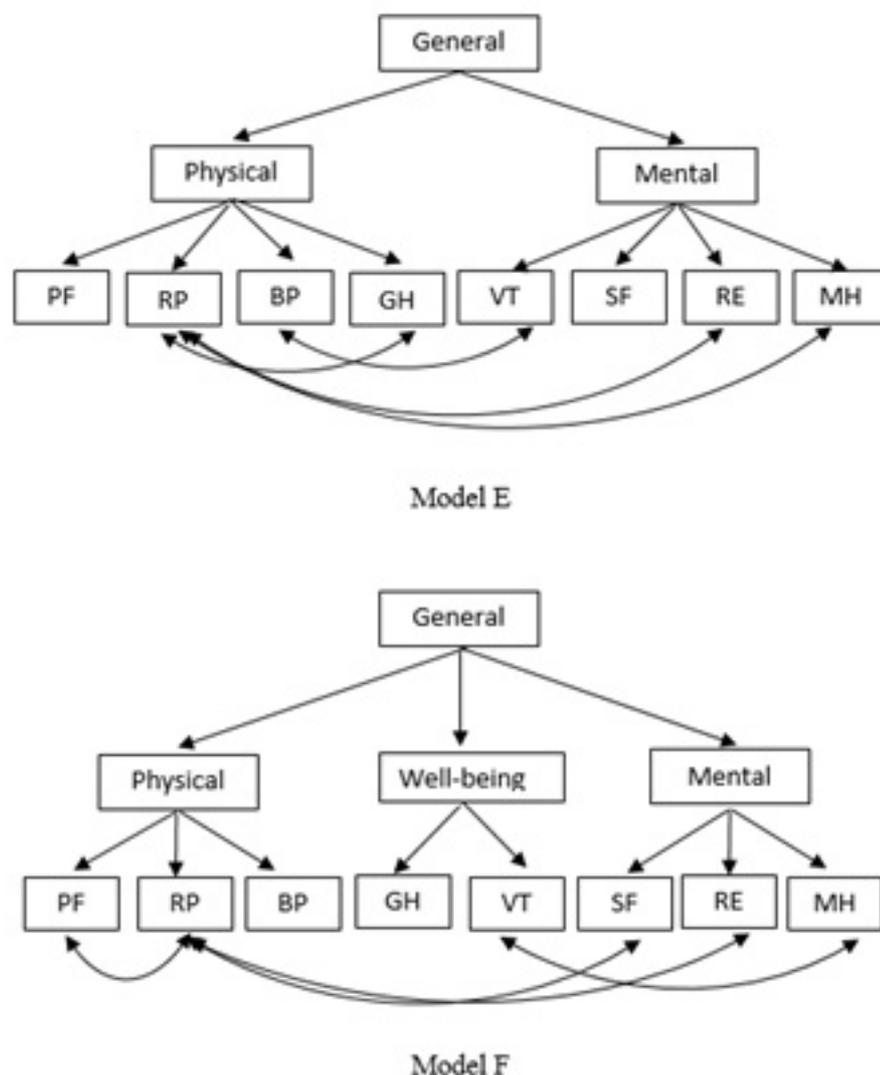


Figure 2. Path diagrams of second order models E and F of the Farsi SF-36. Model E, included the two summary measures belonging to one general factor (General Health), Model F included the three summary measures belonging to one general factor.

Table 3 shows how both models demonstrated an unacceptable fit of this data. The chi squares were significant, with $p < 0.05$, the relative chi square was higher than 2, and the RMSEA was higher than 0.05. However, the goodness-of-fit indices were acceptable and confirmed both models.

One strategy to improve the models was to add the correlations between error terms which were specified, when suggested, by high modification indices and also where theoretically defensible. In Model E, the correlated errors were added between RP items with GH, RE and MH, and between BP-VT. The correlated errors in model F were added between RP with PF, SF, RE and MH, and between MH-VT.

An examination of model fit statistics after modification revealed adequate evidence for a good model fit. However, in both Models the RP scale had the most error correlations with the other scales, but its pattern of correlated errors was different in the models with GH, RE and MH.

Discussion

A comparative approach of the four factor structure models of the Farsi SF-36 is presented here.

Reliability

The Farsi SF-36 has shown satisfactory internal consistency reliability (>0.70) for all scales except VI, SF and MH, with the highest value for PF. Similar results for PF have been reported in other countries (19), which was to be expected given that the PF scale has 10 out of 36 items of the SF-36. Such a large set of items increases the Cronbach's α . A very low level of reliability has been reported for the VI in other studies conducted with older people and patients with chronic conditions (10, 20, 21). These studies determined whether the lower internal consistency of the SF-36 VI scale is due to the study sample or cultural differences, although this deserves further study. Additionally, the SF scale results for internal consistency reliability were below typically accepted standards in Iran, suggesting a decreased level of social abilities among older adults. The fact that this result was consistent with other studies (20, 22, 23) raises the question of whether only two items in the SF scale are adequate for assessing the concept of social functioning.

Factor structure

Both two and three factor models were confirmed in the Iranian older population, however a comparison of fit indices of the higher order two-factor model, Model A with two summary measures, and higher order three factor model, Model C with three summary measures, showed no differences between these two models. This result means it is not possible to show a preferred model for older people and suggests the instrument is conceptually equivalent with the original version. However, the question remains about how many scales could be extracted from this concept.

The two factor model (mental and physical) showed PF, RP, BP and GH to correlate with physical health component, and VI, SF, RE and MH with the mental dimension. These results are consistent with other studies (24) and confirmed the Farsi SF-36 met the psychometric standards hypothesized in the original model for physical and mental health.

The results of testing a three second-order factor are consistent with the study conducted across nine countries (18) and Rasch validation of the SF-36 in Korea (25). The third factor, interpreted as general well-being in this data, was the result of clustering GH and VI, as in previous studies, and interpreted for the mixed factor content of GH and VI (18). The reason for such a divergent result between this and previous studies that confirmed the two-factor model may be the difference in separating elderly from the other population group. Another reason for this divergent result is that cultural value plays a role in the interpretation of these differences, and Iranian elderly tend to put more value on items related to well-being compared with other population groups and cultures. Therefore the three-factor model makes the Farsi SF-36 particularly suitable for use in the assessment of older adults, as its three scales make it more appropriate to identify older people's needs. Such data makes it possible to develop a more precise care plan, since the more factors indicate a greater identification of the underlying latent trait. The three factor model will be achieved by slightly modifying items on the VI scale and developing items for the well-being scale.

Conclusion

The Farsi SF-36 has generally accepted psychometric properties, with empirical evidence showing that developing items for the third factor of well-being would be useful to better identify the needs of older people.

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References

1. Myint PK, Smith RD, Luben RN, Surtees PG, Wainwright NW, Wareham NJ, et al. Lifestyle behaviours and quality-adjusted life years in middle and older age. *Age and ageing*. 2011;40(5):589-95.
2. Garratt A, Schmidt L, Mackintosh A, Fitzpatrick R. Quality of life measurement: bibliographic study of patient assessed health outcome measures. *BMJ*. 2002;324(7351):1417.
3. McHorney CA, Ware JE, Jr., Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Medical care*. 1993;31(3):247-63.

4. McHorney CA, Ware JE, Jr., Lu JF, Sherbourne CD. The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Medical care*. 1994;32(1):40-66.
5. Mishra GD, Gale CR, Sayer AA, Cooper C, Dennison EM, Whalley LJ, et al. How useful are the SF-36 sub-scales in older people? Mokken scaling of data from the HALCYon programme. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*. 2011;20(7):1005-10.
6. Hazard WR. *principles of geriatric medicine and gerontology*1999. 1387-403 p.
7. Bohannon RW, DePasquale L. Physical Functioning Scale of the Short-Form (SF) 36: Internal Consistency and Validity With Older Adults. *Journal of Geriatric Physical Therapy*. 2010;33(1):16-8.
8. Hill R, Mansour E, Valentijn S, Jolles J, van Boxtel M. The SF-36 as a precursory measure of adaptive functioning in normal aging: the Maastricht Aging Study. *Aging Clin Exp Res*. 2010;22(5-6):433-9.
9. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*. 2005;14(3):875-82.
10. Meng H, King-Kallimanis B, Gum A, Wamsley B. Measurement bias of the SF-36 Health Survey in older adults with chronic conditions. *Quality of Life Research*. 2013;22(9):2359-69.
11. Bartsch L, Butterworth P, Byles J, Mitchell P, Shaw J, Anstey K. Examining the SF-36 in an older population: analysis of data and presentation of Australian adult reference scores from the Dynamic Analyses to Optimise Ageing project. *Quality of Life Research*. 2011;20(8):1227-36.
12. Ngo-Metzger Q, Sorkin DH, Mangione CM, Gandek B, Hays RD. Evaluating the SF-36 Health Survey in Older Vietnamese Americans. *Journal of Aging and Health*. 2008.
13. Ware JE, Jr., Keller SD, Gandek B, Brazier JE, Sullivan M. Evaluating translations of health status questionnaires. Methods from the IQOLA project. *International Quality of Life Assessment. International journal of technology assessment in health care*. 1995;11(3):525-51.
14. Ware JE, Jr., Gandek B. Overview of the SF-36 Health Survey and the International Quality of Life Assessment Project. *Journal of clinical epidemiology*. 1998;51(11):903-12.
15. Ware JE KM, Keller SD. . SF-36 Physical and Mental Component Summary Measures—A User's Manual.: Boston: The Health Institute; 1994.
16. Joreskog KG SD. *Scientific Software* 2003. Available from: <http://www.ssicentral.com/>.
17. Hu L-t, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999;6(1):1-55.
18. Keller SD, Ware JE, Jr., Bentler PM, Aaronson NK, Alonso J, Apolone G, et al. Use of structural equation modeling to test the construct validity of the SF-36 Health Survey in ten countries: results from the IQOLA Project. *International Quality of Life Assessment. Journal of clinical epidemiology*. 1998;51(11):1179-88.
19. Ware JE, Jr., Gandek B, Kosinski M, Aaronson NK, Apolone G, Brazier J, et al. The equivalence of SF-36 summary health scores estimated using standard and country-specific algorithms in 10 countries: results from the IQOLA Project. *International Quality of Life Assessment. Journal of clinical epidemiology*. 1998;51(11):1167-70.
20. ten Klooster PM, Vonkeman HE, Taal E, Siemons L, Hendriks L, de Jong AJ, et al. Performance of the Dutch SF-36 version as a measure of health-related quality of life in patients with rheumatoid arthritis. *Health and quality of life outcomes*. 2013;11:77.
21. Hoopman R, Terwee CB, Deville W, Knol DL, Aaronson NK. Evaluation of the psychometric properties of the SF-36 health survey for use among Turkish and Moroccan ethnic minority populations in the Netherlands. *Quality of life research : international journal of quality of life aspects of treatment, care and rehabilitation*. 2009;18(6):753-64.
22. Pappa E, Kontodimopoulos N, Niakas D. Validating and norming of the Greek SF-36 Health Survey. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*. 2005;14(5):1433-8.
23. Tseng HM, Lu JF, Gandek B. Cultural issues in using the SF-36 Health Survey in Asia: results from Taiwan. *Health and quality of life outcomes*. 2003;1:72.
24. Ware JE, Jr., Kosinski M, Gandek B, Aaronson NK, Apolone G, Bech P, et al. The factor structure of the SF-36 Health Survey in 10 countries: results from the IQOLA Project. *International Quality of Life Assessment. Journal of clinical epidemiology*. 1998;51(11):1159-65.
25. Kim SH, So WY. Rasch validation of the SF-36 for assessing the health status of Korean older adults. *Journal of physical therapy science*. 2015;27(3):601-6.

Evaluation of seizures in pregnant women in Kerman – Iran

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Abstract

Background and Objectives: Seizure occurs in 0.5 to 1 percent of pregnant women, marking it as one of the most prevalent serious neurological disorders during pregnancy. Women with epilepsy face a greater threat of pregnancy-related adverse effects. The effects of seizures on pregnancy and its maternal and fetal adverse effects, necessitates the study of the prevalence of pregnancy seizures, an issue ignored by previous studies conducted elsewhere.

Method: The present study is a descriptive-analytical research. The participants included women who were referred to delivery centers of Kerman (public and private) for childbirth. The exclusion criteria were lack of cooperation and consent of the subjects for sitting the interviews.

Results: Among 3,807 admitted pregnant women, 38 cases (1%) experienced epileptic seizures. Among the participants, 2,125 subjects were admitted to public hospitals and 1,682 subjects to private hospitals. Seizure recurrence remained constant in 58% of the subjects, declined in 21%, and increased in 21%. Twenty four cases (0.63%) had a history of prepartum seizures, and 14 cases (0.36%) experienced seizures for the first time during pregnancy,

with eclampsia as the most prevalent cause. Patients of public hospitals had lower levels of education and higher number of epileptic seizures. Average age of patients experiencing epileptic seizures was lower than the non-epileptic cases. Seizures were observed more in nulliparous women.

Conclusion: More than 6 in 1,000 pregnant women suffer from epilepsy. Eclampsia is the most prevalent cause. Epileptic seizures increased in 21% of epileptic pregnant women, and declined in 21% of the cases.

Key words: seizure, epilepsy, pregnant, women

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Introduction

Seizures are referred to as the temporary physiological dysfunction of the brain, caused by the abnormal electrical and excessive discharges of cortical neurons, and epilepsy is the unexplained and unpredicted repetition of these attacks (1-5). Women with epilepsy have a greater risk of pregnancy-related adverse effects, including cesarean section, preeclampsia, pregnancy-induced hypertension, premature contraction or preterm labor, postpartum hemorrhage, possibility of stillbirth, and microcephaly. Also, the risks of mental retardation and afebrile seizures are increased in their infants. Women with a history of pregnancy seizures are likely to experience epilepsy-related adverse effects including status epilepticus and increased epileptic seizures(2). Uncontrolled seizures influence maternal and fetal mortality and morbidity; tonic-clonic seizures may cause physical damage and spontaneous abortion, hypoxia, acidosis and intracranial hemorrhage in the fetus; also fetal bradycardia is possible during the mother's seizures. The etiology of epileptic seizures in pregnancy includes epilepsy of unknown cause, metabolic disorders, eclampsia, and cerebral sinus thrombosis, causing pregnancy and postpartum seizures(4, 6). Convulsion has occurred in 0.5-1% of pregnancies(6), and is one of the serious neurologic disorders in pregnancy(6, 7).

The most seizure attacks occurred in pregnant women, who have history of epilepsy (8). Another study reported that 1 in 200 pregnant women experience seizures(9).

In India, 2.5 million women are experiencing epileptic seizures, almost half of whom are at fertility ages(10). Approximately 1 million women of childbearing age in the US have seizures, among whom 20 thousand go into labor, annually (2, 3, 5, 11, 12).

In a study in the US on 45,000 pregnant women, 21.4 cases per 1,000 experienced non-eclamptic seizures before or during pregnancy(13). According to estimations, 3 to 5 per 1,000 births are related to women with epilepsy (2-4, 11). Another study in Europe in 2013 reported that pregnant women comprise 25% of all epileptic patients, and most of these women are in need of long-term treatment with antiepileptic medications. Approximately 3-4 out of 1,000 pregnancies concern women with a history of epilepsy and 1,800-2,400 infants in Britain are born from women with a history of epilepsy, most of whom have healthy pregnancies and infants(14).

In a study conducted between 1991 and 2000, at Vali-Asr Hospital of Tehran, out of 21,000 admitted pregnant women, 53 cases had epilepsy; of these women 55% were nulliparous and 45% multiparous; 82% had generalized epilepsy, 14% had focal epilepsy, and 4% had other types. Epileptic attacks occurred in 34 subjects (70%) during pregnancy, and the number of attacks increased in only 15 patients (32%) and declined in 9.5%; 58.6% showed no change in the seizure frequency. This study reported that the cause of increased epileptic attacks may be due to the discontinuation of anti-epileptic medication and

pharmacokinetic and pharmacodynamic changes of these medications during pregnancy, as well as, insomnia, stress, and anxiety(10).

Epilepsy control must be handled adequately, as the frequency of attacks increases in 15 to 30% of the cases. Pregnancy-induced changes of anti-epileptic medications are an important agent(8). Due to reduced serum albumin and increased hepatic and renal clearance, and increased emission volume, the blood level of anti-epileptic drugs falls in pregnancy(5, 8, 9, 12, 15), causing a changed control over epileptic attacks in pregnancy. Mother's compliance and acceptance is, however, another important factor (5, 15).

Fear of fetal adverse effects is a major issue in pregnancy(12), accompanied by nausea, vomiting, and sleep disorders of the mother(5). One of the most important predicting factors is the frequency of attacks in pregnancy versus the prepartum years(16).

It has been shown that sex hormones influence epileptic attacks, as estrogen decreases the threshold and progesterone increases it (17).

Nearly 1-2% of epileptic women are afflicted with status epilepticus, which causes mortality and morbidity (8).

Preconception counseling, as well as monitoring drug serum levels, along with drug and dosage adjustment and providing patients with the information concerning their condition, can help decrease the frequency of attacks (10).

Seizures are the most probable to appear in the first trimester of pregnancy and upon delivery (8). Women with epilepsy who take anti-epileptic medication are likely to suffer from an increased risk of caesarean and hemorrhage(12, 15), yet they do not experience increased risks of premature contractions or preterm labor (2).

The present study was conducted in Kerman with regard to the prevalence of pregnancy seizures and the importance of maternal and fetal adverse effects. It must be mentioned that this study is unprecedented.

Methods

Patient Selection: This is a descriptive-analytical study. The participants of the study were women who referred to delivery centers of Kerman (public and private) for childbirth. The patients were initially asked to fill out the questionnaire developed by Placencia et al (18-20) for screening, containing 9 questions. The questionnaires were also filled out by Hospital obstetricians, who had previously received the required instructions by a faculty member neurologist. Suspicious patients were then examined by a neurologist who filled out the complementary questionnaire, including the demographic information of the patients, type of epilepsy, history of attacks, pregnancy condition, and medications used. A case of epilepsy was approved by

biography, physical examination, and EEG. Patients with approved epilepsy underwent lab assessment, imaging, including MRI and CT scan, and lumbar puncture, when required.

Sample Size: Considering the fact that epileptic seizures are reported in 1% of all pregnancies (5), the population of this study comprised 3,800 cases admitted to public and private hospitals. Since the cause of epileptic seizures in pregnant women is different from others and certain types are more frequent in pregnancy, there was no need for a control group in this study.

Exclusion Criteria: The exclusion criteria were non-cooperation and dissent of participants to sit interviews or non-cooperation of the pertaining delivery wards for patient screening. This study aimed at determining different types of epilepsy (idiopathic or secondary causes) and comparing epilepsy prevalence in nulliparous and multiparous cases, as well as between pregnant women with a prepartum history of seizures and those with no such history. Furthermore, the comparison of epilepsy prevalence according to the admitted medical centers (public and private hospitals) was determined according to the prevalence of seizures in pregnant women in each subgroup and a 95% confidence interval.

Comparison of prevalence between the groups was carried out using chi-squared test.

This study was conducted subsequent to obtaining informed consent from the participants, describing the study objectives, and commitment to confidentiality.

Results

Out of 3,807 pregnant women who were admitted to public and private hospitals of Kerman in the last month of their pregnancy, 38 subjects had experienced seizures (epileptic patients and those who experienced their first seizure in pregnancy).

Age of the epileptic patients ranged from 15 to 33 years, at an average age of 28.1274 ± 5.60687 years; it was 24.6579 ± 6.14267 for patients with epileptic attacks, and 28.1624 ± 5.60687 for patients without epileptic attacks, and the difference was significant ($P=0.001$).

In this study, out of the epileptic patients (a total of 24), 11 cases were nulliparous and 13 cases were multiparous, while, a total of 901 subjects were nulliparous which was statistically significant ($P=0.017$). A number of 2,125 cases were admitted to public hospitals and 1682 cases referred to private hospitals. Incidence of epileptic attacks was 31 cases among those admitted to public hospitals and 7 cases in those admitted to private ones, indicating a significant difference ($P=0.001$). (Table 1).

The degree of gravidity and parity in customers of public and private hospitals showed no significant difference, yet, the number of abortions was higher in public hospitals,

which was statistically significant ($P=0.000$) (Table 2). In total pregnant women these factors are shown in Table 3.

Customers of public hospitals had lower education. The majority of pregnant women in the public sector were less than high school diploma, while, those in the private sector held higher than high school diploma ($P=0.000$). In this study, the number of epileptic patients was directly associated with the education level ($P=0.039$) (Table 1).

Out of the 24 epileptic pregnant women, 20 were receiving antiepileptic medications (7 patients under multi-drug and 13 under single-drug regimens); in 2 cases, the epilepsy was controlled and the treatment was discontinued, and 2 cases did not take any medications. Epileptic attacks were controlled in only 1 case among the multi-drug patients (14%), while they were controlled in 7 cases of single-drug patients (54%), approximately 4 times the former group. The frequency of attacks declined in 5 cases (21%), increased in 5 (21%), and was unchanged in 14 cases (58%).

Of all the patients experiencing epileptic attacks, 24 had epilepsy (2 cases did not take antiepileptic medications, and 2 cases had discontinued their medications after controlling seizures), 13 cases were non-epileptic, and 1 case had a childhood experience of febrile seizure.

Among the 38 cases with a history of seizures, 27 cases had seizures in pregnancy, and the remaining 11 cases experienced no seizures in pregnancy; 6 cases had a family history of epilepsy.

Out of the 27 women with pregnancy seizures, 13 subjects had a history of epilepsy, 14 cases experienced seizures for the first time in their pregnancy; out of 11 cases without pregnancy seizures, 8 cases had a history of active epilepsy. In 2 cases who did not take medications seizures were controlled, and one subject had an experience of seizures once in her childhood.

Out of 22 patients with active epilepsy, 5 had a history of myoclonic jerk. No myoclonic jerks were reported in patients with inactive epilepsy or those experiencing their first epileptic seizure in pregnancy. Table 4 portrays the occurrence of different epileptic seizures in the patients.

Concerning the anti-epileptic medications, 13 cases received single-drug regimens (9 cases, carbamazepine; 2 cases, lamotrigine; 2 cases sodium valproate) and 7 subjects received multi-drug regimens (3 cases, lamotrigine and levetiracetam; 2 cases, carbamazepine and levetiracetam; 1 case, carbamazepine and sodium valproate; and 1 case, carbamazepine and lamotrigine).

In the present study, 11 cases had a history of abortion, out of whom: 2 cases experienced cerebral vein thrombosis (CVT) and 1 case, eclampsia; 6 cases had epilepsy; 1 case had Arterio-Venous Malformation (AVM), and 1 case had brain tumor. Six cases of epileptic patients (24%) had a history of abortion, whereas, in the remaining participants, 654 cases out of the total 3783 subjects (17%) had

Table 1: Relationship between education and seizures in pregnant women and type of Hospital

	Hospital	School + Illiterate	High School	Bachelor	Ms +PhD
Patients	Public	864	744	463	54
	Private	183	834	621	44
Seizures	No	1032	1562	1079	96
	Had	15	16	5	2

Table 2: Relationship between seizures and some pregnancy factors

		Sum of Squares	Df	Mean Square	F	Sig (ANOVA)
Gravidity	Between Groups	375.190	3	125.063	78.839	0.000
	Within Groups	6032.727	3803	1.586		
	Total	6407.917	3806			
Parity	Between Groups	339.484	3	113.161	82.263	0.000
	Within Groups	5231.442	3803	1.376		
	Total	5570.926	3806			
Abortion	Between Groups	0.862	3	0.287	2.007	0.111
	Within Groups	544.064	3803	0.143		
	Total	544.926	3806			

Pregnant women with higher levels of education referred to private hospitals more (P=0.000). The pregnant women with higher education have lower number of seizures (P=0.039).

Table 3: Relationship between hospital type and a number of pregnancy factors

	Hospital	N	Mean	Std. Deviation	P value
Gravidity	Public	2125	2.6551	1.37611	0.009
	Private	1682	2.5470	1.18858	
Parity	Public	2125	1.4442	1.29802	0.030
	Private	1682	1.3603	1.08685	
Abortion	Public	2125	1.1934	0.39507	0.000
	Private	1682	1.1474	0.35465	

Table 4: Type of seizures in pregnant women

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tonic-Clonic	29	0.8	76.3	76.3
	F-G	1	0.0	2.6	78.9
	JME	5	0.1	13.2	92.1
	CPS	3	0.1	7.9	100.0
	Total	38	1.0	100.0	

experienced abortion previously, indicating a significant difference (P=0.000). However, there was no significant difference in the increasing cases of epilepsy, between pregnant women with a history of abortion and those without such history (P=0.111). The difference between the degree of parity and gravidity between women with a history of seizures and those with no such history was significant (P=0.000) (Table 2).

For all the patients with a history of eclampsia, epilepsy, CVT, and AVM, pregnancy seizures occurred in the third

trimester (except for a CVT patient who experienced seizures in month 2).

Only 5 out of 38 patients (total number of patients) had an abnormal neurological examination. According to the assessments, one case was caused by AVM, another case by trauma, one case by tumor; epilepsy in 24 cases had unknown etiology. The causes of the first seizures in pregnancy were eclampsia in 7 cases, CVT in 3 cases, and TTP in one case.

Discussion

In the present study, out of 3807 pregnant women admitted to public and private hospitals of Kerman in their last month of pregnancy, 38 cases (0.99%) had previously experienced seizures. In a study in the US on 45,000 pregnant women, 21.4 cases per 1,000 individuals were reported to have experienced one non-eclamptic seizure during or before pregnancy(2). A study in Vali Asr Hospital of Tehran in 1991, reported 53 epileptic cases out of 21,000 pregnant women (10). The pregnancy prevalence in a study in London was reported at 0.5-1%(21). An Australian study claimed that 1 in 200 pregnant women experience seizures(9).

Out of the total referrals, 2,125 women were admitted to public hospitals and 1,682 women to private hospitals. The prevalence of seizures was significantly higher in patients admitted to public hospitals ($P=0.001$). Numerous causes to this are: 1. Patients with complications who are more likely to experience epilepsy are referred to teaching (public) hospitals; 2. Patients of private hospitals hold higher education, and according to studies in this region, lower education is directly associated with epilepsy; 3. This study, also, revealed that the education of pregnant women in public hospitals is lower, matching the results of a 2011 study in Kerman, indicating a significant relationship between the incidence of epilepsy and lower education (22). Our findings were similar to those of studies conducted in the US (23), Vietnam(24), and Turkey (25), whereas, in his study in England, Ferro did not report such a relationship (26); 4. The degrees of gravidity and parity and abortion were higher in women admitted to public hospitals, which was only significant in case of abortion. This may have caused the increased cases of epilepsy. In a study in Canada on 55 pregnant epileptic women, it was shown that 42 patients were admitted to public hospitals and 13 patients to private hospitals ($P=0.000$)(27).

The age of our patients ranged from 15 to 33. A study in Italy reported the age of pregnant epileptic patients between 15.3 to 43.5 years (28). The decline of the childbearing age in Iran is due to cultural conditions. The important point is that, the age of pregnant women who experienced epileptic seizures was lower than others (24.6 years compared to 28.1 years). A study in England reported the average age of epileptic patients (38 cases) at between 11 to 35 years old(29). The average age of pregnant epileptic patients is reported at 26 years by a study in India (30). This difference arises from cultural conditions.

Among our patients, 6 cases (15.7%) had a family history of epilepsy. This rate was 17.3% in a study in Kerman, in 2011 (22), close to that of a study in Turkey (14.3%) (25).

In the present study, out of patients with a history of epilepsy (24 cases), 14 patients were multiparous and 10 cases were nulliparous, while, 901 women in the population were nulliparous, indicating a significant difference. A study in England reported 12 multiparous cases out of 38 participants ($P=0.000$) (29).

In another study in Canada it was observed that there was no relationship between worsening of seizures and the childbearing age, parity, toxemia, a family history of epilepsy, age at onset of pregnancy, and preterm labor. The most prevalent complication in these patients was preterm labor, occurring in 8 cases (27). Preterm labor or abortion occurred in 2.6% of the cases in a study in Italy (28).

Eleven of our cases had a history of abortion, out of whom: 2 cases experienced cerebral vein thrombosis (CVT) and 1 case, eclampsia; 6 cases had epilepsy; 1 case with Arterio-Venous Malformation (AVM), and 1 case had brain tumor. Six cases of the epileptic patients (24%) had a history of abortion, while, for the remaining participants, 654 cases, out of the total 3,783 subjects (17%), had previously experienced abortion, indicating a significant difference ($P=0.000$). However, there was no significant difference in the increasing cases of epilepsy, between pregnant women with a history of abortion and those without such history ($P=0.111$).

We observed a significant difference between the degree of parity and gravidity between women with and without a history of seizures ($P=0.000$).

None of our patients experienced status epilepticus, similar to our Canadian counterpart(27), however, in the study conducted in Italy, 21 in 3,415 cases (0.6%) experienced status epilepticus (28). The similar study in England reported 2 patients with status epilepticus (29).

For all the patients with a history of eclampsia, epilepsy, CVT, and AVM, pregnancy seizures occurred in the third trimester (except for a CVT patient who experienced seizures in month 2).

The study in Canada reported exacerbation of seizures in early pregnancy (27). In England, the frequency of seizures rose in the first trimester (29). Yet, in Italy, the exacerbation of seizures was reported in 29% of the cases in the first trimester, 32% in the second trimester, and 39% in the third trimester (28). We have no explanations for these differences.

Seizure recurrence declined in 5 cases (20%), increased in 5 cases (20%), and remained constant in 15 cases 60% of the subjects.

In the study in England, out of 38 pregnant women with idiopathic epilepsy, seizure frequency increased in 45.2% of the cases, remained constant in 50%, and declined in 4.8% (29).

Pregnancy in the Australian study increased seizures in 24% of the subjects(9). Seizure frequency in the Canadian study increased in 9, remained constant in 14, declined in 4 cases, and was unknown for the rest of the participants(27). In Italy, pregnancy seizures were unchanged in 70.5% of the patients, declined in 12%, and increased in 15.8% of the cases(28). A study in Texas reported a decline in

the seizures in 3-24% of the subjects, a rise in 14-32%, and no change in 54-80%; 84-92% of the patients were pregnancy seizure-free (4). The study in England showed a positive relationship between seizure frequency 2 years prior to pregnancy and increased seizure frequency in pregnancy. Patients with more than one seizure per month had a higher risk of exacerbation in pregnancy, whereas, only 25% of patients whose seizure intervals were more than 9 months, got worse (29). However, in the study by Rosciszewka and Grudzinska in 1970, no such relationship was reported (21). The average age of onset of seizures was lower in subjects with increased seizures (12.6 years old), compared to others (16.1 years), yet, insignificant. In the present study we did not take into account the age of onset of seizures in epileptic patients.

Of the referrals, 24 cases were epileptic, with 2 cases of inactive and 22 cases of active epilepsy.

Out of the total patients, 25 cases had a history of seizures, while 13 cases did not. Out of the total 27 cases with pregnancy epilepsy, 13 cases already had epilepsy, while, 14 cases experienced seizures for the first time in their pregnancy. From the 38 cases with previous seizures, 11 cases had no pregnancy seizures (8 cases had a history of active epilepsy, 2 cases had non active epilepsy, and one of the patients experienced epilepsy in her childhood only once), while, 27 cases experienced pregnancy seizures. Six cases had a family history of epilepsy and 32 had no such history. In a study in England, in 1974, 59 pregnant women had epilepsy, out of whom, 14 cases experienced their first seizure in pregnancy: 7 cases in the first pregnancy, 5 cases in the second, one case in the third, and one case in the fifth pregnancy. Thirty eight cases had idiopathic and 7 cases had symptomatic epilepsy. In the former group, 11 cases had only one seizure, and 5 cases had recurrent seizures in the very same pregnancy (29). In Canada, 55 patients had a history of idiopathic epilepsy and 3 cases experienced seizures in pregnancy for the first time (27).

In our study seizure attacks occurred in the third trimester of pregnancy, except one case of CVT, which was in the second month. The 8 cases who were epileptic had frequent attacks.

The England study reported pregnancy seizures from week 10 to 38, one case upon delivery, and one case postpartum (29). None of the cases had seizures upon delivery in the study in Australia and seizure recurrence in pregnancy was reported between 30 and 50% in the study conducted in Australia (9).

Incidence of different seizures is portrayed in Table 4 (76.3% GTC (generalized tonic-clonic), 13.2% Juvenile Myoclonic Epilepsy (JME), and 2.6% Focal-Generalized, and 7.9% Complex Partial Seizures (CPS). In the 22 patients with active epilepsy, 5 cases had myoclonic jerks, and 17 cases did not. No myoclonic jerks was reported in patients with inactive epilepsy or those experiencing their first epileptic seizure in pregnancy. In Australia, in a study on 75 pregnant epileptic women, the majority of the cases

(82.7%) had GTC (9). The study in Canada reported most patients with GTC; two cases had absence, and 4 cases had focal or psychomotor epilepsy (27). In Italy, GTC was observed in 39.3% of the cases, localized in 47.1%, and unknown in the rest (28).

Etiology of Epilepsy in the Present Study: Only 5 out of our total 38 patients had abnormal neurological examination. According to the assessments, one case was caused by AVM, another case by head trauma, one case by tumor; epilepsy in 24 cases had unknown etiology. The causes of the first seizures in pregnancy were eclampsia in 7 cases, CVT in 3 cases, and TTP in one case. The English study reported the etiology of symptomatic epilepsy as including meningitis, brain abscess, encephalitis, meningioma, and head trauma, none of which was observed in the present study (29). Epilepsy in the study in Canada was caused by head trauma in 5 cases, and brain aneurysm in 4 cases (27). In a study done in Africa, prevalence of eclampsia was reported at 1.02% (31).

In this study, epileptic patients mostly used Carbamazepine, in addition to a few cases of Lamotrigine, Levetiracetam, and Sodium Valproate. Seven cases received multi-drug regimens (2 drugs), and 13 cases received single-drug regimens. Seizures were seen in 1 case of single-drug patients (14%), and 7 cases of multiple-drug cases (54%), almost four times the single-drug patients.

In Australia, 70.7% of pregnant women with a history of epilepsy received anti-epileptic medications prior to pregnancy. Epilepsy was controlled in 46 patients with only one or two drugs. The most common anti-epileptic medication was Phenytoin (81%), followed by Phenobarbital 29.3%, Primidone 20.7%, Carbamazepine 13.8%, and Sodium Valproate 5.2%. Out of the said patients, 39.6% received only one medication, 39.6% two medications, 17.4% three, and 3.4% more than three medications (9).

In Italy, recurrence of seizures, mostly GTC seizures, was higher in those receiving Lamotrigine (58.2%), and there was no seizure recurrence in 75% of Valproate users, 67.3% of Carbamazepine users, and 73.4% of Phenobarbital users (28).

Conclusion

More than 6 in 1,000 pregnant women have epilepsy. Though without a history of epilepsy, less than 4 in 1,000 pregnant women are afflicted with seizures, mostly caused by eclampsia. Seizures increased in 21% of epileptic pregnant patients, and declined in 21% of the cases.

References

1. Rowland P, Pedley A. *Merritt's neurology*. 2010;927-41.
2. Harden C, Hopp J, Ting T, Pennell P, French J, Hauser WA, et al. Practice Parameter update: Management issues for women with epilepsy—Focus on pregnancy (an evidence-based review): Obstetrical complications and change in seizure frequency Report of the Quality Standards Subcommittee and Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology and American Epilepsy Society. *Neurology*. 2009;73(2):126-32.
3. Harden C, Hopp J, Ting T, Pennell P, French J, Hauser WA, et al. Practice Parameter update: Management issues for women with epilepsy—Focus on pregnancy (an evidence-based review): Obstetrical complications and change in seizure frequency. Report of the Quality Standards Subcommittee and Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology and American Epilepsy Society. *Neurology*. 2009;73(2):133-41.
4. Hart LA, Sibai BM, editors. *Seizures in pregnancy: epilepsy, eclampsia, and stroke*. Seminars in perinatology; 2013: Elsevier.
5. Pschirrer ER, Monga M. Seizure disorders in pregnancy. *Obstetrics and gynecology clinics of North America*. 2001;28(3):601-11.
6. Pandey R, Garg R, Darlong DV, Punj J, Khanna P. Recurrent Seizures in Pregnancy—Epilepsy or Eclampsia: A Diagnostic Dilemma? *AANA journal*. 2011;79(5):389.
7. Walker S, Permezel M, Berkovic S. The management of epilepsy in pregnancy. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2009;116(6):758-67.
8. Beach RL, Kaplan PW. Seizures in pregnancy: diagnosis and management. *International review of neurobiology*. 2008;83:259-71.
9. Svigos J. Epilepsy and pregnancy. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 1984;24(3):182-5.
10. Borna S, Khazardoost S, Hantoushzadeh S, Borna H. The course and outcome of pregnancy in women with epilepsy in Valie-Asr Hospital. *Iranian Red Crescent Medical Journal*. 2006;8:36-40.
11. Kamyar M, Varner M. Epilepsy in pregnancy. *Clinical obstetrics and gynecology*. 2013;56(2):330-41.
12. Caughey AB. *Seizure disorders in pregnancy*. E Medicine. 2013.
13. Nelson KB, Ellenberg JH. Maternal seizure disorder, outcome of pregnancy, and neurologic abnormalities in the children. *Neurology*. 1982;32(11):1247-.
14. Dondapati S, Baban M, Haque S. A descriptive case of seizure in pregnancy:11AP3-5. *European Journal of Anaesthesiology (EJA)*. 2013;30:172-3.
15. Dalessio DJ. Seizure disorders and pregnancy. *New England Journal of Medicine*. 1985;312(9):559-63.
16. Bui E, Klein A. *women with epilepsy: a practical management Handbook*: Cambridge University Press. 2014.
17. Morrell MJ. Epilepsy in women. *American family physician*. 2002;66(8):1489-94.
18. Placencia M, Sander J, Shorvon S, Ellison R, Cascante S. Validation of a screening questionnaire for the detection of epileptic seizures in epidemiological studies. *Brain*. 1992;115(3):783-94.
19. Placencia M, Sander J, Shorvon S, Ellison R, Cascante S. Validation of a screening questionnaire for the detection of epileptic seizures in epidemiological studies. *Brain*. 1992;115(3):771-82.
20. Placencia M, Suarez J, Crespo F, Sander J, Shorvon S, Ellison R, et al. A large-scale study of epilepsy in Ecuador: methodological aspects. *Neuroepidemiology*. 1992;11(2):74-84.
21. Rosciszewska D. [Epilepsy and pregnancy]. *Polski tygodnik lekarski (Warsaw, Poland : 1960)*. 1994;49(4-5):102-3.
22. Ebrahimi H, Shafa M, Hakimzadeh Asl S. Prevalence of active epilepsy in Kerman, Iran: a house based survey. *Acta Neurol Taiwan*. 2012;21(3):115-24.
23. Kobau R, Zahran H, Thurman DJ, Zack MM, Henry TR, Schachter SC, et al. Epilepsy surveillance among adults--19 States, behavioral risk factor surveillance system, 2005: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2008.
24. LE QC, Nguyen VH, Jallon P. Prevalence of epilepsy in Phu Linh-Soc Son—Hanoi, a rural region in North Vietnam. *Neurology Asia*. 2007;12(Supplement 1):57.
25. Velioglu SK, Bakirdemir M, Can G, Topbas M. Prevalence of epilepsy in northeast Turkey. *Epileptic disorders*. 2010;12(1):22-37.
26. Ferro MA. A population-based study of the prevalence and sociodemographic risk factors of self-reported epilepsy among adults in the United Kingdom. *Seizure*. 2011;20(10):784-8.
27. Sabin M, Oxorn H. Epilepsy and pregnancy. *Obstetrics & Gynecology*. 1956;7(2):175-9.
28. Battino D, Tomson T, Bonizzoni E, Craig J, Lindhout D, Sabers A, et al. Seizure control and treatment changes in pregnancy: observations from the EURAP epilepsy pregnancy registry. *Epilepsia*. 2013;54(9):1621-7.
29. Knight A, Rhind E. Epilepsy and pregnancy: a study of 153 pregnancies in 59 patients. *Epilepsia*. 1975;16(1):99-110.
30. Thomas S, Indrani L, Devi G, Jacob S, Beegum J, Jacob P, et al. Pregnancy in women with epilepsy: preliminary results of Kerala registry of epilepsy and pregnancy. *Neurology India*. 2001;49(1):60-6.
31. Tukur J, Muhammad Z. Management of eclampsia at AKTH: before and after magnesium sulphate. *Nigerian Journal of Medicine*. 2010;19(1).

Studying the relation of quality work life with socio-economic status and general health among the employees of Tehran University of Medical Sciences (TUMS) in 2015

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Abstract

Introduction: The importance of socio-economic variables such as level of literacy, income and occupational status and their impact on the physical and psychological wellbeing of the people is clear for experts and policymakers. In much research, the root of increase in life expectancy and improvement in other indexes of health is considered to not only progress in medicine, but also improve in socio-economic indexes. Thus, the present study aims to determine the relation between socio-economic status and general health and the consequences of disease on the quality of work life of the employees of Tehran University of Medical Sciences (TUMS).

Methodology: The present cross-sectional research is of descriptive-analytical type, and was conducted in faculties of TUMS in 2015, and the population under study included all the 1,238 non-academic employees of the TUMS. The required data was collected by the Quality of Work life (QWL) questionnaire. This questionnaire was based on Walton components and Socio-economic Status (SES) questionnaire, and was designed in order to evaluate socio-economic status and has 4 components. The data on general health was collected by Goldberg and Hillier 28-Item General Health Questionnaire (GHQ-28) (1979) that has 4 subscales. Then, the collected data was recorded by SPSS version 18 software and was then analyzed by common methods of descriptive-analytical statistics.

Results: The results demonstrated that the frequency of socio-economic status of the employees under study were 179 persons (53.3 percent) for low level, 109 persons (35.5 percent) for moderate level, and 19 persons

(6.2 percent) for high level, and the frequency of the quality of work life of the employees under study were 10 persons (3.3 percent) for low level, 108 persons (35.6 percent) for moderate level, and 185 persons (61.1 percent) for high level.

Conclusion: Considering the importance of quality of work life in socio-economic status, it is proposed that the following measures be taken into account: appropriateness of salary to economic factors such as inflation; demand and supply in fair and adequate payment; paying more attention to the physical conditions of workplace, e.g. light, cooling and heating facilities to prepare a secure and healthy workplace; preparing some possibilities for the employees so that they can further develop their personal talents and have opportunities for making progress in their specialized field by encouraging them to be creative and innovative to lead them to promotion in the organization; and providing continuous security and growth opportunities for the employees, allowing them to take initiatives, and provide them with any information or skill that they need in workplace to develop their human capabilities. In the present study no significant relationship between the quality of work life and general health, socio-economic status and quality of work life, and also general health and socio-economic status, was found.

Key words: Quality of Work Life (QWL), socio-economic status, general health, faculty employees.

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Introduction

Nowadays organizations are considered as living creatures with an identity that is independent of their members (1), and by this new identity, they can affect the behavior of their employees. This personality and identity can be organizationally healthy or ill (2). Miles introduced the notion of "organizational health" in 1969. In his view, organizational health refers to the durability and persistence of an organization in its environment and adaptability to it, and also developing its own ability to be more adaptable to it (3). Wrong choice, misuse of skills, and lack of proper atmosphere for allowing creativity to flourish can endanger the health and promotion of the organization. When a position or office is proposed to the employees that is not commensurate with their dignity, it can lead to disobedience, absence from work, delays, and resignation. In an organization, if communication at all levels is not multilaterally and openly established, and full confidence does not exist between different parts, misunderstanding and disharmony will be created. When goals are not clear, they become vague, and as the result, the employees do not make a concerted effort to achieve the goals(4).

Recently the human factor has been considered as the most important and sensitive organizational element, and most of the new theories of organization and management have referred to this sensitive factor (5). One of the most important parameters affecting the performance of human resources is the role of individual health in improving the economy of a country. Therefore, any kind of planning or investment in human resources that leads to protect and promote the health of employees, can eventually lead to increased efficiency and return on investment (ROI) (6). Nowadays the notion of Quality of Work life has turned into a major social issue all around the world, while in the past the emphasis was only on personal life. From the 1970s onward, improving the employees' quality of work life has been considered as one of the most important issues in many organizations, including health care organizations (7). Due to the inevitability of some of the stress factors in health care organizations and the need to prevent psychological stress effects, one of the duties of managers in these organizations is taking some measures and actions to improve the quality of work life, and teaching coping techniques (8). Although there is no formal definition of quality of work life, however, Walton's theory has offered the most comprehensive components of quality of work life plan (9). He has offered the main components of quality of work life in four dimensions that are as follows: meaningfulness of work; organizational and social fit of work; provocativeness, richness, and fruitfulness of work; and security, developing skills, and continuous learning in work (10).

Quality of work life programs deal with various objective and subjective areas of employees' issues. Quality of work life is a process by which the organization's members can participate in making decisions that generally affect their job and particularly their work environment; in doing so,

they can use open and appropriate communication ways that have been designed for this purpose. As a result, their work-related stress will diminish and employees' satisfaction will increase. An organization that pays attention to its employees' quality of work life will benefit from having a competent workforce, the signs of which are willingness to cooperate with the management and improvement in the performance of the workforce (11).

General health is a subset of the health system and is defined as a set of important social activities and measures that are based primarily on prevention strategies (12). One of the characteristics of a healthy organization is that the physical and psychological health of the employees are as important and interesting as production and productivity for its managers (13). In recent decades various studies have been conducted on the relationship between work and stress and its consequences for health care workers. In these studies, some topics such as productivity, occupational accidents, absenteeism, and increase in physical and mental damage in various occupational groups have been scrutinized (14). The profession of the people is one of the main causes of stress in their life. There is more stress in professions in which human contact is important (15). Socio-economic determinants of health such as level of income, education, job, nutrition, and social class are far more important in catching diseases than the biological factors, and they play an important role in human health (16). In the social hierarchy, people take different positions based on their occupational status and level of education and income, and the position of the people in this system is defined by their socio-economic status. Although occupation and level of income and education all determine the position of an individual in the social hierarchy, and these factors are generally not separate from each other, they should be individually studied in order to realize their role in health. Level of education makes differences in terms of having access to information and level of expertise to take advantage of knowledge, while occupation entails differences in having access to scarce material goods. Occupational status includes both of these aspects, and also includes benefits of working in certain occupations such as dignity, privilege, and technical and social skills and power (17).

The present age organizations have a strategic approach to human resources and consider it as a smart and valuable asset, and desire to further improve the quality of life and job satisfaction of their employees (18). Workplace health and psychological health are created by improving quality of life indexes, and it is necessary to pay attention to this issue in all organizations in order to prevent job burnout and low efficiency. Measuring the understanding and sense of people about their own health in order to assess the status quo, investigating the efficacy of health interventions and health care, and implementing appropriate health services are of crucial importance (19). Socio-economic status is an important factor that affects the possibility of taking advantage of medical services, while the wealthy social groups, which in every respect are better equipped than the disadvantaged groups, can sooner and better convert

their need to demand, and hence, take more advantage (20). A survey of 17,000 employees in England showed that occupation rank itself plays a more important role in health than some risk factors combined, such as smoking and high blood pressure and cholesterol. Since healthy human is the axis of sustainable development, and also modern societies call for providing a proper environment for production and having the required speed to achieve comprehensive development, it is clearly the responsibility of health practitioners and researchers to investigate and explain all the social factors influencing health, and then give feedback to the macro policy-makers in the form of scientific and practical information. In this way, they can help a great deal in sustainable development (21).

The importance of socio-economic variables such as level of education, income, and occupational status, and their impact on physical and psychological health of the people, is clear for health experts and policy-makers. It has been suggested in many studies that increase in life expectancy and improvement in the other health indexes are not merely because of medical progress, but in many cases are due to the improvement in socio-economic indexes (22).

Global data show that environment, socio-economic status, housing, job security, access to health facilities, and human behavior are all crucial factors in securing or weakening health (23). Researches in many countries show extensive inequalities and differences in health conditions of various socio-economic, racial, ethnic, and geographical groups in society. This is indicative of the crucial impact of various factors on health that include reducing social exclusion, alleviating educational shortcomings, reducing insecurity and unemployment, and improving housing standards (24). Studies on the relationship between health and socio-economic status of a population have originally started from England. Gradually this type of research was of interest to researchers in other countries and useful data was collected in this field, all of which show that individuals and families who are in lower social groups, in comparison to higher and richer social groups, experience more and premature death, and diseases and defects are more common in this group; this inequality can be seen in all European countries, and is an undeniable fact that needs more attention (25). To this aim, this research has been conducted to determine the relationship between socio-economic status and general health, and show the consequences of disease that affects the quality of work life of TUMS's employees.

Methodology

This study is of descriptive-analytical type that has been conducted by cross-sectional method in faculties of TUMS in 2015, and the population under study included all the 1,238 non-academic employees of TUMS. The inclusion criterion for the study was being a non-academic employee in TUMS; data collection was conducted in 10 out of 11 faculties of TUMS, and one faculty was excluded from the study due to lack of cooperation. Quality of Work life (QWL) questionnaire was used to collect the required data.

This questionnaire was based on Walton's components, including fair and adequate payment (questions 1 to 5), safe and healthy working environment (questions 6 to 8), providing growth opportunities and continuous security (questions 9 to 11), having respect for the laws in the organization (questions 12 to 17), social dependence of work life (questions 18 to 20), the overall atmosphere of life (questions 21 to 25), social integrity and solidarity (questions 26 to 29), and developing human capabilities (questions 30 to 32). This questionnaire has been conducted by many researchers and contains 32 items, and is based on a Likert scale from very low (1 point) to very high (5 points).

Walton showed the reliability coefficient of the questionnaire to be 0.88 (26). Also in 2006 Rahimi reported the reliability coefficient of the test to be 0.85 (27). Furthermore, in this study, the Socio-economic Status (SES) questionnaire is implemented, which takes four components of income, economic class, education, and housing into account, and generally consists of 6 demographic questions and 5 key questions. The criterion scaling of questions in this questionnaire has 5 options and responses are graded on a continuum, from very low (1) to very high (5). Eslami et al. (28), by asking 12 sports experts, confirmed the face and content validity of this questionnaire. Also by applying Cronbach's alpha test, the reliability of the questionnaire was calculated as 0.83. General health data were collected by Goldberg and Hillier 28-Item General Health Questionnaire (GHQ-28) (1979). It has 4 subscales and each subscale contains 7 questions. These subscales include somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. Of the 28 items of the questionnaire, questions 1 to 7 are about somatic symptoms, questions 8 to 14 ask about anxiety and insomnia, questions 15 to 21 assess social dysfunction, and finally, questions 22 to 28 are related to severe depression (29, 30).

In standardization of GHQ-28 questionnaire in Iran, Housman (1997) implemented Cronbach's alpha coefficient for the subscales to assess the internal consistency, and reported them to be 0.85, 0.87, 0.79, and 0.91, respectively. For the overall score, that demonstrates general health, he reported 0.85. Goldberg and Blackwell (1972), by using a clinical interview checklist for 200 surgery patients in England, concluded that more than 90% of the sample was correctly classified by the questionnaire as sick or healthy. Moreover, they reported the correlation coefficient between the scores of GHQ-28 questionnaire and the result of clinical evaluation of the results to be 0.80. Also they reported sensitivity and specificity as 0.84 and 0.82, respectively.

In order to assess the socio-economic status, the Socio-economic Status (SES) Questionnaire (Ghodratnama, 2013) was generally implemented. This questionnaire contains 4 components, namely income, economic class, education, and housing, and in total contains six demographic questions and 5 key questions. Criterion scaling in this questionnaire consisted of five responses, and the scoring method for each response was from very

low (1) to very high (5). Eslami et al. (28), by asking 12 sports experts, confirmed the face and content validity of this questionnaire. Also by applying Cronbach's alpha test, the reliability of the questionnaire was calculated as 0.83 (26). Thus, the collected data were recorded by

SPSS version 18 software and then underwent statistical analysis. By using common methods in descriptive-analytical statistics, the results were demonstrated in the forms of tables, diagrams, etc.

Results

The results demonstrated that the frequency of socio-economic status of the studied employees were 179 for low status (58.3%), 109 for medium status (35.5%), and 19 for high status (6.2%).

Table 1: Socio-economic Status

Socio-economic status	Frequency	Percentage
low	179	58.3
medium	109	35.5
high	19	6.2
total	307	100

The results demonstrated that the frequency of QWL of studied employees were 10 for low status (3.3%), 108 for medium status (35.6%), and 185 for high status (61.1%).

Table 2: Frequency and percentage of Quality of Work life (QWL) status

QWL	Frequency	Percentage
low	10	3.3
medium	108	35.6
high	185	61.1
total	303	100

The results demonstrated that the mean and standard deviation of dimensions of quality of work life were 17.09 and 3.65 for fair and adequate payment, 8.44 and 2.95 for safe and healthy working environment, 9.62 and 2.61 for providing growth opportunities and continuous security, 19.76 and 6.39 for having respect for the laws of the organization, 9.12 and 4.30 for social dependence of work life, 15.41 and 5.04 for the overall atmosphere of life, 12.84 and 2.49 for social integrity and solidarity, and 9.08 and 2.83 for developing human capabilities.

Table 3: Status of QWL's dimensions

Dimensions of QWL	Mean	Standard Deviation
Fair and adequate payment	17.09	3.65
Safe and healthy working environment	8.44	2.95
Providing growth opportunities and continuous security	9.62	2.61
Having respect for the laws in the organization	19.76	6.39
Social dependence of work life	9.12	4.30
Overall atmosphere of life	15.41	5.04
Social integrity and solidarity	12.84	3.49
Developing human capabilities	9.08	2.83

The results demonstrated that in the somatic dimension of employee's general health, 135 persons were at very low level (43.4%), 120 persons were at slight level (38.6%), 43 persons were at medium level (13.8%), and 13 persons were at severe level (4.2%). In anxiety dimension, 108 persons were at very low level (35.3%), 125 persons were at slight level (40.8%), 60 persons at medium level (19.6%), and 13 persons at severe level (4.2%). In social dimension,

101 persons were at very low level (32.5%), 171 persons at slight level (55.0%), 34 persons at medium level (10.9%), and 5 persons at severe level (1.6%). In depression dimension, 260 persons were at very low level (83.6%), 40 persons at slight level (12.9%), 7 persons at medium level (2.3%), and 4 persons at severe level (1.3%). In total, the number of employees at very low, slight, medium, and severe levels were 129 (41.5%), 138 (44.4%), 41 (13.2%), and 3 (1.0%), respectively.

Table 4: Status of general health and its dimensions

Dimensions of General health	Status				
	very low	slight	medium	severe	total
Somatic	135 (43.4%)	120 (38.6%)	43 (13.8%)	13 (4.2%)	311 (100%)
Anxiety	108 (35.3%)	125 (40.8%)	60 (19.6%)	13 (4.2%)	306 (100%)
Social	101 (32.5%)	171 (55%)	34 (10.9%)	5 (1.6%)	311 (100%)
Depression	260 (83.6%)	40 (12.9%)	7 (2.3%)	4 (1.3%)	311 (100%)

The results of the test show that among the employees that in terms of quality of work life those who were at a low level, 5 persons (50%) had slight general health. Also those of the employees that had medium quality of work life, 53 persons (49.5%) were at very low level of general health. 82 persons (44.3%) of the employees that experienced a high level quality of work life, had slight general health. The results of Fisher Test demonstrated that there is no significant relationship between quality of work life and general health ($p=0.211$).

Table 5: Quality of work life status in terms of general health

QWL	General health					probability
	very low	slight	medium	severe	total	
low	3 (30%)	5 (50%)	2 (20%)	0 (0%)	10 (100%)	0.211
medium	53 (49.5%)	45 (42.1%)	8 (7.5%)	1 (0.9%)	107 (100%)	
high	71 (38.4%)	82 (44.3%)	30 (16.2%)	2 (1.1%)	185 (100%)	

The results of the test demonstrate that among the employees in terms of socio-economic status those who were at a low level, 5 persons (50%) had low quality of life. Of those employees who had a medium socio-economic status, 59 persons (55.1%) had low quality of life. Also, 106 persons (59.2%) of the employees with high socio-economic status, had low quality of work life. The results of Chi-squared test show that there is no significant relationship between socio-economic status and quality of work life ($p=0.106$).

Table 6: QWL's Status in terms of socio-economic status

Socio-economic status	Quality of work life				probability
	low	medium	high	total	
low	5 (50%)	2 (20%)	3 (30%)	10 (100%)	0.106
medium	59 (55.1%)	41 (38.3%)	7 (6.5%)	107 (100%)	
high	106 (59.2%)	64 (35.8%)	9 (5.0%)	179 (100%)	

The results of the test show that among the employees with a very low level of general health, 71 persons (55.9%) had high quality of work life, while among the employees with slight general health, 82 persons (62.1%) had high quality of work life. Also among the employees with a medium general health, 30 persons (75.0%) had high quality of work life, and among the employees with severe general health, 3 persons (66.7%) had high quality of life. The results of Fisher test show that there is no significant relationship between general health and quality of work life ($p=0.211$).

Table 7: General health in terms of quality of work life

General health	Quality of work life				probability
	low	medium	high	total	
very low	3 (2.4%)	53 (41.7%)	71 (55.9%)	127 (100%)	0.211
slight	5 (3.8%)	45 (34.1%)	82 (62.1%)	132 (100%)	
medium	2 (5%)	8 (20%)	30 (75.0%)	40 (100%)	
severe	0 (0.0%)	1 (33.3%)	2 (66.7%)	3 (100%)	

The results of the test show that among the employees with a very low level of general health, 69 persons (54.8%) had a low socio-economic status, and among the employees with a slight level of general health, 78 persons (58.2%) had a low socio-economic status. Also among the employees with a medium level of general health, 29 persons (70.7%) had a low socio-economic status, and among the employees with severe general health, 2 persons (66.7%) had a low socio-economic status. The results of Fisher test show that there is no significant relationship between general health and socio-economic status ($p=0.071$).

Table 8: General health in terms of socio-economic status

General health	Socio-economic status				probability
	low	medium	high	total	
very low	69 (54.8%)	52 (41.3%)	5 (4%)	126 (100%)	0.071
slight	78 (58.2%)	42 (31.3%)	14 (10.4%)	134 (100%)	
medium	29 (70.7%)	12 (29.3%)	0 (0.0%)	41 (100%)	
severe	2 (66.7%)	1 (33.3%)	0 (0.0%)	3 (100%)	

Discussion and Conclusion

The results of the study show that the frequency of socio-economic status of the employees under study were 179 (53.3%) for low level, 109 (35.5%) for medium level, and 199 (6.2%) for high level. Also the frequency of employees quality of work life were 10 (3.3%) for low level, 108 (35.6%) for medium level, and 185 (61.1%) for high level.

The results also demonstrated that the mean and standard deviation of QWL's dimensions respectively are as follows: 17.09 and 3.65 for fair and adequate payment, 8.44 and 2.95 for safe and healthy working environment, 9.62 and 2.61 for providing growth opportunities and continuous security, 19.76 and 6.39 for having respect for the laws in the organization, 9.12 and 4.30 for social dependence of work life, 15.41 and 5.04 for the overall atmosphere of life, 12.84 and 3.49 for social integrity and solidarity, and 9.08 and 2.83 for developing human capabilities. In the physical dimension of employees' general health, 135 persons (43.4%) are at very low, 120 persons (36.6%) at slight, 43 persons (13.8%) at medium, and 13 persons (4.2%) at severe level. On the anxiety dimension, 108 persons (35.3%) are at very low, 125 persons (40.8%) at slight, 60 persons (19.6%) at medium, and 13 persons (4.2%) at severe level. On the social dimension, 101 persons (32.5%) are at very low, 171 persons (55%) at slight level, 34 persons (10.9%) at medium, and 5 persons (1.6%) at severe level. On the depression dimension, 206 persons (83.6%) are at very low level, 40 persons (12.9%) at slight, 7 persons (2.3%) at medium, and 4 persons (1.3%) at severe level. In total, the number of employees at very low, slight, medium, and severe levels are 129 (45.5%), 138 (44.4%), 41 (13.2%), and 3 (1%), respectively.

The results show that of those among the employees who were at a very low level of general health, 69 persons (54.8%) had a low socio-economic status. Among the employees who had slight general health, 78 persons (58.2%) were at a low socio-economic status. In the group with medium general health, 29 persons (70.7%) had a low socio-economic status, and in the group with a severe level of general health, 2 persons (66.7%) had a low level of socio-economic status. The results of Fisher test show

that there is no significant relationship between general health and socio-economic status ($p=0.071$).

In a study entitled "The relationship between socio-economic status and general health in single mothers", Shahram Mami, et al (2014) investigated the most important factors that have an influence on the general health of single mothers. This study was of cross-sectional-analytical type, the population under study was all the women covered by the State Welfare Organization of Iran-Illam Branch, and the sample size was 750 people. The data was collected by using Socio-economic Status (SES) questionnaire and GHQ-28, and were recorded by SPSS version 16 software and then underwent various statistical analyses such as mean, standard deviation, and logistic regression analysis. The mean and standard deviation of the age of participants were 19.88 and ± 53.3 , respectively. According to the results of this study, 79.8% of the participating women did not have good general health. In the logistic regression analysis, the most important predictors of general health for single mothers were age ($p=0.004$), extending the time of coverage (0.001), and having a diagnosed illness ($p=0.001$). Moreover, low literacy, undesirable economic status, and having chronic illnesses were the most important factors influencing the general health of single mothers. Therefore, paying more attention to this stratum of society, which in terms of general health is at a lower level than the other strata, requires planning and collective effort (24).

In his study entitled "Characteristics of economy, society, demography, and mental health in old age", Seifzadeh has implemented a survey method and questionnaire. The statistical population of the study was all the residents of Azarshahr 65 years old or more. In this study, stratified random sampling method (proportional) was implemented, and the sample size consisted of 312 persons. The results show that:

- 1- Men's mental health was more than that of women.
- 2- Mental health of participants who live with their spouse is more than those who have lost their spouse.
- 3- With aging, the health of the elderly deteriorates.
- 4- By increasing social support, the health of the elderly increases, and those of the elderly with higher social support, have better mental health than their peers with less social support.

5- There is a one-to-one relationship between socio-economic status and mental health, so that the elderly with a high socio-economic status are more healthy than other elderly. (25) Javadi, et al (2011) in a study entitled "Economic burden and health costs of chronic diseases in Iran and the World", investigated the economic burden and health costs of this world crisis and the challenges ahead, and proposed a number of prevention and control strategies. This study was a review of library resources and digital and printed literature from different scientific journals, and searching in valid websites such as Pubmed, SID, ISI, etc. Noncontagious diseases cause 35 million deaths annually, and are considered as a major obstacle to development in countries. These diseases have had extremely bad effects on the poor and vulnerable groups of the society, and have left many people in poverty (32).

In a study entitled "Predicting quality of life based on general health, social support, and self-efficacy in cardiovascular patients of Yasouj in 2014", Moghadam et al studied 70 cardiovascular patients going to medical centers and clinics of Yasouj. These patients were selected by convenience and purposive sampling methods. In this study, there was a significant relationship between quality of life, self-efficacy, general health, and social support ($p < 0.001$). The results of the regression analysis show that all the predictor variables can predict 76% of the changes in the criterion variable (quality of life); furthermore, the results of stepwise regression analysis show that each one of the variables of general health, self-efficacy, and social support can respectively predict 69%, 4%, and 3% changes in criterion variable. By developing supportive social networks and educating self-efficacy skills, we can improve general health and quality of life of cardiovascular patients (33).

Rezghi Shirsavar et al conducted an applied research entitled "A survey of the relationship between occupational stress, general health, organizational intelligence, and job satisfaction with the performance of employees of Islamic Azad University – Shahre Qods Branch". The statistical population of this study consisted of all the employees of Islamic Azad University – Shahre Qods Branch that were in total 222 persons, and based on Morgan Table, 144 persons were selected as sample. In this study, GHQ-28 questionnaire, which explains people's cognitive, emotional, and behavioral performance, was used. The Standard 12-item Job Descriptive Index (JDI) questionnaire was used for investigating components of job satisfaction, and Alireza Faghihi's questionnaire (2009), which was reduced to 20 items, was used for investigating components of organizational intelligence. The results of this study show that the variables under study, namely general health, job satisfaction, and organizational intelligence have positive impact on the performance of the employees of Islamic Azad University – Shahre Qods Branch, but considering the provided data, there was a negative impact between occupational stress and performance (meaning the more occupational stress, the less score on performance). Generally, job satisfaction had the highest level of impact. Considering

the regression results, and in order to get the highest score on performance, it is suggested to managers of Islamic Azad University – Shahre Qods Branch to enhance the job satisfaction of the employees and at the same time reduce their occupational stress. (34) Bakhshayesh in a study entitled "Investigating the relation between general health and personality types and job satisfaction of employees working in Yazd Health Center", which investigated the relation between general health and personality types and job satisfaction of employees, 71 of the 21 to 56-year-old male and female employees working in Yazd Health Center were selected by consensus sampling method and studied by the use of GHQ-28 questionnaire, Standard 12-item Job Descriptive Index (JDI) questionnaire, and NEO Five-Factor Personality Inventory. The method of study was descriptive-correlational, and the data was analyzed by statistical tests of Pearson correlation coefficient, t-test, ANOVA, and stepwise regression. The results of the study showed that general health has a direct relationship with neurotic personality type ($r = 0.542$), and has an inverse relationship to extroversion and favorability ($r = -0.34$ and $r = -0.38$, respectively), and has no relationship to flexibility and responsibility. There was an inverse relationship between general health and three components of job satisfaction (nature of work, job promotion, salary and total score of job satisfaction), and had no relationship to satisfaction of coworkers and supervisors. Low general health was consistent with neurotic personality type, and high general health was related to extrovert personality type and favorability. Low general health was consistent with low job satisfaction, and vice versa. In this study, in terms of personality types and job satisfaction, there was only a correlation ($p = 0.01$) between satisfaction of the nature of work and extroversion. Therefore, we can conclude that any change in personality types or with any decrease or increase in general health, the level of job satisfaction changes (35).

The results of this study show that age, sex, and academic degree have a direct relationship with socio-economic status. In addition, it was noticed that age and academic degree have a positive relationship with general health, however, age, sex, and academic degree did not have a positive relationship to quality of work life. Among the various dimensions of quality of work life, socio-economic status had a significant relationship with fair and adequate payment, safe and healthy working environment, providing growth opportunities and continuous security, and developing human capabilities. As a result, considering the importance of quality of work life in socio-economic status, it is proposed that the following measures be taken into account: appropriateness of salary to the economic factors like inflation; demand and supply in fair and adequate payment; paying more attention to the physical conditions of workplace, e.g. light, cooling and heating facilities to prepare a secure and healthy workplace; preparing some possibilities for the employees so that they can further develop their personal talents and achieve the opportunities for making progress in their specialized field by encouraging them to be creative and innovative that leads to the promotion of the organization; and providing

continuous security and growth opportunities for the employees, allowing them to take initiatives, and provide any information or skill that they need in the workplace to develop their human capabilities. In investigating the relationship between general health and quality of work life, there was a significant relationship between physical and anxiety dimensions of general health and quality of work life. Therefore, by improving any component of general health, a positive impact on the quality of work life will be achieved. On the other hand, in this study, there was no significant relationship between quality of work life and general health, socio-economic status and quality of work life, and general health and socio-economic status.

References

- 1) Seyed Javadian R. The principle of organization and Management. Tehran: Negah Danesh; 2005. [Persian].
- 2) Saatchi M. Work psychology: Application of psychology at work, organization and management. Tehran: Virayesh; 2004. [Persian].
- 3) Jahed H. organizational health. Tadbir training scientific monthly 2005; (159): 10-16. [Persian].
- 4) Daft R. Organization Theory & design. (Translate by: Parsayan A, A'arabi M). 6th ed. Tehran: cultural Research Bureau; 2004. [Persian].
- 5) Muhammad Hashem breakthrough. Improvement of managerial capacity and incentives for employees of institutions and organizations. Tehran: Office of Management and Planning, 1374.
- 6) Spinaci S, Korat L, Keravel V. Tough choices investment in health for development.
- 7) Khaghanizadr M, Ebadi A, Siratinayer M, Rahmani M. [The Study of Relationship between job stress and quality of work life of nurses in military hospital]. Mil Med 2008; 10 (3); 175-84. Persian.
- 8) McVicar A. Workplace stress in nursing: a literature review. J Adv Nurs. 2003; 44(6):633-42.
- 9) Organization WH. The World health report: 2001: Mental health: new understanding, new hope. 2001.
- 10) Conklin MH, Desselle SP. Snapshot of pharmacy faculty quality of work life and productivity. Journal of Pharmacy Teaching. 2007; 14(1):53-77.
- 11) Ballou B, Norman H, Goodwin NH. Quality of work life. Strategic Finance. 2007; 89(4):40-51.
- 12) Davari SA. Health and its determinants. Tehran, contemporary works, 2007: 25.
- 13) Saatchi M. Applied Psychology for Managers in homes, schools and organizations. 1st ed. Tehran: editing, 1995: 5- 51.
- 14) Stellman JM, McCann M, Warshaw L, et al. Encyclopaedia of occupational health and safety. 4th ed. Geneva: International Labour Office. 34.2-34.28. 1998.
- 15) BAHRI BN, Moghiman M, Atarbashi M, Garche M. The survey of relationship between job burnout and health status of midwives and nurses. 2003.
- 16) Motlaq M, Oliaaee Manesh A, Beheshtian M. Health and its social determinants. 2nd ed. Tehran: Moafaq Press; 2007. 42 [In Persian].
- 17) Lahelma E, Kivela K, Roos E, Tuominen T, Dahl E, Diderichsen F, et al. Analysing changes of health inequalities in the Nordic welfare states. Social Science of Medicine 2002; 55: 609-25.
- 18) Bazaz Jazayeri SA, Pardakhtchi MH. [Developing a model for the assessment of quality of work life in organizations]. Iranian Journal of Management Sciences 2007; 2(5):123-51.
- 19) Nejat S, Montazeri A, Holakoie K, Mohamad K, Majdzadeh SR. Quality of Life of Tehran's population by Whoqol-Bref questionnaire in 2005. Hakim 2007; 10(3): 1- 8.
- 20) Marmot M, Wilkinson R. Social determinants of health. Translated by: Montazeri A. 1st ed. Publication of Jahad; 2008. 1-30.
- 21) http://www.unicef.org/sowc08/profiles/child_survival.php. Last accessed at 2011-03-14.
- 22) Ali Ali Akbar; Poverty and its impact on health, experiences and Western experiences; Publishing Co. Jihad Research and Training; Autumn 1380
- 23) Davoudi Saeed; Health and its determinants; Ministry of Health and Medical Education Publications; 1386.
- 24) Virme, G. (2001). "Human behaviour ; improving performance at work". New York : Prentice-Hall, inc.
- 25) Rahimi, Reza. (1385). "Surveying the quality of work life of faculty members of Isfahan University", End of Master's Degree in Management Education, Isfahan University.
- 26) Islamic, Ayoub, Mahmoudi, Ahmad, Khbiri, Mohammad, Najafian Razavi, Seyyed Mehdi (2013). Socioeconomic status (ESE) in the motivation of citizen participation in public sports _ recreation. Journal of Applied Research in Sport Management, 2 (3), pp. 89-104.
- 27) Fathi Ashtiani, Ali. Psychological tests - Personality assessment and mental health. Besat Publishing. 1388
- 28) Saatchi. Mahmoud Kamkari Kambiz, Askariyan. Mahnaz Psychological tests. Publish edited. 1389
- 29) Wisani, Yousef, Shahbazi, Nasrin, Mami, Naderi, et al. Relationship between socioeconomic status and general health in female headed households. Scientific Journal of Ilam University of Medical Sciences. 2015; 23 (1): 56-62.
- 30) A. Ses Economic, social, demographic and psychological well-being in old age, Azarshahr city.
- 31) Karimi S., Javadi M., Jafarzadeh F. Economic burden and health costs from chronic diseases in Iran and the world. Health Information Management. 1390; 7 (8): 984-96.
- 32) Behnam Moghadam M, Behnam Moghadam A, Yarian S, Hosseini S, Mohammad Hosseini S. Predicting the Quality of Life Based on Public Health, Social Support and Self Efficacy in Cardiovascular Patients. Armaghane danesh. 2014; 19 (7) :633-642.
- 33) Hadi Ras, Masoud S., Mohsen A. Investigating the Relationship between Job Pressure, General Health, Organizational Intelligence and Job Satisfaction with the Performance of Employees of Islamic Azad University of Qods.
- 34) Alireza B. The Relationship between General Health and Personality Types and Job Satisfaction among Employees of Health Center in Yazd.

Factors that encourage early marriage and motherhood from the perspective of Iranian adolescent mothers: a qualitative study

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Abstract

Background: Early marriage and motherhood is one of the most important health challenges in developing countries and affects mothers, children, families and communities, thus their causes and predisposing factors must be explored. The aim of this study was to explore the factors that encourage early marriage and motherhood in Iranian culture.

Methods: Inductive Conventional Content Analysis approach was used in this qualitative study. Face to face in-depth semi-structured interview were conducted with 16 Iranian adolescent mothers in the Kerman province of Iran. Data collection continued until acquiring data saturation and MAX-QDA software was used for analysis of the data.

Results: Two main categories (external incentives and internal incentives) and 8 sub-categories (inappropriate economic condition, instability of family, desire and encouragement of parents, copying others, position (status), subjective beliefs, meeting inner needs and desires, insufficient awareness) were extracted from the data.

Conclusion: Various factors (personal, social, economic, cultural, spiritual and technological) encourage adolescents to early marriage and motherhood. Understanding of these factors can help health care providers, who work in the field of mother and child health, to provide appropriate assessment and interventions for improvement of the health of this group of society.

Key words: Adolescent Mothers, Marriage, Encourage, Iran, Qualitative

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Introduction

Marriage is one of the most important life events and is necessary for development of societies(1), but early marriage will be followed by unpleasant feelings if participants are not being prepared to take on new responsibilities(2). Early marriage which includes any legal or illegal marriage under the age of 18 (3, 4) is among the important challenges of the world, and it is estimated to reach 150 million cases by 2030 (5). Early marriages exist in many countries, especially developing countries, but most cases (46%) are related to South Asian countries(3). Early marriage and motherhood in Iranian culture has long been approved and the highest number of marriages has been seen among 15-19 year old girls(6, 7).

Although adulthood is one of the requirements for accepting mother's role, an increasing number of adolescent mothers are among serious challenges of many countries(8). According to the World Health Organization, more than 16 million adolescents become mothers each year(9). Such number is the lowest in South Korea and it is the highest in sub-Sahara Africa. Among 1,000 Iranian adolescent girls, 27 become mothers(10). Adolescent mothers, who must simultaneously go through two developmental crises (motherhood and adolescence), are not physically and emotionally ready to take the roles of mother, wife and their consequent responsibilities, and they are not able to overcome social and psychological challenges (11, 12).

Early motherhood has many consequences for girls, society, and the environment(8). It also causes financial problems for children's future and reduced social support(13). Child abuse, behavioral problems, shock, low self-esteem, depression and role conflict are seen in adolescent mothers(11). Low accountability, emotional fluctuations, lack of knowledge and experience, less desire to engage emotionally with the baby and breastfeeding, lack of attention to health and safety issues, the influence of peers and the probability of high risk behaviors during adolescence; highlight the importance of health care providers' role in dealing with such clients(14). In developed countries, there are several strategies for protect girls from early motherhood. In developed countries early motherhood is considered specially along with cardiovascular disease, cancer, and mental disorders (15), and it is studied by gynecologists, obstetricians, pediatricians, psychologists, sociologists and family physicians(16). Studies have indicated that many factors are effective on early marriage and motherhood including; economic factors (poverty, unemployment) (4, 6, 17, 18), social factors (gender discrimination, school dropout, social norms, mass media, migration from rural to urban areas, the influence of peers)(4, 15, 17, 19-21), cultural and religious factors (prevention from unrestrained sexual promiscuity, religious and cultural incentives, ethnicity and race) (19, 22), safety factors (war, rape, kidnapping)(3, 17, 22), psychological factors (low self-esteem, mental health problems, anti-social behavior, sense of emotional maturity)(19, 23, 24), political and legal factors (the national laws for marriage and sexual relations, legal gap)(23, 25), organizational factors

(views of health care givers and access to services)(23), family factors (breakdown of family structures, the absence of father, family values, social and psychological problems of parents, parents demand)(3, 24), and individual factors (inability to continue education, love, desire to have children, sense of empowerment)(19).

Since, the provision of desirable healthcare services to adolescent mothers requires understanding of factors that encourage marriage and pregnancy through qualitative studies, this study was conducted to determine the factors that encourage early marriage and motherhood from the perspective of Iranian adolescent mothers. Findings of this study can lead healthcare teams to make proper decisions.

Materials and Methods

Design: This qualitative study was conducted through inductive conventional content analysis. Content analysis is a suitable method for obtaining valid and reliable results from textual data in order to create knowledge, new ideas, facts and a practical guide for performance, which extract concepts or descriptive themes from the phenomenon. This approach is recommended when there is not enough knowledge about the phenomenon or if this knowledge is fragmented (26).

Participants & Setting: This study was conducted in 2016 in Kerman province of Iran. Kerman is located in the south east of Iran, and has a high rate of adolescent mothers. A total of 16 adolescent mothers who met the inclusion criteria (having maximum of 19 years of age at the time of first birth, have a child or children up to 2 years of age, marriage of legal form, being able to speak Persian, being willing to share personal experiences and good cooperation with the researcher) participated in this study. Participants were selected purposefully with maximum variation in age, child's age, place of residence (urban or rural), financial situation (Table 1).

Data collection: Data were collected through in-depth semi-structured interviews conducted by first author (PhD candidate in nursing). The interviews were focused on the perspectives of the participants. Adolescents were asked to explain factors that have encouraged them towards early marriage and motherhood. Interviews began with a general question and progressed to specific questions. Time and place of the interviews were set with the agreement of the participants which were mainly at home. Interviews lasted for 45 to 60 minutes and during a 5-month period from March to August 2016. Entire interviews were recorded and transferred into audio files to be entered in the computer. Data collection continues until data saturation, when no new information was obtained from the interviews

Data Analysis: Analysis of the data was done by using the inductive conventional content analysis approach (Graneheim & Lundeman)(26). Predetermined categories were not used and categories emerge from the data. First audio files of interviews were listened to and recorded

interviews were immediately transcribed verbatim and then read several times to gain a general impression. The resulting text from the interviews was read line by line and broken down into meaning units (words or sentence or paragraphs), which were then condensed, abstracted, coded, and labeled. Then, the codes were re-read in order to be arranged into categories and sub-categories based on their similarities and differences. The first author performed data coding and all co-authors supervised the coding process. If there was a disagreement over the coding, the authors discussed and negotiated the codes until they achieved agreement. Data analysis was done continuously and simultaneously with data collection and the data and the generated codes were constantly compared. MAXQDA10 software was used also.

Trustworthiness: In this study, credibility increased through prolonged engagement with the researcher, spending sufficient time for data collection and analysis, favorite communication with participants, member check and peer check. To increase dependability, the baseline review of literature was limited at the beginning of the study and the opinion of an expert (outside the research

team) was used. For confirmability, the research process was accurately recorded to make the follow-up possible. To ensure transferability, results of the study were checked with numbers of similar samples who were not among the participants.

Ethical considerations: The Kerman University of Medical Sciences Human Research Committee approved this study (ethics approval number: IR.KMU.REC.1394.591). Purpose of the study, how to publish results, and possible risks, dangers and benefits were explained to the participants. Participant anonymity, privacy and confidentiality were maintained. Interviews were conducted in a private and non-threatening environment and audio files were kept anonymously in a secure place. Participants were ensured that their responses would remain confidential. Participants were also informed that participation in the study was voluntary and they could withdraw at any time. Written informed consent for participation in the study and recording of the interview was obtained. During the data collection, the first author was ready to provide help and support; if necessary.

Table1: Demographic characteristics of participants

Participants	Age at childbirth (year)	Age at marriage (year)	Children age (month)	Place of living	Current Education level	Education level of husband	Age difference with husband (year)	Job of husband
1	18.5	17	6	Rural	Diploma	Bachelor	4	Worker
2	15	14	24	Rural	Middle school	Diploma	11	Farmer
3	17	15	6	Urban	High school	Diploma	2	Self employed
4	18	16	13	Rural	High school	Diploma	14	Worker
5	14	12	14	Urban	Middle school	University Diploma	10	Engineer
6	17	14	8	Urban	Diploma	University Diploma	7	Jobholder
7	16	13	4	Rural	Middle school	Diploma	11	Self employed
8	17	14	18	Urban	Diploma	Diploma	10	Self employed
9	18	15	14	Urban	Diploma	Diploma	13	Engineer
10	17	14	23	Urban	University Diploma	Bachelor	10	Engineer
11	15	15	10	Rural	High school	High school	7	Self employed
12	17	15	13	Urban	High school	Diploma	11	Jobholder
13	15	14	24	Urban	Middle school	Middle school	24	Self employed
14	17	16	22	Rural	High school	High school	10	Clergyman
15	14	13	3	Urban	Middle school	Diploma	12	Worker
16	16	14	24	Urban	Diploma	Diploma	6	Self employed

Results

In total, factors that encouraged early marriage and motherhood were classified into two main categories and eight sub-categories (Table 2).

Table 2: Main categories and sub categories of factors that encourage early marriage and motherhood

Categories	Sub categories
External incentives	Inappropriate economic condition
	Instability of family
	Desire and encouragement of parents
	Influence of others
Internal incentives	Position
	Subjective beliefs
	Meeting inner needs and desires
	Insufficient awareness

1. External incentives

External motivations related to family, life position and community had caused adolescents to get married and become mothers.

1-1: Inappropriate economic conditions: The financial problem was one of unpleasant situations for early marriage. Some adolescents were getting married to improve economic conditions for themselves and their families (Table 3. Quotation 1).

1-2: Instability of the family: Family breakdown, divorce or death of parents had caused adolescents to get married, and separation from family created a better position for them (Table 3. Quotation 2). Trying to resolve family disputes and helping strengthen families were also among reasons stated by adolescents for pregnancy (Table 3. Quotation 3).

1-3: Desire and encouragement of parents: Early marriage of some adolescents was due to urging of their parents. Financial problems, social norms, cultural and religious issues or their personal attitude were encouraged by parents to this desire (Table 3. Quotation 4, 5).

1-4: Copying from others: Excessive interest in friendship and the need to be approved by friends affected the decision of adolescents on marriage (Table 3. Quotation 6). Early marriage of sister or brother had also encouraged adolescents to get married in order to be similar to other family members (Table 3. Quotation 7).

2 - Internal incentives

Some factors that encouraged early marriage were related to adolescents 'desires', and were originated from their beliefs.

2-1: Position: Some adolescents were married in order not to lose such an opportunity. Adequate understanding of the suitor and detecting ideal features in him, were some of the reasons of early marriage (Table 3. Quotation 8). Some of the adolescents thought that, protection of marital relations depended on childbirth. Therefore they had decided to get pregnant (Table 3. Quotation 9).

2-2: Subjective beliefs that encourage the marriage & motherhood: Some adolescents selected marriage because of their subjective thoughts and beliefs. Some considered marriage as God's will and divine destiny and were not opposed to it (Table 3. Quotation 10). The belief "the situation will get better and more comfortable by childbirth", had caused adolescents to get pregnant (Table 3. Quotation 11). Early puberty and gaining some abilities had caused adolescents to imagine that they were ready to get married (Table 3. Quotation 12). Facing cultural beliefs in consequences of contraception had encouraged adolescents to get pregnant and act based on their mentalities (Table 3. Quotation 13).

2-3: Meeting inner needs and desires: Feelings of loneliness and desires, love, respect, and independence had encouraged some adolescents to be married. Adolescents wanted independence and freedom in decision making and expected to be addressed as an influential person. They were tired of parental interferences and were married for love, soul-mate, and value acquirement (Table 3. Quotation 14). Most participants expressed that they wanted a child to get rid of loneliness. Some adolescents had become lonely after separating from previous dependencies such as; family, friend, school, etc... (Table 3. Quotation 15). Also having old parents who had not been able to be friendly with their children, had encouraged adolescent girls to get pregnant and close the age gap between themselves and their children (Table 3. Quotation 16). Love and desire towards baby, and satisfying the sense of possession which is one of the characteristics of adolescence were reflected in the statements of participants (Table 3. Quotation 17).

2-4: Insufficient awareness: Some of the adolescents thought marriage was simple and viewed it as a child play as they lacked sufficient knowledge about it, its meaning and philosophy. They were assuming the marriage only by its apparent applications and had not thought about it seriously (Table 3. Quotation 18). Some of them were presuming childbirth as a simple process, and were unaware of the possible difficulties of pregnancy and childbirth (Table 3. Quotation 19). Not having enough information about the possible mechanisms of pregnancy, unfamiliar with contraceptive methods, and they referred to their imperfect knowledge in this field as the cause of early pregnancy (Table 3. Quotation 20).

Table 3: Quotations of Participants

Quotation 1 "I saw my dad and my mom were struggling financially. They had difficult to covering our costs, so I was helping them as much as I could, I was working, then I thought that it was better to get married. I wanted to leave the home earlier so I could help my parents".p4

Quotation 2 "I was nine years old when my parents got divorced ... my mother married another man. I had a lot of problems with my stepfather and half-sisters and brothers. I could not accept my stepfather as my father.P6

Quotation 3 "My mother-in-law was angry with my mother. My mother said: if you have children, the hatred and resentment between the two families will be resolved".p7

Quotation 4 "When my sisters got married, my father said to me: if a good suitor comes for you, you have to accept him. My parents were satisfied with him so I accepted to get married" p15

Quotation 5 "A few months after our marriage my husband said: we must have a baby as I could not resist my parents' insistence anymore. I did not want to become pregnant too soon, but my husband's parents forced us".p3

Quotation 6 "I saw my friends who were married and also studying. They were satisfied. I thought I could do the same thing. I was always like them; we were buying the same clothes, and having fun together. I did not want to fall behind them. When the first suitor came, I got married". P5

Quotation 7 "Only one of my sisters married when she was 20 and my other sisters and brothers got married at 17 or 18 years. In our family, my siblings get married at early age".p12

Quotation 8 "I knew him very well. They were very nice people... he met my criteria. I was going to school that time, but I thought, if I got married I would be better off because my husband had a good condition. I did not want to miss the chance"p10

Quotation 9 "Three months had passed since our marriage but I was not pregnant yet. I told my husband: if I do not get pregnant we would get divorced, so you could marry again and have kids ... I was really scared".p4

Quotation 10 "It was God's will that we got married. It just happened. I said nothing, and did not oppose it. I let it happen".p1

Quotation 11 "My mother-in-law said; "if you have a baby, God will sort everything out and if there is a problem it will be solved".p6

Quotation 12 "I was fatter than my peers. I became menstruate very soon. I had to cook, clean and do housework. I had learned lots of things. My attitude was like older women, and I understood more than my age. I thought, I knew how to deal with husband and his family. My general knowledge was so high that older people were consulting with me."p8

Quotation 13 "My mother-in-law said; "if you use contraceptive pills, you may never get pregnant. Contraception is not good". She said: if I use contraceptive pills, my ovaries may stop working forever and I could never have children".p14

Quotation 14 "Before I was married, my parents decided for me. I wanted to be independent and I didn't like people interfere in my business. I wanted to get married as soon as possible, perhaps I would have more freedom. I wanted to get married to somebody that I love. Someone that we could make plan for our life together, and ask me what I like. We would have fun together and be together".p3

Quotation 15 "As I have no sister or brother, father, mother or friends, I decided to get pregnant, no one was beside me".p11

Quotation 16 "I like to have a grown up child when I am still young, because my parents were old and they could not understand me. I wished my parents were younger so we could talk with each other. I liked to get married early so my children wouldn't feel the same".p2

Quotation 17 "I like kids very much. I wanted to have children. When I saw other people's children, I wanted to have a baby too". P8.

Quotation 18 "My dad said: do you want to get married? Yeah, I like it very much I replied. I did not know what marriage means. I thought it was very good, I could put makeup whenever I wanted, and I could showoff my colored hair, my wedding ring and other stuff. Now I understand how playful and childish I was thinking".p9

Quotation 19 "I thought having a baby is very simple, I did not think it is hard. I did not think of childbirth and I was just thinking of having a baby".p16

Quotation 20 "I did not want to become pregnant. I was using contraception but I got pregnant. I did not think that getting pregnant happened so easily. I did not know how I can be pregnant. I wanted to do something in order not to get pregnant. I had heard there were ways to prevent or quit pregnancy but did not know them very well".p13

Discussion

In Iranian culture, being a mother is a predictable and ordinary event that happens after marriage and the reasons for early motherhood lay in early marriage. The minimum legal age of marriage in Iran is 13 for girls and 15 for boys, but there is no legal impediment to early marriage(6). Due to lack of laws or their implementation, there is no possibility to protect the girls from early marriage in many countries (18, 25, 27). In Iranian culture, women are expected to get pregnant as soon as they get married, and if this does not happen, people would assume there exists a problem and women should provide an explanation.

Early marriage and motherhood of the participants was in response to external and internal instincts.

A poor economic condition was among the causes of early marriage. Several studies indicated that poverty is one of the main causes of early marriage which is a survival strategy for cutting the costs for poor families (3, 4, 6, 7, 18-20, 22, 25, 28, 29).

Family breakdown was another incentive for early marriage. In Iran, offspring are highly dependent on family and the existence of parents who have special roles and responsibilities is essential. Divorce or death of a parent can change the normal process of family life. Coyne (2014) recognized the breakdown of family structure and the absence of the father as the reasons for early marriage and motherhood(24).

A group of adolescents were married due to the urge of their parents and relatives. Such a situation occurs mainly in traditional families. UNICEF identifies the most important reasons for early marriage as; the urge of parents, the need for self-esteem and social approval, relatives' pressure; preventing social stigma, staying unmarried in girls, and sex before marriage(3, 20). In Iranian culture, the most important reasons for parents' tendency towards early marriage of their daughters include; protect the girl and ensure her purity, security and safety. Of course, this is the parent's view and daughters may not agree. Worry of some parents from harassment has caused them to be interested in early marriage of their daughters. Most of the daughters in traditional Iranian culture accept decisions of parents without any disagreement. Thus sometimes parents don't consider desires of adolescents. Early marriage in many cultures is a way to avoid sin and sexual promiscuity (without legal marriage)(19). In these cultures, unmarried girl's sex is an odious sin and creates severe social stigma for family. The Muslims of Iran believe, marriage is the best way to meet the sexual needs even when a girl and boy are very young. In Islamic countries, because of religious beliefs in favor of early marriage and fear of pregnancy outside the marriage, parents agree with the marriage of their daughters at first opportunity(20, 22). Some adolescents decided to get pregnant to meet the demands of the relatives, especially the husband and his family. In Iranian culture, having children is fundamental and preservative of marital life and couples have children

to strengthen the relationship between themselves and their families. Kibretb (2014) stated that, one of the reasons for motherhood among adolescents is to help strengthen family relationships(4).

Some adolescents were married to be like their families or friends. Netsanet (2015) believes that, early marriage of mother increases the likelihood of her daughter to copy her(3). Most mothers prefer their daughters to get married at the same age as they did(7). This kind of mothers inculcate to their children that early marriage is a social value. Adolescents' tendency to emulate peers is also another reason for this copying behavior(30). Also, the media encourage adolescents to sexual relations.

Some of the adolescents were married to avoid losing the position. One of the social issues affecting early marriage is the fear of not finding a suitable partner. This belief exists in traditional Iranian culture, especially in rural areas. In some provinces of Iran, adolescent girls have the best suitors for marriage because the best men tend to marry girls who are at the peak of beauty. When the age of a girl increases, her opportunities for marriage diminish. Hence, families prefer early marriage of girls to prevent this problem. In some other cultures, any delay in marriage makes them believe that the girl does not have many options, so the girls get married when they have their first suitable opportunity(3). From the Muslims' point of view (including Iranians) some events are divine destinies, and will happen whether we want them or not, so must accept them. Marriage in adolescents was considered as such an event. In Iranian culture, there is this belief that marriage will happen, if God will. So the marriage time is at "hands of God". Existing religious beliefs of the society had caused adolescent mothers to see children as the reason for receiving God's blessing. They believed that, having children would make their life better so they had decided to get pregnant. Iranians believe, when a child is born, he/she brings many gifts for the family, and God paid more attention to family. Most adolescents believed they had enough physical preparation for marriage, and did not pay attention to mental social, financial, and spiritual preparation that are essential for marriage and making a family. Rapid physical growth during adolescence created the impression that they were prepared for marriage. Early marriage also is more common in adolescents who feel the emotional readiness for marriage. They believe they should offer their love and affection to another human(19). In Iran, marriage is legal and religious way of expressing love and Iranian culture supports adolescents who married to achieve love.

A group of adolescents were married to meet their inner needs and desires. Adolescents at this age are full of emotional instability and become interested in early marriage to get love and affection(19). Another encouraging factor for early marriage was gaining independence. Interference of people, especially parents were unpleasant for some adolescents, so they preferred getting married than obeying their parents. Being interested in having children and responding to inner desires such as getting rid of loneliness was causing adolescent mothers to get

pregnant. Some of the reasons that influence adolescents decision about pregnancy which included; an interest in having children, growing up (responsible, mature, independent), receiving love of the husband and getting rid of loneliness, having a sense of ownership (having a child) and increasing self-confidence (being a good mother)(31). Some of the adolescent mothers believed that, early motherhood depended on the energy and strength of the mother and having a small age gap with children can be beneficial for both mother and children.

Some others thought marriage was simple. Lack of sufficient information about the consequences of early marriage and suitable age for marriage had caused adolescents to believe marriage is simple(7, 29). Insufficient knowledge of adolescents about pregnancy, childbirth, and childrearing had also caused them to assume having children is a simple process, and they decided be pregnant. More participants in this study had been pregnant unintentionally. Majority of adolescents did not have adequate information about sex and pregnancy mechanism, and were using contraception incorrectly or did not have access to it (15, 16, 32, 33). Married adolescents are forced to have sex under the pressure of spouse, family and community that will ultimately lead to pregnancy(33, 34).

In Iranian culture, married women must be engaged in sex and married teens are also not excluded from this law.

In issue of early marriage and motherhood, the youth, mass media, schools, neighbors, religious centers, parents, researchers, health centers, and policy makers must be considered. Health providers can improve families' economy by introducing them to support centers. They could also help family disputes by providing appropriate counseling and advice. Providing appropriate education for adolescents, parents and other people involved can lead to appropriate and timely marriage. Identifying adolescent mothers' educational and caring needs and providing appropriate training and care can prevent unwanted pregnancy and its consequences. School nurses can use the influence of friends to promote optimum health behaviors in adolescents. All of these services must be done in accordance with the principles of counseling adolescents, in order to empower them in decision making and solving challenges. However, the sample size of this study was small and looked at only part of multiple cultures Iranian, so researchers suggest the need for similar research in the field.

Conclusion

The findings of this study showed that, decision for marriage and early motherhood is influenced by adolescents' external motivations (related to society and life situations) and internal motivations. Exploring the cultural context of different societies can guide healthcare policymakers in identifying high-risk groups and predict the consequences of this phenomenon with respect to different cultures' view, because achieving optimum health of mothers and child requires close examination of

factors affecting marriage and motherhood. Adolescents, parents, teachers, and other influential people should be trained on the negative consequences of early marriage and motherhood. Health policymakers in Iran and other countries should protect girls against early marriage and motherhood, because adolescents need sufficient time to properly grow, and for development, and success.

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References

1. Kamal SM, Hassan CH, Alam GM, Ying Y. Child marriage in Bangladesh: trends and determinants. *Journal of biosocial science*. 2015;47(01):120-39.
2. Sumon MNK. Differentials and Determinants of Early Marriage and Child Bearing: A study of the Northern Region of Bangladesh. *Int j sci footpr*. 2014;2(1):52-65.
3. Netsanet T. The Causes, Current Situation and Socio-economic Consequences of Early Marriage: The Case Of Nyagatom Community: AAU; 2015.
4. Kibretb GD. Determinants Of Early Marriage Among Female Children In Sinan District, Northwest Ethiopia. *Health Science Journal*. 2015;9(6):1-7.
5. Psaki SR. Addressing early marriage and adolescent pregnancy as a barrier to gender parity and equality in education. Background Paper for EFA Global Monitoring Report. 2015.
6. Montazeri S, Gharacheh M, Mohammadi N, Alaghband Rad J, Eftekhari Ardabili H. Determinants of Early Marriage from Married Girls' Perspectives in Iranian Setting: A Qualitative Study. *Journal of environmental and public health*. 2016;2016.
7. Matlabi H, Rasouli A, Behtash HH, Dastjerd AF, Khazemi B. Factors responsible for early and forced marriage in Iran. *Science Journal of Public Health*. 2013;1(5):227-9.
8. Pogoy AM, Verzosa R, Coming NS, Agustino RG. Lived Experiences Of Early Pregnancy Among Teenagers: A Phenomenological Study. *European Scientific Journal*. 2014;10(2):157-69.
9. Gyesaw NYK, Ankomah A. Experiences of pregnancy and motherhood among teenage mothers in a suburb of Accra, Ghana: a qualitative study. *International journal of women's health*. 2013;5:773-80.
10. worldbank. Adolescent fertility rate 2016. Available from: <http://data.worldbank.org/indicator/sp.ado.tfrt>.
11. Pitso T, Kheswa J. The Vicious Cycle of Teenage Motherhood: A case study in Eastern Cape, South Africa. *Mediterranean Journal of Social Sciences*. 2014;5(10):536-40.
12. Riva Crugnola C, Ierardi E, Gazzotti S, Albizzati A. Motherhood in adolescent mothers: Maternal attachment, mother-infant styles of interaction and emotion regulation at three months. *Infant Behavior and Development*. 2014;37(1):44-56.
13. Monstad K, Propper C, Salvanes KG. Is teenage motherhood contagious? Evidence from a Natural Experiment. *Nowegian School of Economics, Department of Economics*: 2011 0804-6824.

14. Sarreira de Oliveira P, Néné M. Nursing care needs in the postpartum period of adolescent mothers: systematic review. *Journal of Nursing UFPE on line* [JNUOL/DOI: 105205/01012007]. 2014;8(11):3953-61.
15. Rahman MM, Goni MA, Akhter MR. Correlates of early motherhood in slum areas of Rajshahi City, Bangladesh. *Avicenna*. 2013;6:1-5.
16. Diaconescu S, Ciuhodaru T, Cazacu C, Sztankovszky L-Z, Kantor C, Iorga M. Teenage Mothers, an Increasing Social Phenomenon in Romania. Causes, Consequences and Solutions. *Revista de Cercetare si Interventie Sociala*. 2015;51:162-75.
17. Malhotra A. The Causes, Consequences and Solutions to Forced Child Marriage in the Developing World. International Center for Research on Women (ICRW) US House of Representatives Human Rights Commission, Washington DC. 2010;15:1-12.
18. Okonofua F. Prevention of Child Marriage and Teenage Pregnancy in Africa: Need for more Research and Innovation/Il faut encore plus de recherche et d'innovation dans la prévention de la grossesse chez les enfants et les adolescentes dans les mariages africains. *African Journal of Reproductive Health/La Revue Africaine de la Santé Reproductive*. 2013;17(4):9-13.
19. Hejaziey D. The Relationship between Adolescent Development and Marriage in Cirendeu Village, District East Ciputat, South Tangerang, Banten Province of Indonesia. *International Journal of Psychological Studies*. 2016;8(1):162-77.
20. Jain G, Bisen V, Singh S, Jain P. Early marriage of girls as a barrier to their education. *International Journal of Advanced Engineering Technology*. 2011;2(3):193-8.
21. Mahato SK, Dhakal RK. Causes and Consequences of Child Marriage: A Perspective *International Journal Of Scientific & Engineering Research*. 2015;7(7):698-702.
22. Ezeah P. Marriage and motherhood: a study of the reproductive health status and needs of married adolescent girls in Nsukka, Nigeria. *Journal of Sociology and Social Anthropology*. 2012;3:1-6.
23. Shrestha A. Teenage pregnancy in Nepal: consequences, causes and policy recommendations. 48th International Course on Health Development; Vrije Universiteit Amsterdam: KIT (Royal Tropical Institute) Development, Policy and Practice; 2012.
24. Coyne CA. Quasi-experimental approaches to understanding the causes and consequences of teenage childbirth: Indiana University; 2014.
25. Mulchandani LI. Determinants of Child Marriage. *International Indexed & Referred Research Journal*. 2012;3(32):13-4.
26. Elo S, Kyngäs H. The qualitative content analysis process. *Journal of advanced nursing*. 2008;62(1):107-15.
27. Sibanda T, Mudhovozi P. Becoming a Single Teenage Mother: A Vicious Cycle. *J Soc Sci*. 2012;32(3):321-34.
28. Sabbe A, Oulami H, Zekraoui W, Hikmat H, Temmerman M, Leye E. Determinants of child and forced marriage in Morocco: stakeholder perspectives on health, policies and human rights. *BMC international health and human rights*. 2013;13(1):43-56.
29. Khanam K, Laskar BI. Causes and Consequences of Child Marriage—A Study of Milannagar Shantipur Village in Goalpara District. *International Journal of Interdisciplinary Research in Science Society and Culture(IJIRSSC)*. 2015;1(2):100-9.
30. Kapinos KA, Yakusheva O. Long-Term Effect of Exposure to a Friend's Adolescent Childbirth on Fertility, Education, and Earnings. *Journal of Adolescent Health*. 2016;59(3):311-7. e2.
31. Butler K, Winkworth G, McArthur M, Smyth J. Experiences and Aspirations of Younger Mothers. Institute of Child Protection Studies, Australian Catholic University, Canberra. 2010.
32. Mothiba TM, Maputle MS. Factors contributing to teenage pregnancy in the Capricorn district of the Limpopo Province. *curationis*. 2012;35(1):1-5.
33. Alenkhe OA, Akaba J. Teenage pregnancy in Benin City: Causes and Consequences for Future National Leaders. *International Journal of Social Sciences and Humanities Review*. 2013;4(2):33-41.
34. Kalamar AM, Lee-Rife S, Hindin MJ. Interventions to prevent child marriage among young people in low- and middle-income countries: a systematic review of the published and gray literature. *Journal of Adolescent Health*. 2016;59(3):S16-S21.

The Effectiveness of Cognitive-Existential Group Therapy on Reducing Existential Anxiety in the Elderly

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Abstract

Introduction and Objective: The elderly experience significant developmental changes due to the effects of aging; a common consequence is the activation of existential anxieties. In spite of the natural and constructive nature of existential anxiety, inappropriate response may lead to neuroticism. This study aims to investigate the effectiveness of cognitive-existential therapy on reducing existential anxiety in the elderly.

Method: The present study was carried out using a pretest-posttest semi-experimental design with control group and random assignment. The statistical population included all the elderly women in Yas Daily Rehabilitation Center. In this study, 20 people were selected through non-random sampling and after answering the Existential Anxiety Questionnaire (Masoudi Sani, Bahmani, 2015) and Cognitive Distortions Questionnaire (Abdollahzade et al. 2010 quoted from Farmani-Shahreza et al. 2016) were randomly assigned to experimental and control groups (each group included 10 people). The experimental group participated in 12 cognitive-emotional group therapy sessions (each

session 90 minutes) once a week in, but the control group did not receive any intervention. The collected data were processed using SPSS-20 software to calculate covariance analysis.

Results: The results showed a significant reduction in the existential anxiety and cognitive distortions compared to the pretest. Also, in a two month follow-up session, existential anxiety and cognitive distortion scores were significantly reduced compared to pretest.

Conclusion: The findings of this research can be considered as a confirmation of the basic assumption of the cognitive-existential approach about the effect of correcting cognitive distortions that activate non-authentic responses to the existential anxieties.

Key words: cognitive-existential group therapy, existential anxiety, cognitive distortions, the elderly

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Introduction

Elderliness is a phenomenon that is caused by changes in biology, physiology, biochemistry and anatomy in the cells of the body, these changes affect the function of the cells, and it begins at age 60. It is not a disease but a natural process of transformation that cannot be stopped or reversed (World Health Organization, 2001).

Iran is experiencing the establishment of aging phenomenon. Statistics show that in 2011, the population of the elderly over 60 was about 3.8% of the total population of the country (Iran Statistics Center, 2013), and it is expected that the number of elderly will reach 10 million people, that is about 10% of the total population (Malayeri & Jafari, 2004).

Elderly people experience different consequences in terms of physical, socio-economic, family, psychological, and (existential) being dimensions. In the physical aspect, the elderly experience several problems, including: 1. chronic physical illnesses such as high blood pressure and cardiovascular diseases and diabetes; 2. decreasing abilities such as vision and hearing; 3. Neuropsychological disorders, such as dementia, Alzheimer's and Depression (Duberstein et al., 2008).

In socioeconomic and family dimensions, problems such as declining financial status, loss of job and social status, death or immigration of close relatives, friends and peers (Wurtman, 1993), and loneliness due to physical weakness and reduced mobility (Mussen et al., 2005) have been reported. In the psychological aspect major problems include: depression (Stuart et al., 2005), feelings loneliness (Heravi Karimloo et al. 2007; Wurtman 1993), impatience, anger, feelings of emptiness, anxiety and concern, insomnia, tiredness and fatigue (Kaldi & Foroughan, 2004).

From other dimensions of aging, one can point out existential anxieties that are not necessarily clinical and illness but can be painful and annoying (Yalom, 1980). The increasing awareness of the elderly about the finiteness of life manifests itself with the emergence of the first signs of aging, and anxiety about the loss of control, t physical deterioration (Robbins, 1392) which indicates the arrival of the last stage of life. Diseases such as cancer and heart disease, among friends and acquaintances of the same age, inform the person they are entering this stage. One thinks that he has had limited time, while he has many unfinished projects (Wayne Saint, 2003). In the eyes of the elderly, loneliness is an unpleasant, negative, agonizing, hard, terrible and painful personal experience that creates a sense of impatience, uselessness, frustration, sadness, anxiety and hopelessness (Heravi Karimloo et al. 2007). Confronting existential issues including death, feelings of emptiness and meaninglessness, loneliness, uncertainty and unpredictability of the future, the elderly may face problems which provoke existential anxieties.

Existential anxiety is the result of awareness of the unstable characteristics of human situations. Indeed, since each of us desperately needs eternity, solidity, coexistence and purposefulness of life, and at the same time, all of us will end up with the inevitability of death, groundlessness of existence, loneliness, and absurdity, as a result of this conflict we experience existential anxiety (Yalom, 1980)

According to Kierkegaard, the main axes of anxiety are death, freedom, loneliness and meaning (Kierkegaard, 1848; Poiman, 1990; Yalom, 1980).

The fundamental conflict that causes the anxiety of death is the desire for survival, the continuation of life, and the awareness of mortality and the inevitability of death (Yalom, 1980, 2008; May and Yalom, 2000). According to Yalom, responsibility and choice are the attendants of freedom. The fundamental contradiction arises from the fact that human beings need to have a structural basis for life but there is no basis. The conflict between groundlessness and the desire to have a firm base leads to anxiety (Webb, 2008; Sand, 2008). The loneliness anxiety begins where one loves to be part of a whole; have an honest relationship with others and be protected by others, but in the real world he/she finds that none of these events are realizes and he/she is unmercifully lonely (Kierkegaard, 1848). Stager and Frasber (2006) considered the nature of man to find meaning in life. Because the basic human need is searching for meaning and achieving perfection this quest does not necessarily lead to a meaningful life (Kernan & Lepore, 2009). The existential conflict is created because we must find meaning for a universe that lacks any design and semantics by itself, and set goals for a future that is unpredictable (Yalom, 1980; Sand, 2008).

According to the existential view, genuine response to existential anxieties depend on our awareness and acceptance of such anxieties (Prochaska & Norcross, 1999). All people experience those anxieties but not all of them face personality and communication problems (Blinderman & Cherny., 2005). Misunderstanding of self as a human being and overlooking the givens of existence paves the way to neuroticism (Poiman, 1990).

Pathological anxiety is the product of an individual's quest for escaping and overcoming the inevitable givens of being, through the use of defense mechanisms, causing self-deceit, self-alienation, and getting away from the realities of existence. This type of anxiety is usually out of consciousness and prevents the individual from movement. Therefore contrary to the natural anxiety that is constructive, pathological anxiety is a destructive mental disorder (Corey, 2005).

Also in the elderly, this process can lead to the formation or intensification of psychological problems. The elderly need to have the ability to respond to fundamental existential problems and as they get older, responding to these issues can be a significant contribution to their inherent and fundamental concerns (Langle & Probst, 2000). If they cannot find genuine answers to their existential issues they will suffer pathological anxiety.

A range of psychological interventions have been used to reduce the psychological problems of the elderly, which indicates the need for psychological services for these elderly people. This range includes: cognitive-behavioral therapies (Hedayat, 2015; Barghi Irani, 2015), existential group therapy (Mooziri, 2013), spirituality-based cognitive therapy (Rahimi, 2014), group logo therapy (Poorebrahim, 2006; Fakhar, 2007, Yazdan Bakhsh, 2015); memory telling (Majzoobi, 2012), and hope therapy (Parvaneh, 2015). The literature indicates that existential group therapy and group logo therapy were not effective on the elderly (Mooziri, 2013; Poorebrahim, 2007; Fakhar, 2007).

Furthermore, the focus of most interventions for the elderly has been on the treatment of death anxiety, feelings of loneliness, depression, and enhancement of life expectancy, happiness, self-efficacy, mental health, quality of life and quality of sleep in the elderly. It seems essential to address the anxieties of being due to the prevalence, while less attention has been paid to existential anxieties in the elderly. Also the studies on existential anxiety in the elderly have just focused on one of the four factors of existential anxiety. Therefore, in this study, the Existential Anxiety Questionnaire (Masoudi Sani, Bahmani, 2015) has been used for the first time.

It would be beneficial to find the most effective and practical intervention method to reduce existential anxiety subsequent to aging due to the need to respect the human rights of the elderly and also to save time, effort and facilities. In cognitive-existential group therapy, it aims to use techniques of "cognitive therapy" to refine some schemas, negative automatic thoughts, and to correct the cognitive errors that contribute to the formation of psychological distress caused by the non-genuine response to existential anxiety. Moreover, this method pays attention to existential concerns such as death anxiety, uncertainty, meaninglessness, loneliness, and uncontrollability of the world that are intensified by the death threat in patients. In most intervention methods such concerns do not receive systematic attention. Therefore, it is expected that through this intervention, individuals will find their own unknown fears and conflicts over the issues of existence and will be able to cope with them in a genuine and effective way (Bahmani, 2010). Previous studies indicate that cognitive-existential therapy plays an effective role in reducing psychological distress in different populations (Bahmani, 2010; Naghyiaee, 2014, Farmani Shahreza, 2014; Eskandari, 2013; Paknia, 2015). In this regard, we seek to investigate the impact of this intervention on the elderly and to answer the question of "whether cognitive-existential group therapy can reduce existential anxieties in the elderly?"

Method

The study was carried out using a pretest-posttest semi-experimental design with control group and random assignment. The statistical population included all the elderly women in Yas Daily Rehabilitation Center. The sample included 20 people selected through a non-

random sampling from among the elderly present in the center during the sampling period (summer 2016) who were prepared to participate in the group therapy and were eligible for inclusion criteria. The sample was divided into experimental and control groups in a random assignment (10 individuals in each group).

In this research, the dependent variable is measured before and after the presentation of the independent variable, and its design graph is as follows:

Experimental Group	G ₁	T ₁	X	T ₂	T ₃
Control Group	G ₂	T ₄	-	T ₅	T ₆

T1 and T-4 represent the pretest, T2 and T5 the posttest, T3 and T6 show the follow-up and X is the Cognitive-Existential Group Therapy.

Instruments

In this research, Existential Anxiety Questionnaire, developed by Masoudi Sani and Bahmani (2015), was used to measure existential anxieties. This questionnaire has 29 statements and 4 subscales: 1- Death anxiety, 2- Responsibility anxiety, 3- Meaning Anxiety, and 4. Loneliness anxiety. The content validity of the instrument is based on the opinion of 10 experts, using the ICC method was 0.95 and the reliability of the instrument was 0.83 and 0.86, respectively, by Cronbach's alpha and test-retest method.

In order to measure cognitive distortions, the 20-item scale of Cognitive Distortions developed by Hassan Abdollahzadeh and Maryam Salar (2010) was used. The standardized Cronbach's alpha was 0.80. The questionnaire consists of 20 statements to measure the cognitive distortions proposed on the basis of Albert Ellis's theory and each irrational thought has 2 statements. Thus, statements 1 and 2 assess Polarized thinking; 3 and 4, Overgeneralization; 5 and 6, Filtering; 7 and 8, Disqualifying the positive; 9 and 10, Jumping to conclusions and fortune telling including mind reading and misconception; 11 and 14, Exaggeration and Minimization; 12 and 13, Emotional reasoning; 15 and 16, Should statements; 17 and 18, Labeling; and finally 19 and 20 assess Personalization. The Higher total score reflects a more positive thinking; however statement 1 is scored in reverse (Abdollahzade et al. 2010 quoted from Farmani-Shahreza et al. 2016).

Procedure

After preliminary studies and preparation of the protocol, and receiving a referral letter from the University of Welfare and Rehabilitation Sciences to the Welfare Organization of Tehran province, we got the necessary permissions and referred to the Yas Daily Rehabilitation Center. The research process began after permission was gained from the head of the Center. First, through broadcasting announcements and talks with the elderly in the Yas Daily Rehabilitation Center, they were informed of the study. Subsequently, describing the research goals and obtaining consent from the elderly and observing the ethical rules, the conditions for the participation in the research

were prepared. After interviewing the individuals and completing Existential Anxiety and Cognitive Distortions questionnaires, twenty elderly were selected according to inclusion and exclusion criteria and randomly assigned to the control and experimental groups. The inclusion criteria were: age of 60 and over, having the ability to speak, having no cognitive problems and a score of over 70 in the Existential Anxiety Questionnaire. Exclusion criteria included: having mind and brain disorders such as Parkinson's and dementia, having any psychiatric disorders based on the written contents of their file in the center and use of any psychotherapy and counseling services at the time of the research.

Subsequently, cognitive group therapy was performed for 12 sessions of 90 minutes and once a week for the experimental group (Table 1), while the control group received no intervention. In order to observe ethical issues, after group treatment with the experimental group, group therapy was also performed for the control group. At the last session, the mentioned questionnaires were repeated on the participants of both groups. In order to ensure the durability of the therapeutic results, two months after the completion of the group therapy in the follow up phase, the participants again were assessed using questionnaires.

Data from pretest and posttest was entered in version 21 of SPSS software. After analyzing the assumptions of covariance analysis, this statistical method was used to analyze the data. Covariance analysis limits or eliminates the effect of the pretest variable and measures it using the regression equation. Among the important assumptions of this statistical method was the homogeneity of variances using Levene's test and Normality test by Kolmogorov-Smirnov test. These assumptions were checked and verified in the study.

The ethical considerations of this study included the following topics: 1) the participants in the research were assured that the information received would be confidential; 2) scores were given to those who would like to know their scores; 3) the planning of group counseling sessions was carried out in a way that would not interfere with the programs of the Yas Daily Rehabilitation Center; 4) The control group was assured that they would participate in eight sessions of Cognitive-Existential group therapy after the end of the research; 5) Any of the participants could freely leave the program at any time during the research.

Table 1: The protocol for cognitive-existential group

Sessions	Objectives
First	Setting goals and defining the process of cognitive-existential group therapy Explaining the outline of the sessions that are essential for creating group atmosphere in the sessions
Second	Continuation of the work for the desirable establishment of the group's forming traditions: accountability for themselves and others Introduction to the concept of existential anxiety and its difference from neurotic anxiety
Third	Investigating the concept of death anxiety and the related cognitive distortions
Forth	Helping to accept loneliness as a genuine experience to increase the desire and motivation for being with others and family members
Fifth	Challenging false beliefs about loneliness and social isolation, feelings of rejection, dependency, feelings of uselessness, hopelessness, fear of death and dying
Sixth	Helping the individuals to face the consequences of not accepting responsibility and ignoring the principle of freedom and choice
Seventh	Helping to reduce the fear of dependency and the sense of uselessness and hopelessness as sources of anxiety
Eighth	Challenging the concept of losing meaning in life Helping the elderly to find effective meaning and be free of cognitive distortions
Ninth	Continuing the process of reviewing goals and establishing new directions in life
Tenth	Facilitating continuous and consistent commitment to work in order to achieve new goals
Eleventh	Wrap-up session
Twelfth	Expressing the feelings of the participants about the group therapy Coordination for the follow-up meeting Post test

Results

The sample consisted of 20 elderly women with an average age of 70 who were randomly assigned into two groups of 10 in experimental and control groups (waiting list). According to the results of the Mann-Whitney U test, the two groups were homogeneous in demographic variables of age and education. In addition, the assumptions of the covariance test for the normality of the data distribution were confirmed by Kolmogorov-Smirnov test and homogeneity of variances were confirmed by Levin's test of two groups in dependent variables of existential anxiety and cognitive distortions.

Table 2: Mean and standard deviation of the existential anxiety scores and its subscales in the experimental and control groups in the pretest, posttest and follow-up

Variable	Test stage	Experimental group		Control group	
		Mean	standard deviation	Mean	standard deviation
Meaning anxiety	pretest	23.30	2.79	23.50	2.99
	Posttest	18.90	3.69	23.70	2.90
	Follow up	19.20	3.85	24	2.98
Death anxiety	pretest	17.40	1.42	17.20	1.54
	Posttest	13.40	4.35	17.90	1.59
	Follow up	14.40	4.27	19.30	2.05
Loneliness anxiety	pretest	14.50	1.50	13.70	1.70
	Posttest	11.10	1.37	14.50	1.64
	Follow up	12.70	2.51	14.40	2.01
Responsibility anxiety	pretest	26.90	1.79	25.90	2.46
	Posttest	21.90	2.28	25.60	2.71
	Follow up	22.30	2.35	25.70	2.75
Existential anxiety	pretest	82.40	4.42	80.30	5.57
	Posttest	65.30	8.05	81.30	5.20
	Follow up	66.90	8.26	82.40	6.20

In Table 2, the comparison of mean scores in the pretest, posttest and the two-month follow up of the experimental group showed that the scores in the posttest and follow-up were reduced compared to the pretest.

Table 3: Mean and standard deviation of cognitive distortion scores in pretest, posttest and follow up

Variable	Test stage	Experimental group		Control group	
		Mean	standard deviation	Mean	standard deviation
Cognitive distortions	pretest	49.80	3.11	50.50	3.83
	Posttest	67.30	4.11	51.10	3.95
	Follow up	65.60	5.08	50.90	3.98

In Table 3, the comparison of mean scores of cognitive distortions in the pretest, posttest and follow-up tests showed that scores in post-test and follow-up were increased in comparison with the pretest. Considering that the higher the number of scores, the more positive the thinking is; the increase in scores shows that the cognitive distortions have been decreased.

Table 4: The results of covariance analysis of the comparison of the experimental group and control group in existential anxiety and its subscales' post-test scores

Variable	Source of variance	Sum of squares	Degrees of freedom	Average squared	F	Sig	Effect size	Statistical power
Existential anxiety	Pretest	583/029	1	583/029	40/427	0/000		
	Group	1610/110	1	1610/110	111/644	0/000	0/868	1
	Error	245/171	17	14/422				
	Total	109566	20					
Meaning anxiety	Pretest	175/988	1	175/988	130/012	0/000		
	Group	104/917	1	104/917	77/508	0/000	0/820	1
	Error	23/012	17	1/354				
	Total	9388	20					
Death anxiety	Pretest	0/004	1	0/004	0/000	0/985		
	Group	100/657	1	100/657	8/853	0/008	0/342	0/801
	Error	193/296	17	11/370				
	Total	5193	20					
Loneliness anxiety	Pretest	2/597	1	2/596	1/138	0/301		
	Group	60/261	1	60/261	26/140	0/000	0/608	0/998
	Error	38/803	17	2/283				
	Total	3376	20					
Responsibility anxiety	Pretest	64/466	1	64/466	22/442	0/000		
	Group	98/815	1	98/815	34/412	0/0000	0/669	1
	Error	48/834	17	2873				
	Total	11463	20					

As shown in Table 4, participation in the cognitive-emotional group therapy has significantly decreased the existential anxiety and its subscales in the elderly. Also in the follow-up phase, a significant decrease was continued.

Discussion

The aim of this study was to investigate the effectiveness of interventions that are more appropriate to the specific needs of the elderly and to provide more effective helping methods for reducing the concerns and the existential crises of the elderly. In this regard we examined the general assumption that "cognitive-existential group therapy reduces the existential anxiety of the elderly".

As the findings in Table 4 show, the findings confirm the mentioned hypothesis. It seems that the cognitive-existential group therapy and the elements proposed in the treatment protocol, as well as the special way of relations in the sessions have been able to create a positive and significant change in reducing the existential anxiety and its subscales. It should be considered that the treatment atmosphere in the cognitive-existential group therapy is based on listening to the subject's stories considering the here and now, familiarity with the sufferings of others, the use of emotional support and receiving feedback from different people to reduce the feeling of being victim, the uniqueness of the problem, loneliness and helplessness, discrimination and oppression, feeling of security, secrecy, reflection and empathy, emotional release, self-disclosure, exposure, feedback, affection, acceptance and humour; this can be mentioned as a positive factor for this approach. In this method, the group continued the

sessions assuming that the confidence and sympathy between the group members persists and the psychological refinement was done every session.

Part of the content of the cognitive-existential group therapy helps understanding the phenomenological world of individuals using the prepared existential concepts. Using such concepts helps individuals to encounter their existential anxiety and to communicate with their original selves with all the inevitable existential anxieties and instead of denying and reprimanding their unpleasant feelings and emotions, experience them and take responsibility for their feelings, and most importantly, express these feelings and emotions. According to Kissan it is a useful intervention method that can deal with these fears fast and clear enough and can help reduce mental health problems (Kissan, et al., 2002; quoted from Bahmani et al., 2010).

During the treatment process, the elderly were involved with their existential questions. These questions caused them to activate and discharge their existential anxieties. In general, during the sessions, it became clear that feeling of lack of a worthwhile future and lack of self-efficacy to achieve it, inevitability and fear of death, lack of faith in the future, feeling of hopelessness, lack of meaning and purpose, and loneliness deprives the elderly from the motivation to try. Existential crisis and disturbances are developed as a result of fear of confrontation with

existential anxieties. So during the group process, we tried to help the elderly understand the unpredictability of the world and the uncertainty of the universe, assess their thoughts and assumptions about the uncontrollability of death and loss of opportunities in the past and the resulting anxieties, identify and challenge their cognitive distortions about the meaning of death anxiety (seeing death as the end of everything, unwillingness to track down their illnesses, fear of being forgotten after death, fear of painful death, disqualifying their efforts in their lives, fear of disability) and end their fears by accepting the anxiety of unpredictability and death. We also tried to introduce the concept of fundamental loneliness anxiety and help them identify and challenge their cognitive distortions about the meaning of loneliness (not being understood by close people, especially their spouse and children, the feeling of failing to understand others, the feeling of separation from children, attachment to other individuals to escape loneliness) and accept loneliness as a genuine experience to increase the desire and motivation to be with others and family members. They were also helped to challenge the meaning of their lives created by psychological disturbances and existential anxieties, and find a meaningful term for their lives, and change their attitudes toward problems and tolerance of difficulties, and through giving meaning to the sufferings and pains, change their focus from what has been lost, because the sense of the new meaning and purpose in life during the aging period (which includes the ability to combine and integrate the experiences and achieve an understanding of themselves and the world) is a protective factor against meaninglessness. Also, in the process of group therapy, elderly people tried to accept responsibility and freedom of choice, to identify and challenge their cognitive distortions about the anxiety of responsibility and freedom of choice (assigning responsibility for life events to others or social, cultural, economic, etc. circumstances, leaving the choice to others, believing in luck, trying to show oneself as victim) and to evaluate their priorities and decisions, and accept their own responsibility for their own destiny. In general, the group therapist tried to help the elderly to accept cognitive distortions that prevented them from experiencing existential anxieties and activated their defense mechanisms.

In general, according to previous studies, cognitive-existential group therapy can be considered as a suitable factor in reducing different types of mental disorders. Bahmani et al. (2010) in their research showed that cognitive-existential group therapy was more effective than cognitive therapy in reducing the mean of depression and increasing the mean of hopefulness.

Previous studies, consistent with the present study, Kissan et al. (1997) showed that using this method of treatment is helpful to reduce the amount of sadness and grief in patients with cancer, increase their problem solving ability and also create cognitive strategies. Breitbart (2001) suggested that existential therapies are one of the most appropriate approaches to reduce depression and increase hope in cancer patients. In addition Kissan et al. (2003) concluded that cognitive-existential therapy has a positive effect in reducing overall symptoms of psychological distress in

women with non-metastatic breast cancer. In another study, Kissan et al. (2004) concluded that this method would greatly reduce psychological distress and anxiety, and improve family relationships.

Therefore, according to the findings, the cognitive-existential therapy has been able to affect people with chronic conditions such as cancers, breast cancer, human immunodeficiency virus, and the elderly. This should be due to the main distinguishing feature of this intervention method, namely, paying attention to the existential anxieties and considering here and now during the treatment sessions as compared to other methods.

Also, the results of the two-month follow-up showed that cognitive-existential group therapy has a lasting and stable effect on the improvement of existential anxiety. In explaining this finding, it can be said that Cognitive-Existential psychotherapy can lead to long-term changes in terms of creating philosophical insights and changing attitudes in individuals.

Conclusions

In general, cognitive-existential group therapy due to addressing the existential concepts, especially for the elderly and deal with these concepts and working with the unreasonable beliefs of individuals and substituting logical beliefs can lead to the reduction of psychological factors and existential anxieties. Therefore, this method of intervention can be used in the treatment of the elderly, since the elderly need to continue their lives with meaning and purpose without fear of confrontation with death, loneliness, and existential concerns.

Limitations

The most important limitation of this study was the use of available sampling and, consequently, semi-experimental design, and that the research was conducted only on elderly women, which reduced the generalization power of the research.

Suggestions

Given that existential anxiety is activated in the elderly and addressing these anxieties in counseling and psychotherapy sessions can help to improve the existential crisis of the elderly, it is suggested that counselors of care centers, rehabilitation centers for the elderly and counseling and psychology clinics be trained based on the treatment plan presented in this study and take advantage of it to help the elderly. In addition, the results of this study can be used to improve the design of educational programs for health care and rehabilitation providers, as well as to plan for prevention of existential crises and to improve the health of the elderly and to prevent serious problems such as suicide in the elderly. Also, it is suggested that the effect of this therapeutic approach on other psychological variables be examined and the effectiveness of this treatment method be compared with other types of cognitive therapies in order to reduce the psychological problems of the elderly in order to achieve the most effective treatment method for this group.

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References

- Bahmani B, Etemadi A, Shafieabadi A, Delavari A, Ghanbari M. Cognitive-existential group therapy and cognitive instructional therapy for breast cancer patients. *Developmental Psychology: Iranian Psychologists*. 2010; 6(23):201-14.
- Barghi, I.Z., Dehkoda, A. M., Begian, K. M., (2015). Effectiveness of cognitive behavioral therapy on the status of memory and sleep in the elderly, *Aging Psychology*, 1(1), 19-30.
- Blinderman, C. D., & Cherny, N. I. (2005). Existential issues do not necessarily result in existential suffering: lessons from cancer patients in Israel. *Palliative medicine*, 19(5), 371-380.
- Breitbart, W. (2001). Spirituality and meaning in supportive care. *Supportive Care in Cancer*. 10(4), 272-280.
- Corey, J., (2005). Theory and practice of counseling and psychotherapy, [Seyedmohamadi, Y. (2008), Persian translation], Tehran, Arasbaran Press.
- Duberstein, P., Pálsson, S., Waern, M., & Skoog, I. (2008). Personality and risk for depression in a birth cohort of 70-year-olds followed for 15 years. *Psychological medicine*, 38(05), 663-671
- Fakhar, F., (2007), Effectiveness of group therapy on enhancing mental health in elderly women: a logo therapy approach, M.A. thesis dissertation, Tehran Tarbiat Moallem University.
- Farmani-Shahreza, S, Bahmani, B, Ghaedniay-Jahromi, A, Amin-Esmaili, M, Khanjani, S. The Effectiveness of Cognitive-Existential Therapy on the Demoralization Syndrome in Women with HIV. *Journal of Clinical Psychology*. Vol. 8, No. 1 (29), Spring 2016
- Hedayat, S., Arefi, M., (2015). Effectiveness of cognitive behavioral therapy on promoting sleep quality in the elderly, *Science and Research in Applied Psychology*, 16(2), 60-68.
- Heravi Karimloo, M., Anoosheh, M., Foroughan, M., Sheykhi, M. T., Hajizade, E., Maddah, S. B., . . . Ahmadi, F. (2008). Loneliness From the Perspectives of Elderly People: A Phenomenological Study. *Iranian Journal of Ageing*, 2(4), 410-420.
- Kaldi, A., ALIAKBARI, K. A., & Foroghan, M. (2004). Physical, Social & Mental Problems of Elderly in District 13 of Tehran. *Social Welfare*, 4(14), 233-249.
- Kernan, W. D., Lepore, S, J. (2009). Searching for and making meaning after breast cancer: Prevalence, patterns, and negative affect . *Social Science & Medicine*. 68, 1176–1182.
- Kierkegaard, S., (1849). The sickness unto death, [Monajjem, R., (2009), Persian translation], Tehran, Porsesh Press.
- Kissane, D. W., & Clark, D. M. (2002). Demoralization: its phenomenology and importance. *Australian and New Zealand Journal of Psychiatry*, 36,733-742
- Kissane, D. W., Bloch, S., Miach, P., Smith, G. C., Seddon, A., & Keks, N. (1997). Cognitive–Existential Group Therapy for patients with primary breast cancer Techniques and Themes. *Journal of psycho – oncology*, vol. 6:25-33
- Kissane, D. W., Bloch, S., Smith, G., Miach, P., Clarke, D., Ikin, J., Love, A., Ranieri, N. & Mckenzie, D. (2003). “Cognitive-existential group psychotherapy for women with primary breast cancer: a randomized controlled trial”. *Psycho-Oncology Journal*. 12, 532-546.
- Kissane, D. W., Love, A., Hotton, A., Bloch, S., Smith, G., Clarke, D., Miach, P., Inkin, J., & Raymond, S. (2004). Effect of Cognitive-Existential Group Therapy on Survival in Early Stage Breast Cancer. *Journal of Clinical Oncology*, 22, 1-6.
- Langle, A., & probst. C. (2000). Existential Questions of the Elderly, *International Medical Journal* Vol. 7, No. 3, pp. 193 - 196, September 2000
- Majzoobi, M. R., et al., (2012). Effectiveness of structural group memory telling on enhancing life quality and happiness in the elderly, *Developmental Psychology: Iranian psychologists*, 9(34).
- Malayeri, S., & Jafari, Z. (2004). Frequency distribution of hearing loss among nursing home residents of Tehran province. *Razi Journal of Medical Sciences*, 11(40), 299-306.
- Masoudisani, R., Bahmani B., Asgari, A., Khanjani, M.S., Paknia, N., (2015). Existential Anxiety Questionnaire development: validation and reliability checking, *Clinical Psychology and Personality*, 13(2), 151-162.
- May, R, Yalom, I (2000). *Existential Psychotherapy in Corsini R & Wedding D. Current psychotherapies*. Itasca Illinois, F, E, Peacock publisher, inc.
- Mehdi Eskandari, Bahman Bahmani, Fariba Hasani, Abdollah Shafi-Abadi, Amir Hossien Hossien. *Cognitive-Existential Group Therapy for Parents of Children with Cancer Iranian Rehabilitation Journal*, Vol. 11, No. 18, October 2013
- Mooziri, A., (2013). Effectiveness of existential group therapy on reducing pathological death anxiety in the elderly, M.A. thesis dissertation, Tehran University of social Welfare and rehabilitation sciences.
- Mostafavi F AH, Mohd H. . Conditions Affecting the Elderly Primary Health Care in Urban Health Care Centers of Iran. *Research Journal of Medical Sciences*. 2009;3:202-13.
- Mussen, P. H., (2001). Development and personality of the child, [Yasaii, M., Persian translation], Tehran, University Publications Center.
- Mussen, P. H., Conger, J. J., Kagan, J., & Houston, A. C. (2002). *Child development and personality* (M. Yasayi, Trans.). Tehran: University Publication Center.
- Naghiyae M, Bahmani B, Ghanbari Motlagh A, Khorasani B, Dehkoda A. The effect of rehabilitation method based on Existential Approach and Olson's model on Marital Satisfaction. *Iranian Rehabilitation Journal*. 2014; 12(21):12-7.

29. Nasim Pakniya; Bahman Bahmani*; Asghar Dadkhah Mojtaba Azimian; Maedeh Naghiyae; Rahele Masudi Sani. Effectiveness of Cognitive Existential Approach on Decreasing Demoralization in Women with Multiple Sclerosis, *Iranian Rehabilitation Journal*, Vol. 13, Issue 4, winter 2015
30. Negin Yazdanbakhsh, Younesi Jalal Seyed, Aazimiyan Soraya, Foroughan Mahshid, Effects of Group counselling based on logo Therapy to decrease loneliness in elderly men. *Iranian journal of ageing*. Vol 11, num3. 2016
31. Parvaneh, E., Aiziz, K., Karimi, P., (2015). Effectiveness of hope therapy on enhancing elderly's health, *Aging Psychology*, 1(1), 41-47.
32. Poiman, L. P (1990). Kierkegaard on Faith and Freedom. *Philosophy of religion*, Vol 27, pp 41- 61.
33. Poorebrahim, T., Rasooli, R., (2008), Effectiveness of group logo therapy on decreasing depression and enhancing meaning of life in elderly women living in nursing home, *Applied psychology*, 8 and 9.
34. Prochaska, J. O., Norcross, J. C. (1957). *Systems of psychotherapy*, [Seyedmohamadi, Y., Persian translation], Tehran, Roshd Press.
35. Sand, L (2008). *Existential challenge and coping in palliative care; experiences of patients and family members*. Published by Karolinska institute.
36. Stuart, Gaile. Laraia, Michele. (2005). *Psychiatric nursing*. Philadelphia: Mosby.
37. Vincent, J. (2003). *Old age*. NY: Routledge Publication
38. Webb, J.T (2008). Dabroweski, S *Theory and Existential Depression in Gifted children and adults*. Eighth International Congress of the Institute for Positive GIs integration in Human Development, Canada.
39. World Health Organization (2001). *Health statistics and information systems*. Available online at www.who.int
40. Wurtman, J. J. (1993). Depression and weight gain: the serotonin connection. *Journal of affective disorders*, 29(2), 183-192.
41. Yalom ID. *Existential psychotherapy*. Translated by Habib, S. Tehran: Ney Publication; 2008.
42. Yalom, I.D.(1980). *Existential psychotherapy: Basic Books (AZ)*
43. Yearbook IS. Statistical Center of Iran. *Iranin population and Housing census*. Tehran, Iran. 2013.
44. Zahra Rahimi; Bahman Bahmani; Asghar Dadkhah; Saeed Khanjani, Effectiveness of Cognitive Spirituality-Based Counseling of Demoralization in Elderlies. *Iranian Rehabilitation Journal*, Vol. 13, Issue 2, Sum Younesi1 Jalal Seyed, mer 2015

Post-mortem Distribution of Morphine in Cadavers' Body Fluids

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Abstract

Purpose: We aimed to compare morphine in urine and other body fluids, including cerebrospinal fluid (CSF), bile, pericardial fluid (PCF), and vitreous humor to determine the most reliable fluid for detection of postmortem morphine.

Methods: In this cross-sectional study on 87 cadavers of Kahrizak Forensic Autopsy Center of Iran, cadavers with a maximum of 72 hours after death with positive urine morphine rapid strip test were included. Morphine was evaluated with thin layer chromatography (TLC) test in urine, bile, CSF, PCF, and vitreous samples. The presence of morphine in these fluids was compared to urine samples. Data were analyzed by SPSS software, version 21.0.

Result: Mean±SD age of the cadavers was 44.5±4.1 (range: 22–67) years consisting of 85 (97.7%) men and 2 (2.29%) women. From 87 cadavers with positive urine morphine Rapid Strip Test, only 42 urine samples (48.3%) had positive TLC results, among which TLC was positive in 24 cases (27.6%) of bile,

9 cases (10.3%) of PCF, 5 cases (5.7%) of CSF, and 2 cases (2.3%) of vitreous sample. There was a statistically significant relationship between urinary and biliary morphine (Kappa=0.527, P<0.001), PCF (Kappa=0.22, P<0.001), and CSF morphine (Kappa=0.123, P=0.017), but the relationship between urinary and vitreous morphine was not statistically significant (P=0.139).

Conclusion: The moderate agreement between urine TLC and bile TLC reveals bile sample as the most reliable fluid for morphine detection, when a urine sample is not accessible.

Key words: Morphine; Bile; Cerebrospinal Fluid; Pericardial Fluid; Vitreous Body; thin layer Chromatography; Post-mortem

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Introduction

Opioids are frequently used as drug abuse and in clinical practice for acute and severe pain management (1). It alleviates pain at different levels, including raising the threshold at the spinal level, attenuating the perception of pain, and influencing the emotional and hormonal conditions at the limbic system; they act as full-agonists for μ receptor and a weak agonist for δ and κ receptors (2).

The major metabolites of morphine include morphine-3-glucuronide (M3G), and morphine-6-glucuronide (M6G), which are metabolized in different organs, such as liver, brain, and the kidneys (3). The ultimate aim of drug metabolism is to facilitate its urinary excretion (4); thus, urine samples are considered an appropriate method for measurement of drugs, like opioids (5). But the clinical measurements are different from postmortem methods, as the drug concentrations may be redistributed according to the anatomical site of sampling and time after death, known as postmortem redistribution (PMR) (6). As far as peripheral blood samples are suggested to have lower concentrations than the central samples and peripheral samples are not always available in cadavers after a few hours (7).

Thin layer chromatography (TLC) is an easy and inexpensive method to isolate or assess the purity of a compound in a mixture with high sensitivity and good reproducibility (8) that is used to detect drugs in biological materials, including measurement of urinary morphine (9). The distribution of drug metabolism and the PMR phenomenon make plasma, whole blood, urine, bile, and cerebrospinal fluid (CSF) as appropriate sampling sites for detection of morphine in cadavers (10). When central blood samples, like femoral vein samples, and urinary samples (as gold standard sampling sites) are not available, other body fluids can be used (11), yet, the difference in measurement accuracy of different sampling sites has to be further studied. We aimed to compare morphine in urine and other body fluids, including cerebrospinal fluid (CSF), bile, pericardial fluid (PCF), and vitreous humor (VH) to determine the most reliable fluid for detection of postmortem morphine.

Materials and Methods

Study design

In this cross-sectional study, 87 cadavers who referred to Kahrizak Forensic Autopsy Center, Tehran, Iran were recruited. The protocol of the study was approved by the Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran. Before recruitment of cadavers into the study, the design and objectives of the study were explained to their family and written informed consent was obtained. All principles of Helsinki's guideline were met throughout the whole steps of the present study.

The sample size was calculated to be 85 cases, based on the frequency of positive morphine in body fluids (12), with an accuracy of 10%, and $\alpha=0.05$. The eligible cadavers were included using convenient sampling method. The inclusion criteria consisted of cadavers with a maximum of 72 hours after death with positive urinary morphine, documented by rapid strip test. Participants' age and sex were recorded and morphine was evaluated with thin layer chromatography (TLC) test in urine, bile, CSF, PCF, and vitreous samples. The presence of morphine in the fluids was compared to urine samples.

Statistical analysis

The results were reported by descriptive analysis, including mean \pm standard deviation (SD), and frequency (percentage) and inferential statistics, including independent sample T test and chi-square test. The associations of variables were tested by Kappa. For the statistical analysis, SPSS software, version 21.0 for Windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

Results

Mean \pm SD age of the cadavers was 44.5 \pm 4.1 (range: 22–67) years consisting of 85 (97.7%) men and 2 (2.29%) women. From 87 cadavers with positive urinary morphine (Rapid Strip Test), only 42 samples (48.3%) had positive TLC results, among which TLC was positive in 24 cases (27.6%) of bile, 9 cases (10.3%) of PCF, 5 cases (5.7%) of CSF, and 2 cases (2.3%) of vitreous sample. Comparison of positive and negative cases detected by urinary morphine than other fluids (sensitivity and specificity) are shown in (Table and Figure 1 - next page).

There was a statistically significant relationship between urinary and biliary morphine, PCF ($P<0.001$), and CSF morphine ($P=0.017$), but the relationship between urinary and vitreous morphine was not statistically significant ($P=0.139$). Measurement of agreement showed moderate correlation (Kappa=0.527) between urinary and biliary morphine, and weak agreement between urinary and PCF morphine (Kappa=0.22); also, there was a weak agreement between urinary and CSF morphine (Kappa=0.123).

Discussion

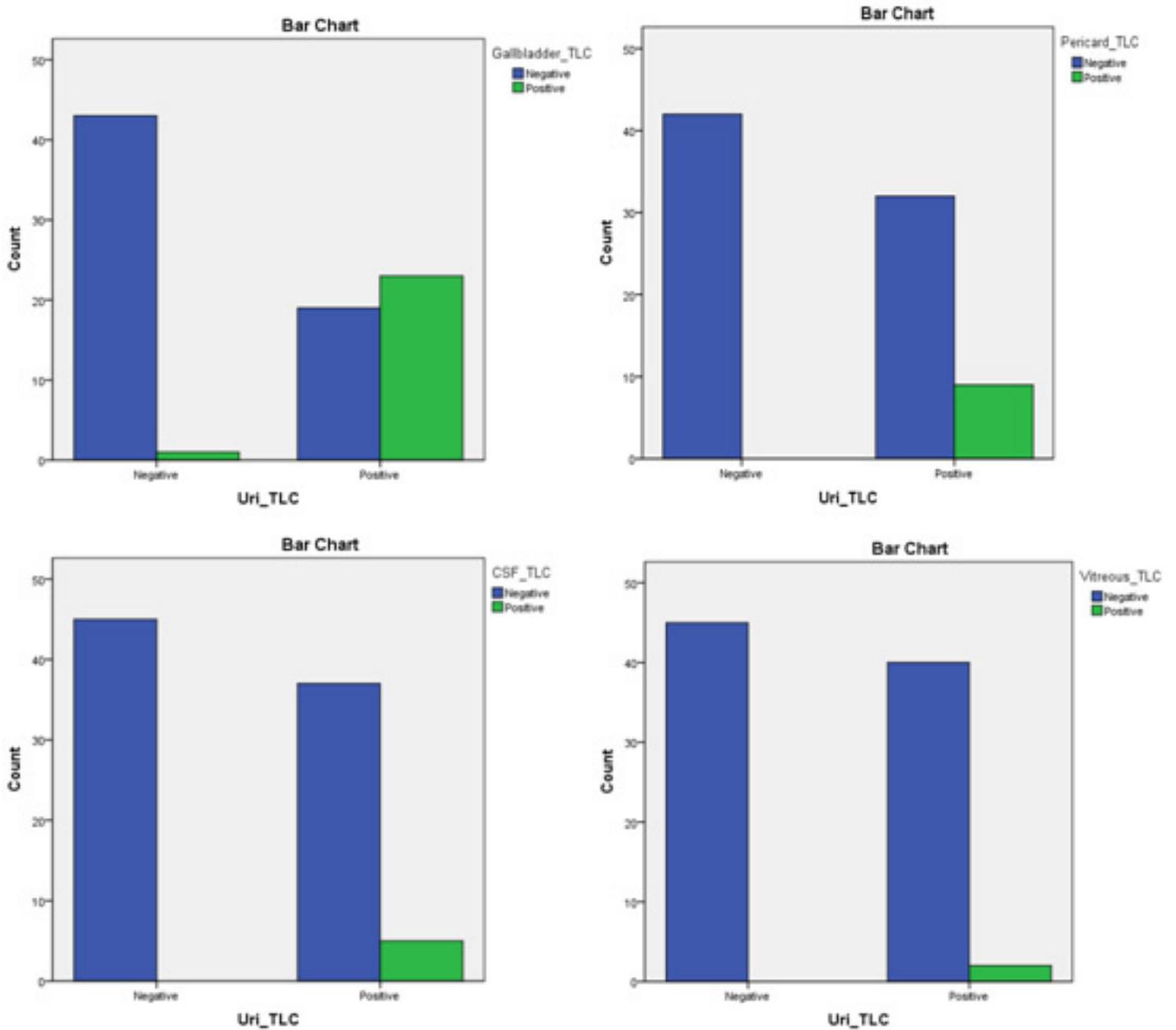
The results of the present cross-sectional study on 87 cadavers indicated the statistically significant association between urinary morphine and biliary morphine, PCF, and CSF morphine with moderate agreement between urinary morphine and biliary morphine, and a weak agreement between urinary morphine and PCF, and CSF morphine.

There are various reasons that a cadaver must be studied for the presence of drugs, for instance, toxicity of opioids and blood samples are the gold standard sampling site (13). But in cases where blood samples are not available or accessible, other specimens should be selected, including urine, bile, CSF, and VH (14).

Table 1. Comparison of positive and negative cases detected by urinary morphine than other fluids (sensitivity and specificity)

Urinary morphine	Biliary morphine		Pericardial morphine		CSF morphine		Vitreous morphine	
	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Negative	97.7%	2.3%	100%	0%	100%	0%	100%	0%
Positive	45.2%	54.8%	78%	22%	88.1%	11.9%	95.2%	4.8%
Total	72.1%	27.9%	89.2%	10.8%	94.3%	5.7%	97.7%	2.3%

Figure 1. Frequency of positive and negative cases detected by urinary morphine than other fluids



There are few studies that have evaluated the postmortem concentration of morphine in different body fluids and most studies have only focused on the comparison of one or two methods. One study showed higher drug concentrations in bile analysis than blood samples obtained from different sites (15), which is in line with the present study. Therefore, biliary specimens are an appropriate sample for assessment of morphine in cadavers. Also, other studies have indicated similar concentrations in PCF and blood samples for most drugs, especially morphine and its metabolites, and suggested PCF as a useful material for forensic toxicological assessment, when blood samples are not available (16, 17), which is consistent with the results of the present study, as there was a statistically significant association between PCF and urinary morphine, although the correlation was weak. Wyman and colleagues demonstrated highest morphine levels in liver, blood, CSF, and VH, respectively (12), which is similar to the results of the present study, indicating a statistically significant association between urinary and CSF samples, while this association was not statistically significant for VH. In another study, morphine and its metabolites was positive (>1 ng/ml) in 89% of urine samples, 68% of CSF samples, and 75% of VH cases (18), which was higher than the present study, indicating positive morphine in 48.3%, 5.7%, and 2.3% of urine, CSF, and VH samples. This difference can be due to the differences in the sampling technique, and measurement method. Holmgren and partners showed a significant difference between the concentrations in the VH and femoral blood for 23 substances and suggested VH an alternative specimen when blood samples are not available (19), while the results of the present study did not depict VH as an appropriate specimen, as there was no statistically significant association with urinary morphine, although in the study by Holmgren and colleagues, it was compared with blood sample, and was not specifically for morphine, which can justify the discrepancy between the results of the studies. The results of the present study on VH might be due to the inappropriateness of TLC method for analysis of morphine in VH, as studies have shown disposable pipette extraction (DPX) a fast, reliable, and easy to perform method for detection of drug abuse in VH with satisfactory sensitivity, precision, and accuracy (72–91%) (20), although TLC method, used in the present study, is an appropriate tool for forensic medical analysis of urinary opioids (21). In addition to the issues raised above, the interval between death and sampling also plays a significant role in the concentration of the drug, due to PMR phenomenon (6), which can justify the discrepancies among studies, as well. Thus, it is suggested that specimens should be selected individually for each case, based on the history and availability, while the procedures should be performed with proper quality (22), and post-mortem tissue/samples should be carefully selected, stored, preserved and utilized (23). Other studies have also assessed the tissue distribution of morphine and its metabolites in forensic medicine (24, 25), while the present research could suggest body fluids as an easy access method, especially bile, although further research is required on a comparison of the diagnostic accuracy of tissue versus fluids.

The main strength of the present study was a comparison of different sampling sites in one study in a referral Forensic Center that enables researchers with an appropriate spectrum, while most studies have only evaluated one or two methods (12, 16, 19). On the other hand, the present study had several limitations, such as limited sample size and cases of one Forensic Center that limits the generalizability of the results. In conclusion, the results of the present study showed that biliary measurement of morphine by TLC method could be an appropriate alternative for morphine detection in cadavers less than 72 hours after death when the urine sample is not accessible.

References

1. Kys M, Maciow-Glab M, Rojek S. [On the history of opium]. *Arch Med Sadowej Kryminol.* 2013 Jul-Sep; 63(3):226-35.
2. Ghelardini C, Mannelli LDC, Bianchi E. The pharmacological basis of opioids. *Clinical Cases in Mineral and Bone Metabolism.* 2015; 12(3):219.
3. De Gregori S, De Gregori M, Ranzani GN, Allegri M, Minella C, Regazzi M. Morphine metabolism, transport and brain disposition. *Metabolic brain disease.* 2012;27(1):1-5.
4. Smith HS, editor Opioid metabolism. *Mayo Clinic Proceedings;* 2009: Elsevier.
5. Milone MC. Laboratory testing for prescription opioids. *Journal of medical toxicology.* 2012;8(4):408-16.
6. Péliissier-Alicot A-L, Gaulier J-M, Champsaur P, Marquet P. Mechanisms underlying postmortem redistribution of drugs: a review. *Journal of analytical toxicology.* 2003;27(8):533-44.
7. Hargrove VM, Molina DK. Peripheral postmortem redistribution of morphine. *The American journal of forensic medicine and pathology.* 2014;35(2):106-8.
8. Santiago M, Strobel S. Thin layer chromatography. *Methods in enzymology.* 2013;533:303-24.
9. Ahadi A, Partoazar A, Abedi-Khorasgani M-H, Shetab-Boushehri SV. Comparison of liquid-liquid extraction-thin layer chromatography with solid-phase extraction-high-performance thin layer chromatography in detection of urinary morphine. *Journal of biomedical research.* 2011;25(5):362-7.
10. Oliveira A, Carvalho F, Pinho PG, Remiao F, Medeiros R, Dinis-Oliveira RJ. Quantification of morphine and its major metabolites M3G and M6G in antemortem and postmortem samples. *Biomedical chromatography : BMC.* 2014;28(9):1263-70.
11. Lemaire E, Schmidt C, Denoos R, Charlier C, Boxho P. Postmortem Concentration and Redistribution of Diazepam, Methadone, and Morphine with Subclavian and Femoral Vein Dissection/Clamping. *Journal of forensic sciences.* 2016;61(6):1596-603.
12. Wyman J, Bultman S. Postmortem distribution of heroin metabolites in femoral blood, liver, cerebrospinal fluid, and vitreous humor. *Journal of analytical toxicology.* 2004;28(4):260-3.

13. Cook D, Braithwaite R, Hale K. Estimating antemortem drug concentrations from postmortem blood samples: the influence of postmortem redistribution. *Journal of clinical pathology*. 2000;53(4):282-5.
14. Drummer OH. Postmortem toxicology of drugs of abuse. *Forensic science international*. 2004;142(2):101-13.
15. Vanbinst R, Koenig J, Di Fazio V, Hassoun A. Bile analysis of drugs in postmortem cases. *Forensic science international*. 2002;128(1):35-40.
16. Tominaga M, Michiue T, Ishikawa T, Kawamoto O, Oritani S, Ikeda K, et al. Postmortem analyses of drugs in pericardial fluid and bone marrow aspirate. *J Anal Toxicol*. 2013;37(7):423-9.
17. Gerostamoulos J, Drummer OH. Postmortem redistribution of morphine and its metabolites. *Journal of forensic sciences*. 2000;45(4):843-5.
18. Pragst F, Spiegel K, Leuschner U, Hager A. Detection of 6-acetylmorphine in vitreous humor and cerebrospinal fluid—comparison with urinary analysis for proving heroin administration in opiate fatalities. *Journal of analytical toxicology*. 1999;23(3):168-72.
19. Holmgren P, Druid H, Holmgren A, Ahlner J. Stability of drugs in stored postmortem femoral blood and vitreous humor. *Journal of Forensic Science*. 2004;49(4):1-6.
20. Kovatsi L, Rentifis K, Giannakis D, Njau S, Samanidou V. Disposable pipette extraction for gas chromatographic determination of codeine, morphine, and 6-monoacetylmorphine in vitreous humor. *Journal of separation science*. 2011;34(14):1716-21.
21. Gorbacheva N, Orlova A. Use of thin layer chromatographic analysis in forensic medical analysis of urine for opiates. *Sudebno-meditsinskaia ekspertiza*. 2002;46(3):34-8.
22. Skopp G. Postmortem toxicology. *Forensic science, medicine, and pathology*. 2010;6(4):314-25.
23. Allan AR, Roberts IS. Post-mortem toxicology of commonly-abused drugs. *Diagnostic Histopathology*. 2009;15(1):33-41.
24. Frost J, Lokken TN, Helland A, Nordrum IS, Slordal L. Post-mortem levels and tissue distribution of codeine, codeine-6-glucuronide, norcodeine, morphine and morphine glucuronides in a series of codeine-related deaths. *Forensic Sci Int*. 2016;262:128-37.
25. Staeheli SN, Gascho D, Ebert LC, Kraemer T, Steuer AE. Time-dependent postmortem redistribution of morphine and its metabolites in blood and alternative matrices-application of CT-guided biopsy sampling. *International journal of legal medicine*. 2017;131(2):379-89.

Application of Social Networks to Support Students' Language Learning Skills in a Blended Approach

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Abstract

Introduction: The emergence of new technologies has created a potential educational environment where teachers can support second language learning. This study examines the effectiveness of the blended approach in learning English through the mobile social networks to enhance the level of listening and speaking skills of primary school students.

Method: The research design is an applied and semi-experimental method. Population included the students of primary school aged 7-9 with sampling selected randomly. Research tool was a researcher made test in English. In data analysis descriptive statistics (mean, standard deviation) and inferential statistics (covariance) were used.

Result: Gains in the scores of the final exam of the experimental group exposed to blended designing instruction compared to those in the control group taught through current face-to-face method, demonstrated a significant difference. The findings of the study support the idea that the use of the blended approach has affected the skills of the language learners for 1stgrade students ($p<0.03$), 2ndgrade ($P<0.01$), and third grade ($P<0.02$) positively.

Conclusion: The findings of the study bear some significant implications for curriculum designers, teachers and students and highlight the crucial role of using the technological devices and applications in promoting the learners' capabilities in listening/speaking.

Key words: Blended Approach, Primary School, English Language Teaching, social Networks

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Introduction

The Primary focus on computer use in language learning classrooms has improved to the point where technology is regarded as a part of the common teaching experience. While due to the limited time of the classrooms and abundance of students in primary schools, a solution is required to direct their individual language learning in a more effective way. Moreover children always need support during language learning and the intervention of parents or other family members with no expertise in the field of foreign language teaching will lead to irreparable harm to both teaching process and their motivation. These observations raised the question of how to design technology for digital natives to support second language learning in the classroom.

The concerns raised above are echoed by the blended learning approach in that the primary focus on computer use in language learning would be of a hybrid function i.e. in and out of classrooms.

The main focus of blended learning is on the learner involvement which could be better achieved with the help of the Internet and Information and Communication Technology (ICT). Garrison and Vaughan (2008) believe that the approach is fundamentally based on the thoughtful combination of face- to- face and online education, reconsideration of the design of the lessons for the highest possible learner involvement, and the reconstruction and replacement of the traditional classroom hours(1).

To understand foreign language learning, it is necessary to examine not only the linguistic characteristics of the target language, but also the physical, psychological, and the social characteristics of the learner. As children play an active role in learning their native language, foreign language learners acquire through their skills, strategies, physical/ cognitive development, goals, attitudes, and certain motivations that are effective in their success. So with all these effective factors, learning will not be identical in different subjects. According to Uso-Juan and Martinez-Flor (2006), there has been a shift in our understanding of second language skills and the way they are learned/taught over the past five decades. They maintain that there has been a big change in the paradigms of teaching language skills in three phases. They call the first phase the environmentalist approach where under the influence of the structural linguistics and behaviouristic psychology, the learning of the language skills were considered as a stimulus/response/reinforcement procedure. During the second phase (the 1960s) and after the publication of Chomsky's book *Syntactic Structure* (1957), the innatist view towards learning the four language skills was dominant. That is, learning language skills were considered as an active cognitive process where the learner and his mental abilities have a crucial role in active involvement in acquiring a second language skill. And the last phase or paradigm shift, as they further highlight, took place in 1970s where the interactionist approach and the functional/contextual aspects of language were of more

significance(2). Actually in learning the four language skills the interactional purposes of the learners were taken into consideration and not just the linguistic information or forms. In line with this very last approach towards learning the four language skills, the present study intends to use the social network framework as the main focus of the study and gear the learning procedure of the L2 skills and particularly listening and speaking, towards the interactional orientation of such educational technologies. Although many large-scale studies have been undertaken to identify the potential benefits of blended learning for primary school students, several researchers, as detailed in the following sections, have explored the concerns of this approach in language learning from different perspectives in a number of studies.

Kennedy and Levy (2008) conducted a study on Italian language learning using mobile phone. That is, in addition to classroom presentation, practice and feedback were also performed via mobile phone in their research. The results of the learners being taught through the mobile phone in Kennedy and Levy's study were more significant than those who were taught through current methods in classrooms. Meanwhile, each learner showed progress according to their learning speed(3).

Wong, et al.(2011) studied the blended approach in the development of the writing skills of primary school students in China. Writing problems of these students included incorrect use of words and writing rules. In their study the collaborative writing practice program was developed in the Wiki platform using a variety of tasks including paragraph writing, sentence building, summarizing or cataloguing. Based on the interaction between teacher and students and among students, the aim was to restore their writing skills. The results analysis indicated the improvement of writings kills of students in the experimental group. Blended approach had, indeed, a positive effect on the improvement of the students' writing skills(4).

In a study by Sandberg, et al. (2011), the effect of learning English via the mobile phone was evaluated on the fifth grade students of a primary school in three groups. To the first group, English lesson was presented in the class room with the subject of wild animals. In the second group, in addition to class room teaching, children visited the zoo and were given the mobile phone in order to perform some related activities. The third group, like the second one, learned their lessons as the other groups, but they took their mobile phone home. The pre-test and post-test were performed for all the three groups. The results showed that the group who took their mobile phone home had more learning progress. The study showed that the use of the mobile phone in language learning increased the students' motivation and ultimately led to more effective learning providing efficient learning experiences(5). In effect, in addition to the formal English teaching at school, it has become more possible to practice in an informal environment outside the classroom context by using mobile phones at home.

Although the studies reviewed in this section intended to enhance the language learning phenomenon by the use of such ubiquitous technological devices as mobile phones, they did not take the role of the social network tools on the mobile phones into much consideration. Another point worth noting is that even those research studies which investigated the impact of the social network tools in learning mainly focused on the skills other than listening and speaking. As an example Sugie (2012) intended to develop an appropriate blended social learning model for Chinese language education in Japan. The point was how to increase the motivation and learning speed of the high school students and include this motivation in real-life events. The main purpose of Sugie's study was to make opportunities to increase students' relationship with native Chinese speakers through the use of information technology and communications in order to improve their writing skills and thereby increase their motivation and satisfaction from learning Chinese. The participants in the experimental group were novice learners undergoing presence training and presence grammatical exercises, web-based training and having interaction with the native Chinese speakers through the use of a white board. Qualitative analysis of students' evaluation showed that the level of satisfaction increased in Japanese learners and the experience of online speaking with native speakers had a good impact on Chinese learning improvement(6). Based on the appropriate analysis of the students' needs, the educational systems stakeholders can design technological models in such a way that both the learners' reaction to the new learning environment and the possible effects on the process of learning /acquisition are promising.

The literature shows that there have been some studies which considered the role of social networks in boosting the learners' language acquisition procedure and the type of interactions. Despite the growing body of research on the use of the technological platforms in language learning, a gap is still felt to exist in elaborating the social network potentiality in supporting the learners and their cognitive learning development (7).

Motivated by the issues raised above from both the pedagogical and theoretical perspectives, the researchers conducted an action research to further examine the application of social networks technology in language learning. Hence, the purpose of this research study was to explore the effect of blended approach in a supportive environment on the listening and speaking skills of the children aged 8-10 in a real context. Thus, the formulated hypothesis of this study was that the English learning gains in the first, second and third grade students through the blended approach were greater than those not exposed to the same method.

Method

1. Study design and population

The present study was applied and interventional research. The population of the study included all male elementary

school students in Tehran, District 3, South-west of Iran, of whom 90 students were selected randomly as the sample of the study. Students ranged in age from 8 to 10 in first, second and third grade, respectively.

2. Methods

The study design is quasi-experimental.

3. Measuring tools: validity and reliability

To measure the student's achievements in listening and speaking skills, a researcher-made test (Oral test was developed for the pre-test and post-test phases of the study). Since one of the researchers was indeed the teacher of the experimental group, before administering the test and to assure the validity of the test, a panel of experts with 15 years of relevant experience provided some comments in 3 rounds and their opinions were taken into account in revising the test items. The test-retest technique was utilized in determining the test reliability (0.70).

4. Intervention

In each of the control and experimental groups there were 14 first grade students, 16 second grade students, and 15 third grade students. At the beginning of the training phase, the pre-test was performed to both the experimental and control groups according to the determined objectives. For each session of implementation, an appropriate lesson plan was developed consistent with the class teaching methodology and available technology facilities. The students' performance was reported by the teacher at the end of each class and the contents required for the next session were sent to them through their parents' mobile phone using What's App software for the experimental group but for the control group the activities were carried out through the usual notebooks or in class practices. The parents were briefed and trained on how the assignments were sent and how they should check. In fact, a survey questionnaire was administered among the students' parents asking who would like to cooperate with the researchers in the project and could contribute to the sending and receiving procedure of their children's assignments via their mobile phones, with the support teacher who provided the main teacher and the students with some help where necessary. Some of the sent activities were assessed during the class or the related feedback was provided for the students. The students were sometimes required to do some activities, report on them and send the recorded assignment through the mobile phones. As an example, when some audio files were sent to the students, they could send the answer as audio, picture or movie files. In one of the activities, for instance, one question was posed as: 'Where are you sitting, what is your mother doing, and what are you having for dinner tonight?'... One month after the complete implementation of the program along with attending the classes two days a week for four weeks, the post-test was carried out on the students in both groups. The score 70 out of 100 was regarded as the passing grade. In the meantime, parents and their children had some interactive activities with the support and guidelines of the teacher and looked

for their probable problems through the intervention or non-intervention educational /language practices of their children.

In fact, according to the expected performance of the children group, the primary presentation was conducted in the classroom with regard to the network-based real and tangible medium, drawing and presentation medium, or multimedia. Also the second round of presentations were carried out with the appropriate feedback and guidance from the teacher for each student in different groups or individual groups using a diverse range of activities. A variety of small and large group games was carried out with the help of audio files or repeating of the same files by students for their performance in both classes of each grade. However for productive performance, it was attempted to create an opportunity outside the classroom and in real-life environments for students to express their thoughts and send them to support teachers in the form of audio and video files or movies. But for the control group they should have imagined and talked about the same situation as the experimental group.

In the control group the feedback was given inside the classroom to the students but for the experimental group it depended on their mistakes or errors i.e. sometimes the support teacher provided each student with direct feedback and sometimes the teacher herself talked about it inside the classroom providing some clues for the correct answer, and finally they came up with the final correct form together and decided on the best answer.

5. Ethical consideration

The ethical considerations necessary to satisfy the participants were observed, so a survey questionnaire was administered among the students' parents showing who liked to cooperate with the researchers in the project and could contribute to the sending and receiving procedure of their children's assignments via their mobile phones with the support teacher who provided the main teacher and the students with some help where necessary.

6. Inclusion and exclusion criteria

Inclusion criteria included having written consent on behalf of the parents in order to implement the social network activity in learning English language.

Exclusion criteria included unwillingness to participate in the study and the absence in sessions or transfer of a student from school.

7. Data Analyses:

Data of study were analysed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (Kolmogorov - Smirnov test and Levin analysis, Covariance) using SPSS- 21 software to examine the hypothesis of study.

Results

Descriptive statistics data in the two groups are presented in Tables 1-3 opposite :

Table 1. Descriptive statistics data in experimental and control groups of 1st(n=28), 2nd(n=32) and 3rd(n=30) grade primary school.

In order to test the hypothesis of research homogeneity of variance and normality of distribution in the analysis of data. They were examined through the Kolmogorov–Smirnov and Levine tests. Test results are presented below in Tables 2 and 3.

As the results in Table 2 show, the probability of random difference between sample distribution and normal distribution is higher than 0.05.

As the results in Table 3 show, the significance level was higher than 0.05, and thus the hypothesis of homogeneity of variance was confirmed in sample groups.

The first row of Table 4 (page 94) showed the effect of the pre-test significance (0.04). That is, the pre-test and post-test were correlated and it was required to select it to control primary differences between the two groups in each grade. The second rows show the performance between the two groups after the test, which was significantly different (0.03, 0.01, 0.02). Thus, as indicated in the table of descriptive data, the group who learned language through the blended pattern had a higher mean than the group who underwent conventional training. The ubiquitous technological tool of mobile phone has the potentiality of presenting so many learning features and its ease of use, convertibility into a language learning device and capability of creating new software enabled all teachers and students to work with them.

Discussion

To answer the research hypothesis (English learning in first, second and third grade students through the blended approach were greater than the students not exposed to blended approach), language program with a blended approach using mobile phone was designed and was tested on the first, second and third grade students. The results of analysis of covariance showed that the blended approach had a positive impact on the learning process and the difference between the experimental and control groups were statistically significant for the primary first-grade students (0.03), second grade (0.01) and third grade (0.02) at the level of 0.05. In other words, the approach has been able to facilitate a kind of personalized learning by developing a flexible environment. The study results are consistent with that of Ghaffari et al.(8), Sandberge et al. (5), Sugie (6), De Silva Soares & Weissheimer (9) , Lai et al. (10), and Ferreira et al. (11), Fahimi et.al(12).

Table 1: Descriptive statistics data in experimental and control groups of 1st(n=28), 2nd(n=32) and 3rd(n=30) grade primary school

	Mean			Standard deviation			Maximum value			Minimum value		
	1st	2nd	3rd	1 st	2nd	3rd	1st	2 nd	3rd	1st	2nd	3rd
Pretest	51.5	59.8	63	8.7	13	8.5	73	78	78	40	37	45
Posttest	88	87.3	90	9.3	9	8.7	100	100	100	66	69	74

Table 2: Kolmogorov–Smirnov test results of 1st, 2nd, 3rd grade primary school

Variable	Statistic			Significance		
	1 st	2nd	3rd	1st	2nd	3rd
Pretest	0.83	0.8	0.5	0.83	0.7	0.9
Posttest	0.85	0.8	0.8	0.85	0.6	0.5

Table 3: Levine test for homogeneity of variances of 1st, 2nd, 3rd grade primary school

	Statistic			First degrees of freedom			Second degrees of freedom			Significance		
	1st	2nd	3rd	1st	2nd	3rd	1st	2 nd	3rd	1st	2nd	3rd
Pretest	0.03	2.0	0.04	1	1	1	26	30	28	.80	0.1	0.8
Posttest	1.6	0.4	1.8	1	1	1	26	30	28	0.2	0.5	0.1

The students and their parents expressed positive feelings regarding working through the blended approach using mobile phone. As the support teacher was aware of the specific interests and needs of the students they felt a sense of obligation to further their students' learning and correct their common mistakes. The students expressed some surprise about the feedback provided because it did not resemble the type of feedback they had had before. Drawing from the results discussed above, the researchers developed a visual model to better illustrate the instructional design of the learning environments in different models of blended approach.

According to researchers in the field of Computer Assisted Language Learning (CALL), some of the existing shortcomings in the foreign language learning contexts can be overcome using the appropriate technology and innovative medium of instruction. This is in part due to the fact that there is limited access to the natural environment of native language in foreign language education and in many cases; it is confined to a few minutes of listening to/watching the audio/video materials inside the classroom through the implementation techniques which are also impaired. As Jonassen, et al.(2008) point out; technology includes the design of various types of learning environments which involve the learner(13) Facilitating the role of the teacher and learner is useful in this type of exercise. The most significant perceived merits of blended learning were related to the combination of the elements and the amount of support provided by teachers and the institute's infrastructure. Creating the blended learning environments that are informative and interactive without sacrificing the flexibility of the individualized instruction requires much greater effort and creativity on the side of teachers. What seems to be necessary is developing a bank of learning activities relying on various types of game

and non-game software based on the fixed or portable technologies that are becoming more popular day by day among children. It can provide a lifelong learning route for them in a way that in more advanced levels of productive performance, students will be able to show their creativity and linguistic competence by writing a variety of interesting topics in group blogs or Wikis as some forms of blended learning platforms which can be the foundation for some useful learning models.

It also turned out that the techniques and methods of blended approaches and the use of media or technology in children's language learning has caused some confusion for teachers. As Ozdamli and Uzunboylu, (2015) assert, teachers' and students' perceptions to use technology are positive but their technology learning adequacy levels are not sufficient (14). Therefore, some educational courses should be provided for teachers in the context of this approach and its methods so that they can adapt themselves to the demands of new learning opportunities.

Conclusion

In summary, even though the findings of the present study and a large number of other research projects have supported the positive role of technology, it should be borne in mind that the key to the success in using the blended approach in teaching language is to integrate it wisely in educational contexts. Since technology as Saedi and Sajjadi (2014) have asserted, has a double face(15). That is, much care should be taken in designing a practical and fruitful blended classroom by the use of the technological platform through which the maximum learning outcome is achieved.

Table 4: The results from examination of the impact of pretest on posttest through analysis of covariance of 1st, 2nd, 3rd grade primary school

Source	Sum of squares			Degrees of freedom			Mean square			Statistic			Significance		
	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd
Pretest	316	275	263	1	1	1	316	275	263	4.6	4.2	4.2	0.04	0.04	0.04
Group	337	468	334	1	1	1	337	468	334	4.9	7.2	5.3	0.03	0.01	0.02
Error	1704	1884	1671	25	29	27	68	65	62						
Total	219182	246595	245230	28	32	30	316								

Table 4: The results from examination of the impact of pretest on posttest through analysis of covariance of 1st, 2nd, 3rd grade primary school

The present study made an attempt to develop a model of blended classroom for children at different proficiency levels in a way that they enjoy learning and are supported positively within a face-to-face and virtual environment. The finding of the study can be of benefit to curriculum designing stakeholders and teachers to be more active in using the technological tools in enhancing the learning phenomenon in primary school contexts.

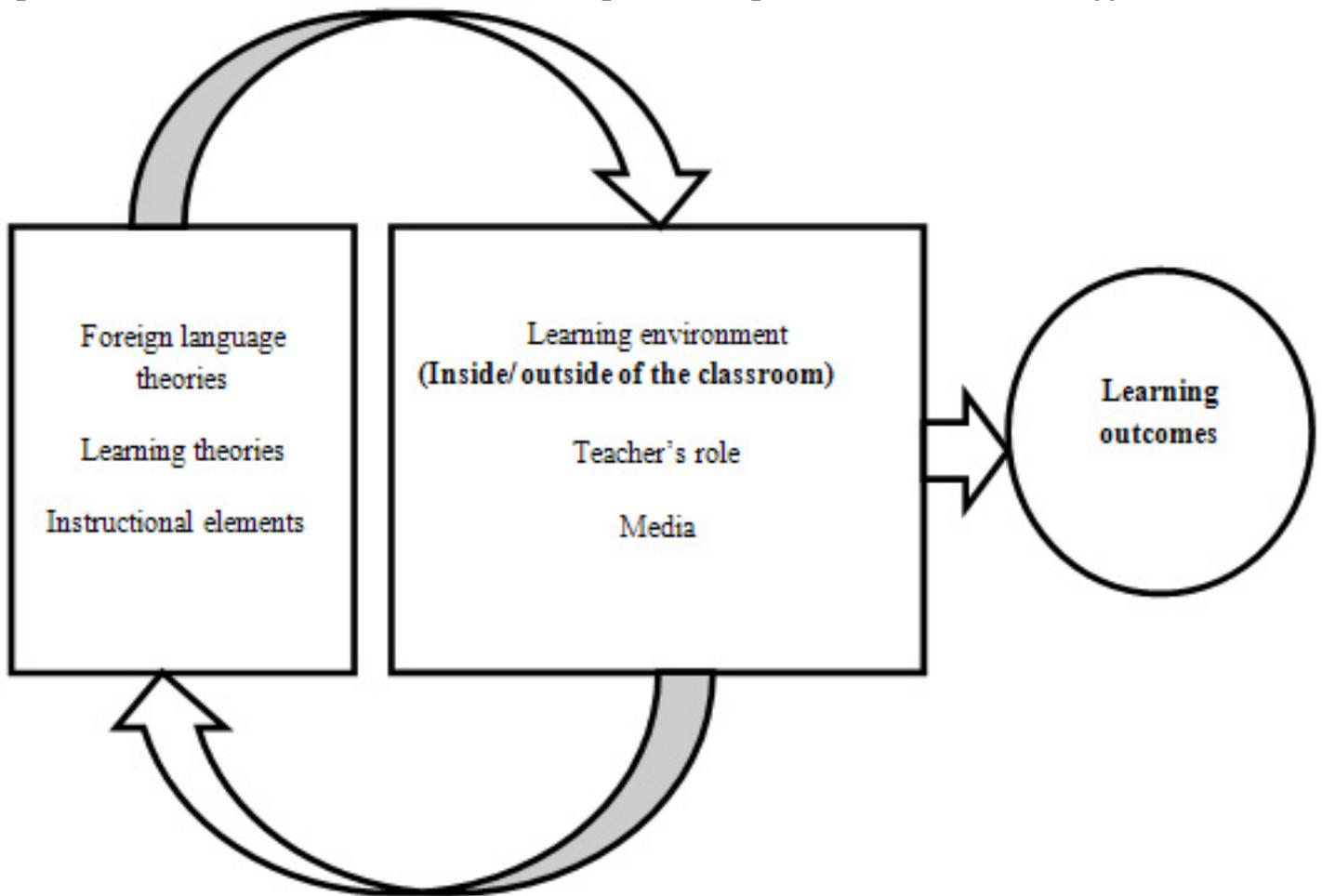
Limitation:

Even though this study unravelled some issues related to blended learning in the context of Iran, further research should be conducted on this approach, especially in the field of language learning. Furthermore most studies focused on one aspect of technology and were mostly case studies. Moreover, articles were not so much concerning language blended learning on children and the study population were boys and for girls the results may not be applicable.

References

- 1- Garrison, D. R., & Vaughan, N. D. Blended learning in higher education: Framework, principles, and guidelines. John Wiley & Sons, 2008.
- 2- Usó-Juan, Esther and Martínez-Flor, Alicia. "Approaches to Language and Teaching: Towards acquiring communicative competence through the four Skills". In E. Usó-Juan and A. Martínez-Flor, eds., Current Trends in the Development and Teaching of the Four Language Skills. Berlin: Mouton de Gruyter,2006, 111-135.
- 3- Kennedy, C., & Levy, M. L'italiano al telefonino: Using SMS to support beginners' language learning. ReCALL;2008, 20(03): 315-330.
- 4- Wong, L. H., Chai, C. S., & Gao, P. The Chinese Input Challenges for Chinese as Second Language Learners in Computer-Mediated Writing: An Exploratory Study. Turkish Online Journal of Educational Technology-TOJET,2011,10(3): 233-248.
- 5- Sandberg, J., Maris, M., & de Geus, K.' Mobile English learning: An evidence-based study with fifth graders'. Computers & Education, 2011;57(1): 1334-1347.
- 6- Sugie, S. Instructional Design of the Communicative Blended Learning for Chinese as a Foreign Language. Hokkaido University; 2012.
- 7- Golonka, E.M, Bowles, A.R., Frank, V.M, Richardson, D.L. & Freynik, S. Technologies for foreign language learning: a review of technology types and their effectiveness. Computer Assisted Language Learning; 2014, 27(1): 70-105.
- 8- Ghaffari M, Rakhshanderou S, Mehrabi Y, Tizvir A. Using Social Network of TELEGRAM for Education on Continued Breastfeeding and Complementary Feeding of Children among Mothers: a Successful Experience from Iran. International Journal of Pediatrics. 2017 Apr 10:5275-86.
- 9- De Silva Soares, W. C., & Weissheimer, J. (2013). Hibridizando O Ensino De Ingles Como Lingua Adicional Na Ufrn: UMA Experiencia Com Jogos Electronicos Do Tipo Mmorpq. (Con) textos Linguisticos; 2013,7(8.1): 357-373.
- 10- Lai, K.-W., Khaddage, F. and Knezek, G. Blending student technology experiences in formal and informal learning. Journal of Computer Assisted Learning;2013, 29: 414–425. doi: 10.1111/jcal.12030
- 11- Ferreira, A.F., Salinas, J.G, 7 Morales, S. Using a task-based approach for supporting a blended learning model for English as a foreign language. International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT); 2014 4(1): 44-62.
- 12- Fahami F, Mohamadirizi S, Bahadoran P. Effect of electronic education on the awareness of women about post partum breast feeding. International Journal of Pediatrics. 2014 Aug 1;2(3.2):57-63.
- 13- J onassen, D., Howland, J., Marra, R. M., & Crismond, D. How does technology facilitate learning. Meaningful Learning with Technology; 2008: 5-10.

Figure 1: A model to illustrate the instructional design of learning environment in a blended approach



14- Ozdamli, F. and Uzunboylu, H. M-learning adequacy and perceptions of students and teachers in secondary schools. *British Journal of Educational Technology*; (2015). 46: 159–172. doi: 10.1111/bjet.12136.

15- Saeedi, Zari, Sajjadi, Shohre .Teaching Persian/Farsi to Non-native Speakers: The Use of Computer & Technology. *Journal of Teaching Persian Language to Non- Persian Speakers*;2014,3(8), 1-20.

The Relationship between Chronic Pain and Obesity: The Mediating Role of Anxiety

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Abstract

Obesity is nowadays considered as one of the problems impairing functioning and quality of life. Obesity is defined by body mass index (BMI), and most studies on the association between psychiatric disorders and obesity have exclusively studied depression. But there are just a few researchers that have studied the association between obesity and anxiety, and the mechanism of this association remains unclear. This study aims to evaluate the extent to which the association between chronic pain and obesity are mediated by anxiety and moderated by coping strategies. The study population comprised 200 participants (100 male and 100 female) aged between 20 and 70 (M=45) years old. All participants completed the Pain Self-Management Checklist, Beck Anxiety Inventory-II, and Lazarus Coping Skills Scale. The statistically significant paths were anxiety-pain, pain-obesity,

and anxiety-emotional coping strategies ($p < 0.005$). In summary, chronic pain predicted obesity directly, and specific coping strategies (emotional coping strategies) did not moderate the relationship between chronic pain, obesity and anxiety, but anxiety mediated this relationship.

Key words: Obesity, Anxiety, Chronic pain, coping strategies

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Introduction

In the coming decades, global health will be faced with enormous challenges with several public health problems such as Obesity, major depressive disorder (MDD), and anxiety (Kelly, Yang, Chen, Reynolds, & He, 2008; Kessler et al., 2003). Obesity and Major depressive disorder and/or anxiety disorders impose a large cost on individuals, health care services and society and are associated with long-term disabilities, morbidity and mortality (Müller-Riemenschneider, Reinhold, Berghöfer, & Willich, 2008; Pi-Sunyer, 2009). Several studies have suggested bilateral relationship between obesity and MDD and/or anxiety disorders and also the possibility of their comorbidity (Afari et al., 2010; Luppino et al., 2010).

Pain is the most common physical symptom-based condition reported in both the general population and in primary care (Kroenke, 2003) and it causes several functional and work-related disabilities (Greenberg et al., 1999; Institute of Medicine, 2011). Additionally, several studies have proved additive and adverse effects of different kinds of pain such as osteoarthritis pain, chronic headaches (Bigal et al., 2007) and neuropathic pain (Miscio et al., 2005). In obese people the impact of pain on the functional status and health-related quality of life is greater than people with normal weight (Marcus, 2004; Ray, Lipton, Zimmerman, Katz, & Derby, 2011).

The underlying mechanisms of the pain and obesity relationship is still unclear (Rossi, Luu, DeVilbiss, & Recober, 2013). In some literature obesity has been defined as a pro-inflammatory state and inflammatory mechanisms are involved in the development of pain, so inflammation can be considered as a part of the causal pathway. Additionally, evidence suggested a causal relationship between acute pain and transient insulin resistance (Greisen et al., 2001; Ray et al., 2011). Eventually, there is an association between depression and both obesity and chronic pain, and obsessive patients with comorbidity of depression and anxiety have worse experience of pain (Ray et al., 2011; Tietjen et al., 2007). A potential unifying mechanism may be found in the metabolic syndrome, which is known to be associated with chronic pain (Loevinger, Muller, Alonso, & Coe, 2007; Ray et al., 2011), inflammation (Lee, Lee, Huang, & Sheu, 2007), insulin resistance (Lann & LeRoith, 2007) and mood disorders (Räikkönen, Matthews, & Kuller, 2007).

There are several ways and strategies to cope with chronic pain which has been examined by various studies (Büssing, Ostermann, Neugebauer, & Heusser, 2010). Pain-related coping may be defined as individuals' attempts to manage problems associated with their pain state (DeGood & Tait, 2011) and according to their ability to effect symptoms, coping strategies has been divided into two categories: adaptive and maladaptive. Often, adaptive and maladaptive coping responses have been known as active and passive responses, respectively. For instance, adaptive coping appears in the form of staying active and pacing problem solving, while maladaptive

copings tends to present passive strategies such as resting and avoiding (Jensen, Turner, Romano, & Nielson, 2008). It's assumed that the role of maladaptive coping strategies in chronic pain consequences is more important than adaptive coping strategies (Geisser, Robinson, & Riley, 2000). This assumption has been examined frequently in different studies. For instance, the increased use of passive coping responses after multidisciplinary pain treatment has been associated with increased disabilities and depression (Jensen, Turner, & Romano, 2007). In a study on 106 military veterans who suffered from chronic pain, there was a strong association among maladaptive responses, pain interference and depression, while the relation of adaptive coping styles and pain intensity was considerable (Tan, Teo, Anderson, & Jensen, 2011). It is hypothesized in the present study that coping strategies and anxiety would impact the relationship between chronic pain symptoms and obesity.

Materials and Methods

This study explores the mediating role of anxiety and moderating role of coping strategies in the relationship between chronic pain and obesity. As one of the inclusion criteria, participants had to meet the criteria for chronic pain and obesity (BMI >30). Additional inclusion criteria for this study were being at least 18 years of age, current self-report of chronic pain (of more than 6 months' duration) confirmed by medical record and diagnosis, obesity, and having received treatment for a painful condition within the last 5 years (recorded in their medical records). Participants were excluded if they were older than 70 years old. All participants (N=200) signed informed consent and completed study-related tasks. Participants were selected through accessible sampling from the general population.

Data collection

Demographic characteristics, such as participants' age, gender and educational level, were gathered with relevant self-report questions.

Measures

Symptoms of anxiety were assessed by Beck anxiety inventory (BAI-II). The 31-item self-report Chronic Pain Inventory (CPI) was used for assessment of pain severity. Coping strategies were evaluated by Coping Questionnaire, developed by Lazarus and Folkman, (1984), containing 66 items (16 distractors and 50 main items) that assess direct confrontation, distancing, self-control, seeking social support, accepting responsibility, evasion and avoidance, solving planned problems and positive re-evaluation (Sadeghi & Niknam, 2015). Lazarus reported the reliability of each subscale from 0.66 to 0.79 and the reliability of the coping skills was estimated 0.84 (Rajabi Damavandi, Poushne, & Ghobari Banab, 2009). These values reflect the desirable reliability of the test (Sadeghi & Niknam, 2015).

Asghari-moghaddam et al (2008, 2011, 2008, 2002) assessed chronic pain using Chronic Pain Inventory (CPI) (Asghari-moghaddam, Abedi Ghelich Gheshlaghi,

(Asghari-moghaddam, Abedi Ghelich Gheshlaghi, & Khalilzade Poshtgol, 2008; Asghari Moghadam, 2011; Asghari Moghadam & Golak, 2008; Asghari Moghadam & Najarian, 2002). This inventory, which contains 31 items, assesses pain severity, the start time of pain, pain intensity six months after pain start time, influence of pain on the social and family relationships, and the number of operations because of pain.

Statistical analysis

Table 1 shows the mean and standard values of research variables: the scores mean for emotional coping and problem solving coping were 39.80 and 36.87, respectively. Furthermore, the means for anxiety, pain and obesity were 14.76, 33.01 and 32.34, respectively.

Table 1: Descriptive statistics of variables

Variables name		N	Mean	Std.
Coping styles	Emotional	200	39.80	11.84
	Problem solving	200	36.87	9.69
Anxiety		200	14.76	11.06
Pain		200	33.01	15.12
Obesity		200	32.34	3.22

Results

Path analysis was used for analysis of research data. As per the obtained results, anxiety proved to be a mediating variable in the present study and, based on literature review, pain and coping styles have effects on obesity after they have been affected by anxiety; therefore, the following model was tested (Figures 1 & 2)):

Three paths from anxiety to pain, emotional coping and problem solving coping; one direct path from anxiety to obesity; and three direct paths from pain, emotional coping and problem solving coping to obesity can be observed on the path diagram. Analysis results show that standardized regression weight from anxiety to emotional coping is 0.23 and $p < 0.001$; anxiety to problem solving coping is 0.12 and $p > 0.08$; anxiety to pain is 0.32 and $p < 0.001$; emotional coping to pain is 0.08 and $p > 0.23$; problem solving coping to pain is -0.18 and $p < 0.01$; pain to obesity is 0.25 and $p < 0.001$; emotional coping to obesity is -0.05 and $p > 0.50$; problem solving coping to obesity is -0.04 and $p > 0.58$; and anxiety to obesity is 0.005 and $p < 0.94$. Table 2 shows the foregoing results completely. Fitness indexes did not confirm the fitness of conceptual model with observed data. Chi-square stood at 141, 983, the degree of freedom at 1, and Probability level at 0.001. Chi-square index shows the significant difference between conceptual model and observed model. As many references have suggested that chi-square is dependent upon sample size, it is thus more desirable to use other fitness indices for model fit test. Therefore, CFI, NFI and RMSEA indices were used. As shown in Table 3, these indices do not confirm the models.

Table 2: Regression Weights (Default Model)

			Regression Weights		S.E.	C.R.	P
			Unstandardized	Standardized			
Emotional coping strategies	<---	anxiety	.246	.230	.074	3.330	***
Problem solving coping strategies	<---	anxiety	.107	.122	.062	1.734	.083
Pain	<---	anxiety	.451	.327	.094	4.805	***
Pain	<---	Emotional defence	.103	.080	.087	1.178	.239
Pain	<---	Problem solving defence	-.275	-.175	.104	-2.639	.008
Obesity	<---	pain	.052	.248	.016	3.339	***
Obesity	<---	Emotional defence	-.013	-.047	.019	-.669	.503
Obesity	<---	Problem solving defence	.013	.039	.023	.551	.582
Obesity	<---	anxiety	-.001	-.005	.022	-.065	.948

Figure1: Unstandardized estimated

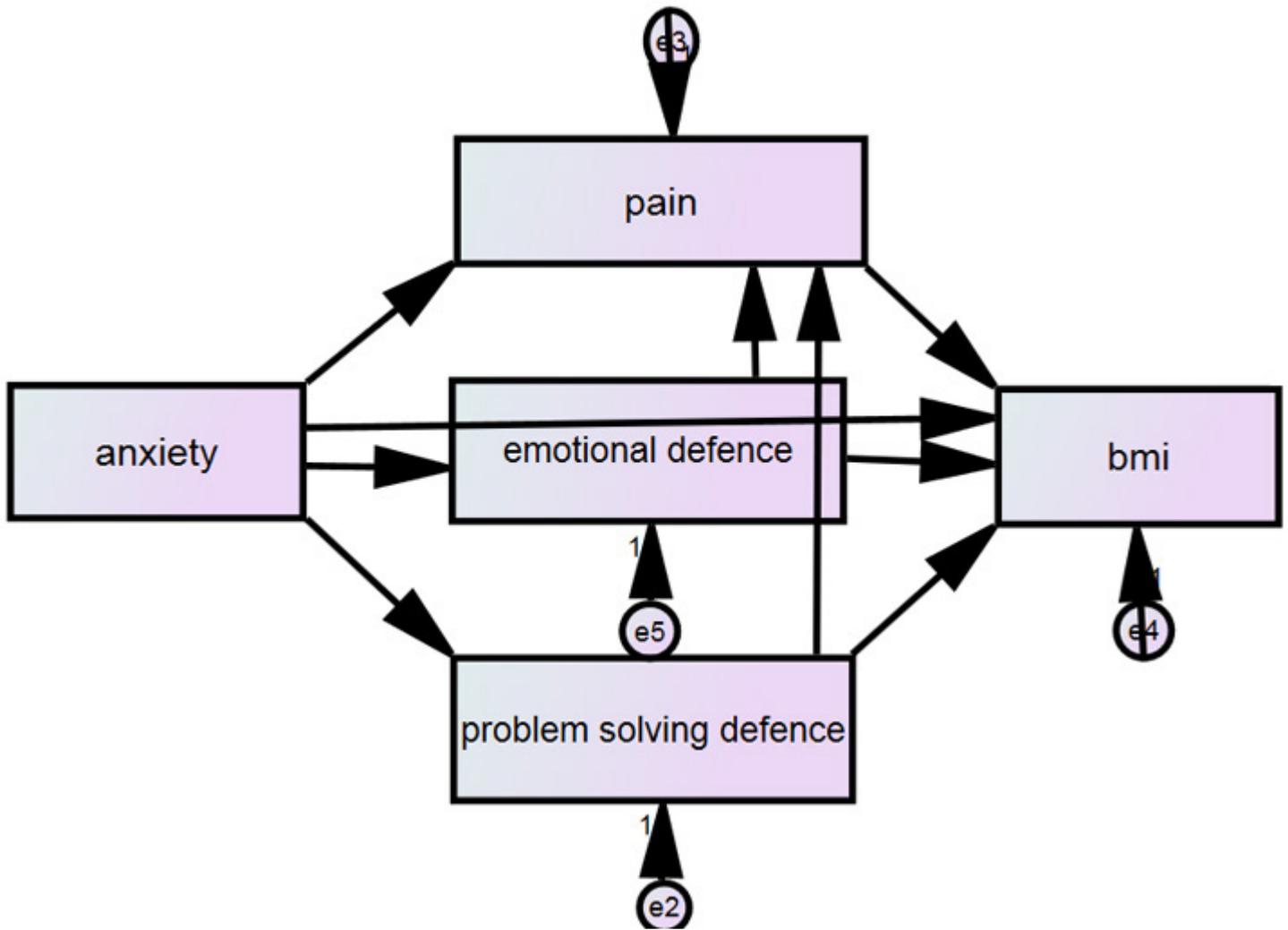
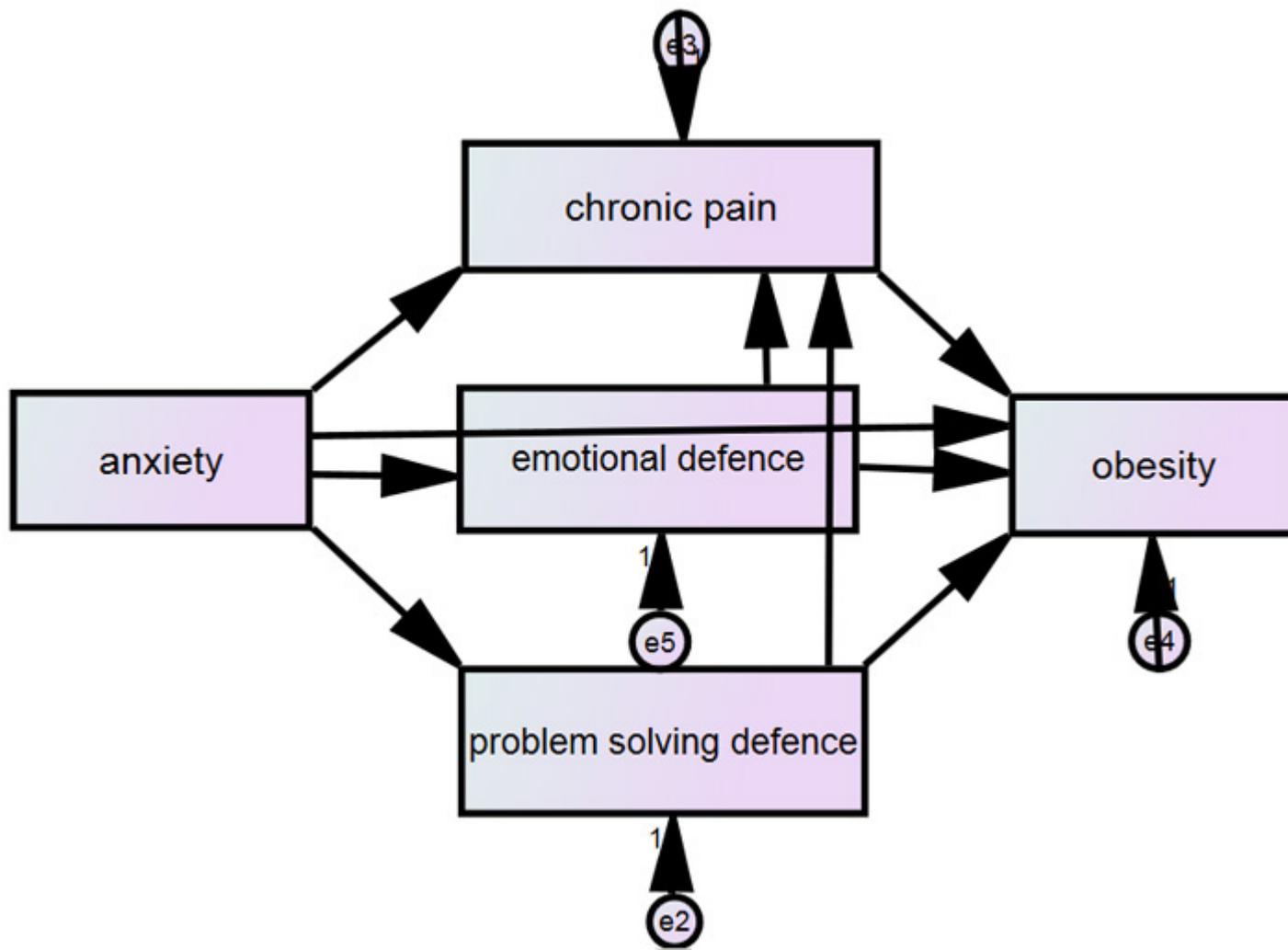


Table 3: Indices of fitness

Index Name	Observed Value	Excepted Value
$\frac{\chi^2}{df}$	141.983	Below 3
RMSEA	0.84	Below 0.1
CFI	0.23	More than 0.9
NFI	0.27	More than 0.9
IFI	0.27	More than 0.9

Figure 2: Standardized estimated



Discussion

The present study explored the relationship between chronic pain and obesity with the mediating role of anxiety and moderating role of coping strategies. Personal resources play an important role in reduction and prevention of anxiety. The results obtained by the present study show that anxiety predicts emotional coping strategies. In other words, greater anxiety correlates with greater emotional coping strategies. The result is consistent with the findings of similar studies. For example, the importance of dysfunctional coping strategies in predicting anxiety and its helpful role in managing anxiety were indicated by researchers (Cooper, Katona, Orrell, & Livingston, 2006). There is a relationship between psychological distress and different coping strategies. There are negative relations between the problem-focused coping and anxiety, stress and depressive symptoms, while this relation in case of the avoidant coping is positive (van Berkel, Boot, Proper, Bongers, & van der Beek, 2014). Problem-focused coping helps to manage the stress causing the problem, and emotional-focused coping diminishes the negative emotions associated with the stressor (Folkman, Lazarus, Dunkel-Schetter, DeLongis,

& Gruen, 1986). However, avoidance coping, as a type of passive coping, is highly related to psychological outcomes due to minimizing, denying or ignoring to deal with a stressful situation (Holahan, Moos, Holahan, Brennan, & Schutte, 2005; Snow, Swan, Raghavan, Connell, & Klein, 2003).

Based on the results obtained in this study, there is a significant prediction between anxiety and chronic pain. In other words, anxiety increases the severity of pain. Additionally, pain, depression and anxiety frequently co-occur and have additive and adverse effects on health-related quality of life (HRQL), functional impairment and treatment response (Bair, Robinson, Katon, & Kroenke, 2003; Bair, Wu, Damush, Sutherland, & Kroenke, 2008). A study on 500 primary care patients with chronic pain discovered negative association between anxiety severity and pain severity (Bair et al., 2008). There are some findings that claim chronic pain substantially increases the likelihood of anxiety disorder (McWilliams, Cox, & Enns, 2003). In other research, it was concluded that the presence of any of the five common pain complaints increased the likelihood of having an anxiety disorder significantly (Kroenke & Price, 1993).

The other finding of the current study is related to the prediction of obesity by chronic pain. The findings demonstrate that obesity is strongly associated with chronic regional pain (CRP) as well as reporting of musculoskeletal pain at specific members such as the knees. Furthermore, obesity is associated with more severe pain (Deere et al., 2012). Obesity is also associated with an increased risk of pain at any members, as well as a range of musculoskeletal pain phenotypes. The strongest associations, as observed in analyses on boys and girls combined, were between obesity, risk of CRP, and knee pain. Whereas CRP also comprised pain at shoulders, lower back, and hips, all of which showed weak evidence of an association with obesity, the relationship between obesity and CRP may have been driven by that with knee pain. Obesity was also associated with pain severity, as reflected by higher average pain scores in obese participants reporting CRP and knee pain (Deere et al., 2012). However, the findings of the present study are in contrast with those of other researchers that claim obesity influences the pain. It was found that pain predicts obesity. In general, the path analysis (as shown above) shows that anxiety is a predictor of chronic pain and chronic pain can predict obesity. On the other hand, anxiety can predict the emotional coping strategies, but the emotional coping strategies are not able to predict obesity.

Limitations

The present research was faced with some limitations, such as a small study population. The population of the present research being 200 individuals can be one of the reasons for indices of fitness not confirming any fitness between conceptual model and observed data. Another limitation was the cross-sectional design, and the authors of the present study recommend that this research be repeated in a longitudinal prospective design.

References

1. Afari, N., Noonan, C., Goldberg, J., Roy-Byrne, P., Schur, E., Golnari, G., & Buchwald, D. (2010). Depression and obesity: do shared genes explain the relationship? *Depression and anxiety*, 27(9), 799-806. doi: <http://dx.doi.org/10.1002/da.20704>
2. Asghari-moghaddam, M. A., Abedi Ghelich Gheshlaghi, M., & Khalilzade Poshtgol, M. (2008). Investigation of psychometric characteristics of pain self-management checklist Paper presented at the Congress of Cognitive Behavioral Therapy.
3. Asghari Moghadam, M. (2011). Screening of chronic pain patient inventory book. Iran: Developmental publication.
4. Asghari Moghadam, M., & Golak, N. (2008). Investigation of multiple pain inventories in Iranian population of chronic pain. *Journal of Psychology*, 1(12), 55-70.
5. Asghari Moghadam, M., & Najarian, B. (2002). *Psychology of pain*. Tehran: Roshd Pub.
6. Bair, M. J., Robinson, R. L., Katon, W., & Kroenke, K. (2003). Depression and pain comorbidity: a literature review. *Archives of internal medicine*, 163(20), 2433-2445. doi: <http://dx.doi.org/10.1001/archinte.163.20.2433>
7. Bair, M. J., Wu, J., Damush, T. M., Sutherland, J. M., & Kroenke, K. (2008). Association of depression and anxiety alone and in combination with chronic musculoskeletal pain in primary care patients. *Psychosomatic medicine*, 70(8), 890. doi: <http://dx.doi.org/10.1097/PSY.0b013e318185c510>
8. Bigal, M. E., Tsang, A., Loder, E., Serrano, D., Reed, M. L., & Lipton, R. B. (2007). Body mass index and episodic headaches: a population-based study. *Archives of internal medicine*, 167(18), 1964-1970. doi: <http://dx.doi.org/10.1001/archinte.167.18.1964>
9. Büsing, A., Ostermann, T., Neugebauer, E. A., & Heusser, P. (2010). Adaptive coping strategies in patients with chronic pain conditions and their interpretation of disease. *BMC Public Health*, 10(1), 507. doi: 10.1186/1471-2458-10-507
10. Cooper, C., Katona, C., Orrell, M., & Livingston, G. (2006). Coping strategies and anxiety in caregivers of people with Alzheimer's disease: the LASER-AD study. *Journal of affective disorders*, 90(1), 15-20.
11. Deere, K. C., Clinch, J., Holliday, K., McBeth, J., Crawley, E. M., Sayers, A., . . . Tobias, J. H. (2012). Obesity is a risk factor for musculoskeletal pain in adolescents: findings from a population-based cohort. *PAIN®*, 153(9), 1932-1938. doi: <http://dx.doi.org/10.1016/j.pain.2012.06.006>
12. DeGood, D., & Tait, R. (2011). Assessment of pain beliefs and pain coping. In Turk DC Melzack R (Ed.), *Handbook of pain assessment* (pp. 320-334). New York: Guilford Press.
13. Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of personality and social psychology*, 50(5), 992-1003. doi: <http://dx.doi.org/10.1037/0022-3514.50.5.992>
14. Geisser, M. E., Robinson, M. E., & Riley, J. L. (2000). Pain beliefs, coping, and adjustment to chronic pain: let's focus more on the negative. Paper presented at the Pain Forum.
15. Greenberg, P. E., Sisitsky, T., Kessler, R. C., Finkelstein, S. N., Berndt, E. R., Davidson, J. R., & Fyer, A. J. (1999). The economic burden of anxiety disorders in the 1990s. *The Journal of clinical psychiatry*, 60(7), 427-435. doi: <http://dx.doi.org/10.4088/JCP.v60n0702>
16. Greisen, J., Juhl, C. B., Grøfte, T., Vilstrup, H., Jensen, T. S., & Schmitz, O. (2001). Acute pain induces insulin resistance in humans. *The Journal of the American Society of Anesthesiologists*, 95(3), 578-584. doi: <http://dx.doi.org/10.1097/0000542-200109000-00007>
17. Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: a 10-year model. *Journal of consulting and clinical psychology*, 73(4), 658. doi: <http://dx.doi.org/10.1037/0022-006X.73.4.658>
18. Institute of Medicine. (2011). *Relieving pain in America: a blueprint for transforming prevention, care, education, and research*. Washington, DC: National Academies Press.
19. Jensen, M. P., Turner, J. A., & Romano, J. M. (2007). Changes after multidisciplinary pain treatment in patient pain beliefs and coping are associated with concurrent

- changes in patient functioning. *Pain*, 131(1), 38-47.
20. Jensen, M. P., Turner, J. A., Romano, J. M., & Nielson, W. (2008). *Chronic pain coping inventory professional manual*. Lutz: FL: Psychological Assessment Resources.
21. Kelly, T., Yang, W., Chen, C.-S., Reynolds, K., & He, J. (2008). Global burden of obesity in 2005 and projections to 2030. *International journal of obesity*, 32(9), 1431-1437. doi: <http://dx.doi.org/10.1038/ijo.2008.102>
22. Kessler, R. C., Berglund, P., Demler, O., Jin, R., Koretz, D., Merikangas, K. R., . . . Wang, P. S. (2003). The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *Jama*, 289(23), 3095-3105. doi: <http://dx.doi.org/10.1001/jama.289.23.3095>
23. Kroenke, K. (2003). Patients presenting with somatic complaints: epidemiology, psychiatric co-morbidity and management. *International journal of methods in psychiatric research*, 12(1), 34-43. doi: <http://dx.doi.org/10.1002/mpr.140>
24. Kroenke, K., & Price, R. K. (1993). Symptoms in the community: prevalence, classification, and psychiatric comorbidity. *Archives of internal medicine*, 153(21), 2474-2480. doi: <http://dx.doi.org/10.1001/archinte.1993.00410210102011>
25. Lann, D., & LeRoith, D. (2007). Insulin resistance as the underlying cause for the metabolic syndrome. *Medical Clinics of North America*, 91(6), 1063-1077. doi: <http://dx.doi.org/10.1016/j.mcna.2007.06.012>
26. Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
27. Lee, I.-T., Lee, W.-J., Huang, C.-N., & Sheu, W. H. (2007). The association of low-grade inflammation, urinary albumin, and insulin resistance with metabolic syndrome in nondiabetic Taiwanese. *Metabolism*, 56(12), 1708-1713. doi: <http://dx.doi.org/10.1016/j.metabol.2007.07.015>
28. Loevinger, B. L., Muller, D., Alonso, C., & Coe, C. L. (2007). Metabolic syndrome in women with chronic pain. *Metabolism*, 56(1), 87-93. doi: <http://dx.doi.org/10.1016/j.metabol.2006.09.001>
29. Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry*, 67(3), 220-229. doi: <http://dx.doi.org/10.1001/archgenpsychiatry.2010.2>
30. Marcus, D. A. (2004). Obesity and the impact of chronic pain. *The Clinical journal of pain*, 20(3), 186-191. doi: <http://dx.doi.org/10.1097/00002508-200405000-00009>
31. McWilliams, L. A., Cox, B. J., & Enns, M. W. (2003). Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain*, 106(1), 127-133. doi: [http://dx.doi.org/10.1016/S0304-3959\(03\)00301-4](http://dx.doi.org/10.1016/S0304-3959(03)00301-4)
32. Miscio, G., Guastamacchia, G., Brunani, A., Priano, L., Baudo, S., & Mauro, A. (2005). Obesity and peripheral neuropathy risk: a dangerous liaison. *Journal of the peripheral nervous system*, 10(4), 354-358. doi: <http://dx.doi.org/10.1111/j.1085-9489.2005.00047.x>
33. Müller-Riemenschneider, F., Reinhold, T., Berghöfer, A., & Willich, S. N. (2008). Health-economic burden of obesity in Europe. *European journal of epidemiology*, 23(8), 499-509. doi: <http://dx.doi.org/10.1007/s10654-008-9239-1>
34. Pi-Sunyer, X. (2009). The medical risks of obesity. *Postgraduate Medicine*, 121(6), 21-33. doi: <http://dx.doi.org/10.3810/pgm.2009.11.2074>
35. Räikkönen, K., Matthews, K. A., & Kuller, L. H. (2007). Depressive symptoms and stressful life events predict metabolic syndrome among middle-aged women: a comparison of World Health Organization, Adult Treatment Panel III, and International Diabetes Foundation definitions. *Diabetes care*, 30(4), 872-877. doi: <http://dx.doi.org/10.2337/dc06-1857>
36. Rajabi Damavandi, G., Poushne, K., & Ghobari Banab, B. (2009). [Relationship between personality characteristics and coping strategies in parents Children with autism spectrum disorders] [Persian]. *Research on Exceptional Children*, 9(2), 133-144.
37. Ray, L., Lipton, R. B., Zimmerman, M. E., Katz, M. J., & Derby, C. A. (2011). Mechanisms of association between obesity and chronic pain in the elderly. *Pain*, 152(1), 53-59. doi: [10.1016/j.pain.2010.08.043](http://dx.doi.org/10.1016/j.pain.2010.08.043)
38. Rossi, H. L., Luu, A. K. S., DeVilbiss, J. L., & Recober, A. (2013). "Obesity increases nociceptive activation of the trigeminal system". *European journal of pain (London, England)*, 17(5), 649-653. doi: [10.1002/j.1532-2149.2012.00230.x](http://dx.doi.org/10.1002/j.1532-2149.2012.00230.x)
39. Sadeghi, H. S., & Niknam, M. (2015). The Relationship between Coping Skills with Social Maturity and Adjustment of Female First Graders in High School: A Case Study in Iran. *Asian Social Science*, 11(25), 144.
40. Snow, D. L., Swan, S. C., Raghavan, C., Connell, C. M., & Klein, I. (2003). The relationship of work stressors, coping and social support to psychological symptoms among female secretarial employees. *Work & Stress*, 17(3), 241-263.
41. *Medical care*, 43(12), 1164-1170. doi: <http://dx.doi.org/10.1097/01.mlr.0000185750.18119.fd>
42. Tan, G., Teo, I., Anderson, K. O., & Jensen, M. P. (2011). Adaptive versus maladaptive coping and beliefs and their relation to chronic pain adjustment. *The Clinical journal of pain*, 27(9), 769-774. doi: <http://dx.doi.org/10.1097/AJP.0b013e31821d8f5a>
43. Tietjen, G. E., Peterlin, B. L., Brandes, J. L., Hafeez, F., Hutchinson, S., Martin, V. T., . . . Herial, N. A. (2007). Depression and anxiety: effect on the migraine-obesity relationship. *Headache: The Journal of Head and Face Pain*, 47(6), 866-875. doi: <http://dx.doi.org/10.1111/j.1526-4610.2007.00810.x>
44. van Berkel, J., Boot, C. R., Proper, K. I., Bongers, P. M., & van der Beek, A. J. (2014). Effectiveness of a worksite mindfulness-related multi-component health promotion intervention on work engagement and mental health: results of a randomized controlled trial. *PloS one*, 9(1), e84118. doi: <http://dx.doi.org/10.1371/journal.pone.0084118>

Implementation status of moral codes among nurses

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Abstract

Background and objective: Nurses should have an appropriate level of ethical development to perform their daily care. Ethical codes should be understood by nurses and used in each dimension of nursing practice. Therefore, this study aimed to investigate the implementation status of nurses' ethical codes.

Methods: This descriptive-analytic study was carried out on 202 nurses working in internal and surgical wards using easy sampling in educational hospitals of the Faculty of Medical Sciences, Abadan. The implementation status of ethical codes was investigated using a researcher-made questionnaire and the obtained data were analyzed using SPSS ver. 16.

Results: There was a statistically significant difference between the level of ethical performance of nurses with cases such as organizational positions, work shift, academic education, and ethics retraining courses and work experience ($p < 0.005$). This difference was not observed in relation to gender, marital status, educational degree, history of presenting complaints and job satisfaction and the workplace ($p > 0.005$).

Conclusion: Results of this study showed that nurses should firstly recognize the dimensions and ethical issues in their profession for the ethical performance of professional nursing; therefore, it is recommended to maximize the efficiency and quality of health care by educating the medical staff and raising their awareness of professional ethics.

Key words: Professional Ethics, Code of Ethics, Nurses

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Introduction

The health care system consists of a variety of components, each of which plays its role in some way. Among the components of this system, nursing is one of the most important pillars, so that the services provided by this component directly affect health and disease related indicators and related outcomes (1). Although observance of professional ethics is necessary in all occupations, this factor is more necessary in the nursing profession because spiritual behavior along with the responsibility of nurses with patients plays an effective role in their health improvement and recovery. Therefore, the nursing profession is based on ethics (2-3). Nursing ethics refers to the observance of professional ethics in providing nursing cares (4) which leads to conscientiousness towards the patient and the health organization (2-3). Any problem in observing nursing ethics can affect the most scientific and best nursing care (5). Although nursing knowledge has been significantly expanded and great emphasis has been placed on nursing technical competencies as well, the issue of ethical competence in care or care ethics has been some times neglected (6). With increasing attention to ethical issues and challenges in care settings, health care providers have been facing complex situations due to ethical issues (7). The working environment of nurses and their daily exposure to death lead to ethical tension among them (8). In fact, ethical tension occurs when a person knows what is right but the work constraints hinder proper work (9). According to existing studies, about 11% of and 36% of nurses face ethical challenges and problems every day and every few days, respectively (10-11). In the clinical environment, the ethical action factor, which means thinking, practicing, and accepting the responsibility of the performed act, may be confused with the contradictory values existing in it (12). There is also the fact that it seems nursing ethical values are not always clear (13), and the health services providing working environment undergo constant changing affecting the ethics factor (14). This issue leads to more complexity of the subject. The evident fact in recent years is that although nurses are trained on ethical issues, one of their major concerns is that they do not know how to deal with different ethical situations and problems (15). The results of studies in the ethics field indicate weakness in nursing ethical decision making (16). According to the studies, the mean score of ethical reasoning was reported to be 51.74 and 16.42 among nurses in other countries and Iran, respectively (17). Many investigations in different societies have led to the recognition of different aspects of ethical sensitivity (18). However, there are limited studies on ethical sensitivity, and this issue has not been adequately addressed by the researchers as to the importance it has in clinical practice. Kim et al. believe that the outcomes of previous research on the subject of ethical sensitivity are limited and of little depth (19). Therefore, it seems that a comprehensive view of this important issue can be valuable. Given the inadequate studies on nursing ethics, and since one of the important achievements of observance of ethical codes is to facilitate the implementation of clinical governance, which includes cases such as taking steps to minimize

the risk to employees and patients, paying attention to patients' complaints and use of the best evidence in clinical decision making (20), this study aimed to investigate the implementation status of ethical codes in nurses.

Method

The present research is a descriptive-analytic study which was conducted in 2016. The research population consisted of nurses working in hospitals affiliated to the Abadan Faculty of Medical Sciences who were selected using convenience sampling method. Inclusion criteria included having a bachelor's degree in nursing and above, employment in one of the internal and surgical wards, having at least six months of work experience and informed consent for participation in the study. After obtaining permission from the Research Ethics Committee of Abadan Faculty of Medical Sciences, and presenting an introduction letter from Research Management to the head of target hospitals, the questionnaires were distributed by the researcher after repeated referring to the wards at the right time, explaining the research objectives, the method of filling in the questionnaire and obtaining informed consent. It should be noted that the samples completed the questionnaire freely and without direct supervision of the researcher, then the completed questionnaires were collected by the researcher. Two questionnaires were used to collect information.

A) Demographic information questionnaire including age, sex, marital status, educational level, organizational post, work shift, ethics education, retraining courses during recruitment, the history of a patient's legal complaint from a nurse, professional satisfaction, work experience and the workplace.

B) To investigate the nurses' performance to the nursing ethics of Iran, a researcher-made questionnaire, by Mohajl Moghadam et al. (5), was used. In this questionnaire, according to Iran's Nursing Ethics, ethical guidelines have been developed in five areas of nurses and community, nurses and professional commitment, nurses and cares provision, nurses and the therapeutic team colleagues, nurse and education, and have 35 statements per area. Options, including Always, Often, Occasionally, Rarely, Never, and not experienced were considered in each statement. Cronbach's alpha coefficient for the reliability and internal consistency of the questionnaire was calculated 0.79 by Mohajl Moghadam et al (5). Face and content validity of the questionnaires were also evaluated in this study (5) by the professors of medical ethics, social medicine, Islamic education and nursing. SPSS ver. 16 is used in this research. For statistical analysis of data, descriptive statistics were used for obtaining basic information such as frequency, frequency percentage, mean, minimum and maximum, number of data and standard deviation. In inferential statistics, the Kolmogorov Smirnov test was used for normality of variables and independent t-test, Mann-Whitney U test, Kruskal-Wallis and Pearson correlation were also used. It should be noted that all ethical considerations, including obtaining the code of ethics (IR. ABADANUMS.REC. 1395. 133), obtaining

informed consent from the participants, confidentiality of information, the possibility of withdrawal from the continued participation of nurses if desired and the publication of the results as a group study were considered.

Findings

69.3% of the participants in this study were women and 52% were married. 93.6% had ethical education and 86.6% had passed retraining courses in this field. Moreover, 86.6% had no history of making complaints, 67.3% of them are satisfied with their professions, and the average age is 32.396 ± 7.335 . Other information on demographic variables is presented in Table 1.

Table 1: Descriptive statistics of demographic variables

		Frequency	Frequency percentage
Degree	BA	196	0.97
	MA	6	0.3
Organizational position	Nurse	194	0.96
	Head nurse	8	0.4
Work shift	Morning	26	12.9
	Afternoon	2	0.1
	Night	15	7.4
	Circulating shifts	159	78.7
Work experience	Less than 5 years	92	45.5
	5-10 years	56	27.7
	11-15 years	30	14.9
	More than 15 years	24	11.9

Comparison of the nurses' performance to the Iranian nursing ethics in each of the demographic variables is presented in Table 2. Considering the normality or non-normality of distribution of the sample, the appropriate test has been used. There was no statistically significant difference between the distribution of performance to Iran's nursing ethics with gender, marital status, educational level, complaints history and having job satisfaction and workplace ($p > 0.005$).

Table 2: The relationship between the socio-demographic characteristics of nurse with their performance to the nursing ethics of Iran

Variable	Classification	Mean	Standard deviation	Statistics	Degrees of freedom	Significance level
Organizational position**	Nurse	5.256	0.527	0.457	-	0.049
	Head nurse	5.589	0.304			
Work shift ***	Afternoon	4.928	0.020	Only two cases do not participate in the test 10.021	2	0.007
	Morning	5.374	0.369			
	Night	4.870	0.567			
	Circulating shifts	5.294	0.529			
University education **	Yes	5.297	0.503	0.693	-	0.009
	No	4.874	0.669			
Retraining course **	Yes	5.299	0.511	1320.500	-	0.022
	No	5.012	0.575			
Work experience***	Less than 5 years	5.159	0.575	9.888	3	0.02
	5-10 years	5.426	0.3977			
	11-15 years	5.311	0.499			
	More than 15 years	5.276	0.534			

* Both groups are normal and the independent T test is used.

** At least one group is not normal and Mann-Whitney U is used.

*** At least one group is not normal and the Kruskal-Wallis test is used.

Table 3 shows the frequency percentage of distribution of nurses' performance to the nursing ethics of Iran from their point

Table 3: Frequency percentage of distribution of nurses' performance to the nursing ethics of Iran from their point of view

	Statements on Nursing Ethics in Iran	Not experienced	Never	Rarely	Sometimes	Mostly	Always
1	I attempt to reduce pain, prevent diseases and improve public health.	0	0	20	5	19.3	73.8
2	I carry out nursing care with respect for human rights, social values and religious beliefs of the patient.	0	2.5	1	2	18.3	76.2
3	I paid special attention to vulnerable groups such as the elderly, people with disabilities and physical disabilities	0	1	0.5	3.5	21.8	73.3
4	In crises, natural disasters and epidemics, I carry out my duties with caution.	2.5	1	1	5	23.3	67.3
5	When considering nursing interventions and clinical decisions, I will also take ethical responsibilities.	0	0	1	2	14.4	82.7
6	Within the range of my duties and authority, I try to provide a safe and healthy environment for the patient.	0	0	0.5	2.5	18.3	78.7
7	I secure patient safety with timely attendance, performing professional tasks and recording care provided.	0	0.5	1	1.5	24.3	72.8
8	I provide the best care to the patient, based on professional standards from valid research findings.	0	0	0.5	8.4	27.2	63.9
9	I carry out all nursing interventions by maintaining human dignity and respect for the patient and his or her family.	0.5	0.5	1	3	20.3	74.8
10	I attempt to protect patient's secrets, privacy, respect for individual autonomy and obtain informed consent.	0	0	0.5	3	21.3	75.2
11	I prevent possible injuries to the patient by identifying and reporting possible professional errors made by my colleagues.	0.5	0	0	6.9	26.7	65.8

12	In the event of an error in nursing interventions, I honestly explain it to the patient and observe honesty and fairness.	2.5	2.5	4.5	10.4	30.2	50
13	I maintain and promote my physical, mental, social and spiritual abilities.	0	0	4.5	5.4	28.7	64.4
14	To maintain professional competence, I keep my knowledge and skills up to date.	0.5	0.5	3	8.4	28.2	59.4
15	I have the knowledge and ability to take care of the patient, without direct supervision of the authorities, and I am responsive to my duties.	0	1.5	0	9.9	22.8	65.8
16	I refrain from accepting any gift or privilege from a patient or relatives	7.4	3.5	0.5	2.5	11.9	74.3
17	I introduce myself to the patient by naming my name, title and professional role.	0.5	2	1.5	6.9	16.8	72.3
18	I establish a relationship of mutual trust with the patient so I can understand his/her needs and concerns.	0	0.5	0	74.5	35.1	56.9
19	Prior to nursing interventions, I will provide the patient with sufficient information to accept or reject the interventions.	0	0	2.5	5.9	37.6	54
20	In order to empower the patient to improve her/his self-care, the patient and their family are being trained upon discharge	0.5	0.5	1	3	28.2	66.8
21	In emergency situations outside of the work environment, I also provide care for the patient or injured person.	5.4	2.5	7.9	13.4	30.7	40.1
22	I use patient information only for health-related purposes (treatment, research) and for the benefit of the patient.	0	0	2	5	27.7	65.3

23	I adopt precautions to ensure the safety of nursing interventions and consult with colleagues.	0	0	1	5.4	27.2	66.3
24	I will report any complaints and problems to the department in charge.	0.5	0	0.5	6.4	25.2	67/3
25	I will abstain from taking actions that violate ethical and legal principles, even with the patient's request.	0.5	0.5	0.5	2	19.8	76.7
26	I work to accept reality and meet the patient's wishes in the final days of her/his life.	0.5	1	1.5	8.4	19.8	64.4
27	Different levels of professionalism, other nurses, masters and behavioral students are honored with respect.	1	0.5	2	3	15.8	77.7
28	I consult with the Ethics Committee of the Hospital in the face of any ethical challenge.	10.9	2	5.9	20	29.2	42.1
29	In case of patient participation in research projects, I will observe patient rights and ethical considerations.	2.5	1	3.5	6.4	28.7	57.9
30	I use my professional position to persuade the patient to participate in research and education of students	9.4	2.5	5	12.4	27.2	43.6
31	If the patient and his/her family do not cooperate in teaching the students, it will not affect the delivery of the services.	5	2.5	1	11.4	25.7	54.5
32	As a clinical nurse, I attempt to improve the skills and capacities of nursing students.	3.5	0.5	4.5	11.9	25.7	54
33	I decide on the donation of patients with brain death or vegetable life.	32.7	22.8	3.5	5.4	12.9	22.8

34	I decide regarding the quality and quantity of the survival of coma patients.	30.2	24.8	5	5.4	8.9	25.7
35	I hide the prognosis of malignant diseases like cancer from the patient or his/her family.	25.7	18.3	11.9	9.9	13.9	20.3

Discussion and Conclusion

Based on the findings of this study, the variables such as age, sex, level and type of education have no effect on the ethical development of nurses and this has been emphasized by Zirk et al. (21) and Ghoorchani et al. (22); however, Dehghani et al. (23) and Sokhanvar et al. (24) opposed to the lack of correlation between these variables. Also, there was no significant statistical difference between married and non-married nurses in terms of ethical performance, which was also emphasized in other studies (23, 25). The organizational position of nurses has had a significant effect on their ethical performance in this study, so that head nurses who often have a better a history of work and a sense of responsibility towards their work, had best performance, though it is not confirmed in some studies (23 and 25). Since the ethical principles in human encounters with patients and ethical laws are the same, in this research, the service area has not had an effect on the level of ethical development of nurses, which is consistent with the study by conducted by Zirk et al. (21). There was a significant relationship between the shift work of nurses and the quality of professional ethics performance and other studies achieved similar results (23). Morning nurses have had a better ethical performance than working shift nurses. The work environment and various shifts lead to nursing burnout, which in turn leads to a decrease in the ethical development level in nurses. Therefore, it seems necessary to make some changes in nurses' work shifts in order to reduce the effect of fatigue due to long working hours. Variables of passing the retraining course and university education were significantly related with the level of ethical development. Individuals with both trained ethics as well as in-service training were more likely to use ethical resources and institute ethical performance. In an environment where this training is not given much importance, ethical issues are overlooked over time and individuals only consider themselves to be bound to comply with institutional policies and clinical considerations. Since the studies of other researchers (26, 21, 23, 5) have also confirmed the effect of this training, it is necessary to pay close attention to educating ethical concepts, especially using new teaching methods in nursing education programs and in-service nursing programs. Hundert points out that there is a small probability that students who are not familiar with ethical theories before being in a clinical position can identify ethical problems (27). Erdil and KorkMazz agree with this idea (28). Their undesirable performance requires a change in the content of the curriculum and the method of teaching professional ethics in the nursing baccalaureate and before entering the clinical field (29).

Perhaps one of the challenges facing ethics education is the provision of qualified instructors in the teaching of ethical issues that have been referred to in research (30), because learning situational ethics has a considerable impact in increasing the internal motivation of individuals for ethical performance. Also, it was shown in this study that as the clinical experience of nurses increases, the ethical development of nurses decreases, which is consistent with the results of the Ham and Dean Mohammadi (31-33). However, there are obstacles to implementing these codes, which should be addressed first, so that they can be expected to be implemented well in the clinical field. Implementation of these codes requires the coordination and cooperation of all nursing practitioners and authorities such as the Ministry of Health, the Nursing Organization, the National Medical Sciences Universities, the Nursing Board and other nursing organizations, which must, with the participation of each other, eliminate structural barriers to the implementation of nursing ethical codes so that it will be turned into a charter applicable to hospitals. One of the limitations of this research is the fact that only nurses' views have been investigated, but it seems that a more comprehensive view on solving ethical problems in a clinical setting can be achieved by investigating the viewpoints of patients and nursing students. Data were also collected by self-reporting questionnaire, in which participants may not report their actual data.

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References

1. Tschudin V. Ethics in Nursing: Caring Relationship, 3th Ed. Edinburgh: Butterworth Heinemann; 2003.
2. Sanjari M, Zahedi F, Larijani B. Ethical Codes of Nursing and the Practical Necessity in Iran. Iranian J Publ Health. 2008; 37(1): 22- 27[Persian]
3. Jormsri P, Kunavicticul W, Ketefian Sh, Chaowalit A. Nurs Ethics. 2005; 12(6): 582 – 593.
4. Mohammadi M, Mohammadi SH. Ethics in Midwifery. Journal of Navid. 2008; 30(42):25- 30. [Persian]
5. Mohajjel Aghdam A, Hassankhani H, Zamanzadeh V, Khameneh.S, Moghaddam. S. The Knowledge and

- Practice of Nurses to the Code of Ethics for Iranian Nurses of Tabriz Teaching Hospitals. *Journal of Medical History*. 2013; 17(5): 113-140. [Persian]
6. Homayi Rahimi M. Investigate The Viewpoints of The Patients Hospitalized In Teaching Hospitals of Hamedan In Its Own Territory Invaded In 2003. Abstracts of Articles National Congress of Quality of Life. Tehran; 125. [Persian]
 7. Han, SS. Kim, J. Kim, YS. Ahn, S. Validation of a Korean Version of the Moral Sensitivity Questionnaire. *Nurs Ethics*. 2010; 17(1): 99-105.
 8. Robinson, R. Registered Nurses and Moral Distress. *Dimens Crit Care Nurs*. 2010; 29(5): 197-202.
 9. Ohnishi, K. Ohgushi, Y. Nakano, M. Fujii, H. Tanaka, H. Kitaoka, K. Narita, Y. Moral Distress Experienced By Psychiatric Nurses In Japan. *Nurs Ethics*. 2010; 17(6): 726-40.
 10. Kozier B. *Fundamentals of Nursing: Concepts, Process & Practice*, 7th Ed. Mosby: 2008.
 11. Hariharan S, Jonnalagadda R, Walrond E, Moseley H. Knowledge, Attitudes and Practice of Healthcare Ethics and Law among Doctors and Nurses in Barbados. *BMC Med Ethics* 2006; 7:7.
 12. Lutzen, K. Blom, T. Ewalds-Kvist, B. Winch, S. Moral Stress, Moral Climate and Moral Sensitivity among Psychiatric Professionals. *Nurs Ethics*. 2010; 17(2): 213-24.
 13. Ambrose, D. Cross, T. *Morality, Ethics, And Gifted Minds*: Springer. 2009
 14. Gallagher, Ann. Tschudin, Verena. Educating For Ethical Leadership. *Nurse Education Today*. 2010; 30(3): 224-27.
 15. Borhani F, Alhani F, Mohammadi E, Abbas Zadeh A. Professional Development Of Nurses' Moral Authority, Needs And Challenges In Ethics Education. *Journal of Medical Ethics and History of Medicine*. 2008; 2(3): 27-38(Persian)
 16. Izadi A. Imani E, Khademi Z, Asadi Noughabi F, Hajizadeh N, Naghizadeh F. The Correlation Of Moral Sensitivity Of Critical Care Nurses With Their Caring Behavior. *Ijme*. 2013; 6(2): 43-56. [Persian]
 17. Borhani F, Abbas Zadeh A, Kohan M, Fazel M.A. Comparison Moral Reasoning Abilities Nurses And Nursing Students Dealing With Ethical Dilemmas In Kerman University Of Medical Sciences. *Ijme*. 2010; 3(4): 71-81. [Persian]
 18. Weaver K, Morse AM. *Pragmatic Utility: Using Analytical Questions to Explore the Concept of Ethical Sensitivity*. Research and Theory for Nursing Practice. 2006; 20 (3), 191-214.
 19. Borhani F, Abbas Zadeh A, Mohsen Por M. Students' Perceptions of Barriers to Professional Ethical Sensitivity: A Qualitative Study. *Journal of Medical Ethics*. 2011; 5(15): 84-104. [Persian]
 20. Rashidian A. Adapting Valid Clinical Guidelines for Use in Primary Care in Low and Middle Income Countries. *Primary Care Respiratory Journal*. 2008; 3: 36-137. [Persian]
 21. Zirk Moghaddasian S, Abdollahzadeh F, Rahmani A. Level of Ethical Development in Nurses Working In Teaching Hospitals Affiliated To Tabriz University of Medical Sciences. *Qom University of Medical Sciences Journal* 2012; 6(3). [Persian]
 22. Ghoorchiani F, Barati Marnani A, Abol Ghassem Gorji H, Khatami Firooz Abadi A, Haghani H, Goldost Marandi F. Observance Of Nursing Ethics From Nurses And Patients' Viewpoints In A Therapeutic Hospital In Tehran University Of Medical Sciences 2013. *Medical Ethics Quarterly*. 2014; 7(23): 63-79[Persian]
 23. Dehghani A, Mohammad Khan Kermanshahi S. Evaluating Of Compliance with Professional Ethical Standards in Nursing Practice from Nursing Staff's Viewpoints in Tehran University of Medical Sciences. *Modern Care, Scientific Quarterly of Birjand Nursing and Midwifery Faculty*. 2012; 9(3): 208-216 .[Persian]
 24. Sokhanvar R.]The Effect Knowledge of Nursing Ethics in Clinical Decision-Makings and Applying the Perspective of Working Nurses in Shiraz University of Medical Sciences]. [Dissertation]. Shiraz: Shiraz University Of Medical Sciences, Fatemeh School Of Nursing & Midwifery Shiraz; 1997.[Persian]
 25. Tefagh MR, Nikbakht Nasrabadi A, Mehran A, Din Mohammadi N. Investigation Of The Ethical Practice In Medication Process Among Nurses. *Hayat, Journal of Faculty of Nursing & Midwifery*. 2005; 10 (23): 77-85. [Persian]
 26. Arangie-Harrell, P. *Moral Development among College Nursing Students: Cognitive and Affective Influences* [Phd Dissertation]. University Of Memphis. 1998
 27. Hundert, EM. *A Model for Ethical Problem Solving In Medicine, With Practical Applications*. 1987; *Am J Psychiatry*. 144(7).
 28. Erdil F, And Korkmaz F. Ethical Problems Observed By Student Nurses. *Nursing Ethics*. 2009; 16 (5).
 29. Hashemi F, Parsyar N. Assessment of Professional Moral Practice of Nursing Student from Perspective of Nurse-Practitioners in Shiraz University of Medical Sciences. Abstract of Articles in 10th General Congress in Medical Sciences Education in Shiraz University of Medical Sciences. 2009. *Green Journal: Specific Journal In Medical Sciences Education* 2009; 6.
 30. Burkemper, JE. Dubois, JM. Lavin, MA. Meyer, GA. Mcsweeney, M. *Ethics Education in MSN Programs: A Study of National Trends*. *Nurs Educ Perspect of Medical Sciences Journal*. 2012; 6(3).
 31. Ham KL. *A Comparison of Ethical Reasoning Abilities of Senior Baccalaureate Nursing Students and Experienced Nurses* [Phd Dissertation]. The University Of Memphis; 2002.
 32. Din Mohammadi N. Investigation Level Of Observance Of Nursing Ethics In Professional Practice Of Nurse-Practitioners In Adult Wards In Selected Hospitals Of TUMS [Dissertation]. Nursing & Midwifery Faculty: Tehran University Of Medical Sciences; 2002.
 33. Mahdavi Lenji Z, Ghaedi Heidari F. The Comparison of Observing the Ethical Codes among Nursing Students and Nursing Practitioners in AL-Zahra Hospital in Isfahan in 2012. *Journal of Medical Education Development*. 2015; 7(13): 74-81[Persian]

The comparison of quality of life, self-efficacy and resiliency in infertile and fertile women

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Abstract

Background: Pregnancy and infertility are important life events that are associated with specific psychosocial aspects, and infertility is usually regarded as a stressful and threatening event that is influenced by psychological factors.

Objective: The purpose of this study was to evaluate and compare the quality of life, self-efficacy and resiliency in infertile and fertile women.

Method: This causal comparative study, included all fertile and infertile women referred to Arash Hospital and Mirza Kuchak Khan Hospital in Tehran; 60 infertile women and 60 fertile women were selected using convenience sampling method. To collect data, the quality of life questionnaire (WHOQOL-BREF), Sherer's self-efficacy Questionnaire, and Conner and Davidson's Resilience Questionnaire were used. Descriptive statistics (mean and standard deviation) and inferential statistics (correlation test and regression analysis) were used to analyze the data.

Results: The results showed that mean (standard deviation) of quality of life, self-efficacy and resiliency in fertile women was 86.62 (11.162), 64.40 (9.048), and 71.40 (11.640), respectively. The mean (standard deviation) of quality of life, self-efficacy and resiliency for fertile women was 79.13 (10.829), 58.05 (7.688), and 66.92 (10.339), respectively. The results of t-test showed that between fertile and infertile women, in terms of quality of life, self-efficacy and resiliency there is a significant difference.

Discussion and Conclusion: The results showed that the level of quality of life, self-efficacy and resiliency in infertile women is less than in fertile women. Based on these results, it can be said that considering the importance of psychological factors in exacerbating the physical and mental damage associated with infertility, psychological interventions focused on quality of life, self-efficacy and resiliency with the aim of improving the mental health of the infertile people, is necessary.

Key words Fertility, Infertility, Quality of Life, Self-efficacy, Resiliency

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Introduction

In many countries of the world, including Iran, pregnancy and having a child are generally a positive and welcome event and an important factor in gaining social status and strength of marital life, and infertility is often a great stigma, leading to psychological and social harm. Infertility is defined as lack of pregnancy following one year of intercourse without the use of contraceptive methods (Richard et al., 2014). The World Health Organization (WHO, 2004) estimates that 60-80 million couples experience infertility around the world. In recent years, infertility has risen (Jisha & Thomas, 2016).

In this way, it is estimated that in the world, 8-15 percent of couples may experience infertility (El Kissi et al., 2013). The prevalence of primary infertility in Iran was reported at 24.9% in 2004 (Vahidi et al., 2004; quoted by Jamshidimanesh et al., 2015). Infertility is considered one of the most important stressful events in life and a negative event for couples, which causes interpersonal distress in marital relationships (Rashidi et al., 2008; El Kissi et al., 2013), a serious threat to marriage and the continuation of marital life (Khetarpal & Colleagues, 2012), and in some cases, separates couples (Galhardo et al., 2011).

It seems that the impact of infertility is not limited to marital and sexual relationships, but it affects all dimensions of the individual's life and its effects are imposed on other psychosocial aspects of the infertile people (Chachamovich et al., 2010). Psychological problems are the consequences of infertility (Cwikle, Gidron & Sheiner, 2004). Research on the consequences of infertility has shown that infertility causes emotional disturbances in both women and men and their spouses (Greil, et al., 2011; Faramarzi et al., 2013; Takaki & Hibino, 2014). Infertility is linked to the prevalence of psychological and psychiatric problems, and numerous studies have reported the prevalence of these problems in infertile couples (De Berardis et al., 2014). Anxiety, depression and other psychiatric disorders are reported in couples and people with infertility, and studies report the prevalence of psychiatric problems from 6 to 68 percent (Sule, Gupte & De Sousa, 2017).

In several studies, it has been shown that infertility leads to reduced mental (subjective) well-being (Tovliat & Tamannaefar, 2015), reduced mental health and marital adjustment (Tamannaefar, 2011), decreased quality of life (Xiaoli et al., 2016; Chachamovich et al. 2010; Lau et al., 2008), decreased sexual function (Hassanin et al., 2010; Monga et al., 2004), anxiety, depression and decreased quality of marital life (Matsubayashi et al., 2004), feeling of helplessness and experience of negative emotions (Chandra et al., 2014).

Infertility due to its unfortunate consequences affects people's attitudes about themselves, toward life and the quality of life (Chachamovich et al., 2010) and causes a loss in quality of life (Hassanin et al., 2010; Drosdzol & Skrzypulec, 2008).

Quality of life is one of the most important health components that has received considerable attention in recent years. The concept of quality of life has been defined in various ways. The World Health Organization (WHO) defines quality of life as "the individual's perception of one's position in life, according to the cultural context and the value system of the community in which he/she lives," and considers this concept as a combination of physical health, state of Psychological health, level of independence, social relations, individual beliefs of these factors with environmental characteristics (Ghafari et al., 2012). Several studies have shown that quality of life in infertile women is lower than that of fertile women (Trent et al., 2002; Coffey, Bano & Mason, 2006; Nilfrooshan et al., 2006). It has been shown that the quality of life in infertile people with mental disorders is lower (Van der Akker, 2005; Chachamovich et al., 2010). It has been widely demonstrated that clinical symptoms of depression are related to the outcomes of quality of life (Schweikert et al., 2008; Ohaeri, Awadalla, & Gado, 2009).

Some studies have shown that demographic variables such as age, educational level, weak marital relationships, and the length of lifetime attempts to treat infertility are predictive of the quality of life in infertile people (Fekkes et al., 2003; Ragni et al., 2005; Lau et al. 2008). The study of Chachamovich et al. (2010) has shown that anxiety and depression are associated with a low level of quality of life in the infertile and the effect of depression is greater than anxiety and other clinical variables and socio-demographic factors.

Although numerous studies have shown the negative effect of infertility on the quality of life in infertile women (Fekkes et al., 2003), some studies have reported that there is no difference in the quality of life of the infertile population compared to the healthy population (Hearn et al., 1987). Even some studies have shown that quality of life and marital adjustment of infertile women are higher than fertile women (Onat & Beji, 2012). The attitude towards women's infertility is often influenced by racial differences and religion and culture undoubtedly affect quality of life in some aspects, such as infertility (Inhorn & Buss, 1994).

Another factor that has been addressed in women's infertility is self-efficacy of infertile people. In the case of infertile people, self-efficacy is the perception of patients of their ability to use cognitive skills to control emotions. An infertile person with high self-efficacy has more emotional (affective) stability and more insistence on treatment (Cousineau et al., 2006). Self-efficacy is an indicator of the individual's ability to use stress coping skills and the use of personal resources necessary to meet situational demands. There is some evidence that self-efficacy plays a role in managing illness, symptoms, and functional limitations (Banik et al., 2017). Hence, infertile people with high self-efficacy can maintain calmness. High self-efficacy enhances health behaviors and improves health status, and may even lead to an increased probability of pregnancy (Cousineau et al., 2006). Jamshidimanesh et al. (2015) showed that self-efficacy training for infertile

women had a positive effect and training programs that include familiarity with the reproductive system, definition of infertility, prevalence, causes, diagnostic methods, treatment protocol, and the necessary tests will increase the self-efficacy of infertile women. Sami and Tazeen (2012) reported that the increase in infertile women's information about the causes and treatments of infertility and ways to reduce stress and self-efficacy training can have positive effects and will lead to better healthcare of infertility and to avoid traditional and insecure methods. Considering that studies have shown that infertility is associated with a lot of stress, the issue of resiliency has also been of particular importance, because resiliency is considered as one of the personality traits that play a protective role against life-threatening factors including diseases. Resiliency is the process or ability to adapt to the challenges and threats of life and to overcome them (Newman, 2003). Resiliency is the ability to resist against difficult living conditions and a dynamic process in adapting to important disasters; therefore, resiliency is considered as a positive symmetry of vulnerability (Herrmann et al., 2011). Resiliency focuses on groups exposed to risk factors, but who are faced with few negative consequences and may even have positive outcomes (Tiet & Huizinga, 2002).

Studies have shown that infertile people's resiliency is less than fertile people (Sexton, Byrd & Kluge, 2010; Kagan et al., 2011; Lee et al., 2012). Rezaie et al's (2013) study showed that with increasing resiliency, patients are helped to better deal with harsh conditions. A study conducted by Lee et al. (2012) shows that resiliency can lead to optimism, spirituality, psychic calm and an increase in the quality of life of infertile women. Abbasi et al. (2014) showed that considering the fact that resiliency causes people to reasonably and positively deal with life stresses, they can positively evaluate life events. Therefore, low levels of resiliency in infertile women can reduce their psychological well-being.

Researchers believe that infertility is a life crisis for the couples involved, and others consider it as the most stressful event after a divorce and the death of a dear one (Herrmann et al., 2011). Even if most couples with infertility show that infertility does not have a long-term effect on their life satisfaction, at the time of diagnosis and subsequent treatment, the level of satisfaction is reduced (Verhaak et al., 2007) and can affect many aspects of life including the quality of life. Therefore, the present study was conducted to compare the quality of life, self-efficacy and resiliency in infertile and fertile women.

Method

This study is a causal comparative study. The statistical population of this study consisted of all fertile and infertile women referring to Arash Hospital and Mirza Kuchak Khan Hospital in Tehran. 60 infertile women and 60 fertile women were selected using convenience sampling method. After expressing the research aim for the subjects, they were asked to respond to the questionnaires if they wished.

Subjects were told that the data of the questionnaires were completely confidential. To collect data, Quality of Life Inventory (WHOQOL-BREF), Sherer's Self- efficacy Questionnaire, and Connor & Davidson's Resilience Questionnaire were used.

Quality of life questionnaire

The Quality of Life Questionnaire (WHOQOL-BREF) assesses the quality of life totally and in general, and has four areas of physical health, mental health, social relationships and environmental health. This questionnaire has 24 questions, each of the areas has 3, 6, 7 and 8 questions, respectively. The questionnaire has two other questions that do not belong to any of the areas and that generally assess health status and quality of life. Nejat et al. (2006) have reported the reliability of this scale by Cronbach's alpha method in areas of physical, psychological, social and environmental health, respectively, 0.70, 0.73, 0.55 and 0.84, and after two weeks using test-retest method a coefficient of 0.70. In the study of Kiaei et al. (2016), Cronbach's alpha in all areas was above 0.70 and only in the social relationships was 0.55.

Self-efficacy questionnaire

Sherer's Self- efficacy Questionnaire has 17 items. Sherer (1982) argues that this questionnaire measures three aspects of behavior, including the desire to initiate behavior, the desire to expand efforts to complete a task and being different in confronting obstacles. The scoring of this scale is on a Likert scale from absolutely disagree (1) to absolutely agree (5). Sherer (1982) reported the Cronbach's alpha of this scale 0.76. In the study of Behrozian et al. (2013), the coefficient of reliability of this test was 0.80.

Resilience questionnaire

This questionnaire was developed by Connor and Davidson (2003) to measure the power of coping with stress and threat, and has 25 questions. This questionnaire is scored on the Likert scale from zero (completely false) to 4 (completely true). The average score of this scale is 25, and the higher score indicates the more resiliency. In the research by Samani, Jokar and Sahragard (2006), the reliability of this tool using Cronbach's alpha coefficient was reported to be 0.87. In another study by Bavali et al. (2013), Cronbach's alpha coefficient was 0.83.

Results

Table 1 shows the mean and standard deviation of quality of life, self-efficacy and resiliency in infertile and fertile women, and tables 2, 3 and 4 show the results of t-tests.

Data in Table 1 show that the mean (SD) of quality of life, self-efficacy and resiliency in fertile women are 86.62 (11.162), 64.40 (9.048), and 71.40 (11.640), respectively. The mean (standard deviation) of quality of life, self-efficacy and resiliency for infertile women are 79.13 (10.829), 58.05 (7.688), and 66.92 (10.339), respectively.

Table 1: Mean and standard deviation of quality of life, self-efficacy and resiliency in infertile and fertile women

Variable	Group	Minimum	Maximum	Mean	SD
Quality of life	Infertile	55	103	79.13	10.829
	Fertile	70	114	86.62	11.162
Self-efficacy	Infertile	43	77	58.05	7.688
	Fertile	44	85	64.40	9.048
Resiliency	Infertile	48	89	66.92	10.339
	Fertile	57	100	71.40	11.640

Table 2: T-test results for comparing infertile and fertile women in the quality of life variable

	Levene test for homogeneity of variances		T-test for equality of means				Confidence interval 95%	
	F	Significance level	T statistics	df	Significance level	Mean difference	Low	High
Assuming the equality of variances	0.008	0.931	-3.727	118	0.0001	-7.483	-11.459	-3.508
Assuming the inequality of variances	-	-	-3.727	117.892	0.0001	-7.483	-11.459	-3.508

Table 3: T-test results for comparing infertile and fertile women in the self-efficacy variable

	Levene test for homogeneity of variances		T-test for equality of means				Confidence interval 95%	
	F	Significance level	T statistics	df	Significance level	Mean difference	Low	High
Assuming the equality of variances	1.656	0.201	-4.143	118	0.0001	-6.350	-9.385	-3.315
Assuming the inequality of variances	-	-	-4.143	114.992	0.0001	-6.350	-9.386	-3.314

Table 4 T-test results for comparing infertile and fertile women in the resiliency variable

	Levene test for homogeneity of variances		T-test for equality of means				Confidence interval 95%	
	F	Significance level	T statistics	df	Significance level	Mean difference	Low	High
Assuming the equality of variances	0.954	0.331	-2.231	118	0.028	-4.483	-8.464	-0.503
Assuming the inequality of variances	-	-	-2.231	116.379	0.028	-4.483	-8.464	-0.503

Data from Tables 2, 3 and 4 show that there is a significant difference between infertile and fertile women in terms of quality of life, self-efficacy and resiliency, and the level of quality of life, self-efficacy and resiliency in infertile women is lower.

Discussion and Conclusion

Infertility is not just a gynecological illness, but also a bio-psycho-social problem that includes psychiatric problems, reduced quality of life, marital conflicts and sexual disturbances (Onat & Beji 2012). Therefore, the present study aimed to compare the quality of life, self-efficacy and resiliency in infertile and fertile women.

The present study showed that quality of life in infertile women is lower than in fertile women. This finding is in line with the results of the research by Xiaoli and others (2016), Chachamovich et al. (2010), Drosdzol and Skrzypulec (2008), Lau et al. (2008), Fekkes et al. (2003) and Alami et al. (2009). In explaining the difference in the quality of life of infertile women and fertile women, it can be said that the quality of life in infertile women is related to the amount of pressure of people around for giving birth, the intensity of desire for having a child, the burden of infertility treatment costs, an individual's assessment of the household's economic situation and irrational thoughts related to having a child and the duration and cause of infertility. Infertile women also suffer more stress and with increasing stress, their therapeutic response decreases and leads to a decline in quality of life. Attitudes toward the issue of women's infertility are often affected by racial and cultural differences, and on this basis, culture affects the quality of life of the infertile people (Inhorn & Buss, 1994). Because of the problems and consequences of infertility and a decrease in quality of life, most researchers state that the primary objective of psychosocial counseling should be the promotion of the quality of life in infertile people, regardless of their wish to have a child is fulfilled or not (Van den Broeck et al., 2010).

Another result of this study was that self-efficacy in infertile women is weaker than in fertile women. This finding is in line with the results of research by Pahlavani et al. (2002), Alizadeh et al. (2005), Nene, Coyaji and Apte (2009) and Faramarzi et al. (2014). It has been reported that self-efficacy plays a role in predicting health behaviors and quality of life. When dealing with a chronic disease, it is necessary to carry out behaviors and activities that reduce the effect of the disease on the quality of life; self-efficacy can play an important role in this regard and affect the physical, emotional and social dimensions of quality of life (Cramm et al., 2013). A study by Van der Slot et al. (2010) showed that high levels of self-efficacy in patients are associated with their better quality of life. Self-efficacy contributes to individual adaptation to symptoms of illness, and one's beliefs about controlling disease and dealing with it, prevent quality of life from being reduced (Motl & Snook, 2008).

People who see themselves as inefficient individuals avoid difficult assignments and suffer when faced with discomfort. Therefore, self-efficacy is critical to understanding the health status and quality of life. Hence, patients with higher self-efficacy report fewer effects of illnesses and better quality of life (Astrid et al., 2005). Jamshidimanesh et al. (2015) found that self-efficacy training for infertile

women had a positive effect, and a training program that included familiarity with the reproductive system, definition of infertility, prevalence, causes, diagnostic methods, treatment protocol, necessary tests, and fertility methods, enhances the self-efficacy of infertile women. People who have high self-efficacy take part in the health care program, and participation in these programs increases the quality of life of patients (Rafii, Naseh & Yadegary, 2012).

Also, the present study showed that the resiliency level in infertile women is lower than in fertile women. Some other studies have also shown that the resiliency rate in infertile people is lower than in fertile individuals (Sexton, Byrd & Kluge, 2010; Kagan et al., 2011; Lee et al., 2012). Infertility causes tension in infertile women reduces self-esteem, physical health and increases depression, stress and anxiety (Greil, Slauson-Blevins & McQuillan, 2010) and by reducing an individual's coping resources leads to low levels of resiliency (Jebraeili, Hashemi, & Nazemi, 2016). The study by Sexton, Byrd & Kluge (2010) showed that infertility reduces people's resistance to life problems, such that these people have less hardiness and resilience facing problems compared to other people. Resiliency, on the other hand, causes a logical and positive coping with the stresses and leads to a positive reassessment of events (Abbasi et al., 2014). Resilient people have self-esteem, self-efficacy, problem-solving skills, and satisfactory interpersonal relationships (Wagnild & Young, 1993). If we transfer this concept into infertile patients, it means that these patients have a good quality of life despite the fact that infertility has severe stress for them (Ridenour, Yorgason & Peterson, 2009).

According to the findings of this research and previous studies, it can be said that infertility as a gynecologic illness is associated with negative consequences such as psychopathology, loss of quality of life and marital dissatisfaction. Therefore, in addition to the medical treatment process, psychological interventions aimed at improving the mental health of infertile women is necessary.

References

1. Abbasi, M., Dargahi, SH., Jabraeili, H., Ghasemi Jobaneh, R., & Dargahi, A. (2014). Role of meta emotion and resiliency in psychological the well-being of infertile women of Gonabad City in 2012- 2013. *Community Health journal*, 8(1), 9-17.
2. Alami, M., Amanati, L., Shokrabi, SH., Haghani, H., & Ramezanzadeh, F. (2009). Factors influencing quality of life among infertile women. *IJN*. 21 (56), 27-35.
3. Alizadeh, T., Farahani, M.N., Shahraray, M. & Alizadegan, Sh. (2005) The relationship between self-esteem and locus of control with infertility related stress of no related infertile men and women. *Medical Journal of Reproduction & Infertility*, 6(22), 194-204.
4. Astrid, K., Wahl, A. K., Rustoen, T., Hanestad, B.R., Gjengedal, E., & Moum, T. (2005). Self-efficacy, pulmonary function, perceived health and global quality of life of cystic fibrosis patients, *Social Indicators Research*, 72, 239-261.

5. Banik, A., Luszczynska, A., Pawlowska, I., Cieslak, R., Knoll, N., & Scholz, U. (2017). Enabling, not cultivating: received social support and self-efficacy explain quality of life after lung cancer surgery, *Annals of Behavioural Medicine*, 51(1), 1-12.
6. Bavali, F., Faramarzi, S., Manshaie, GH., & Khaledian, M. (2013). Effectiveness of group logo therapy on promotion of resiliency of the mothers with intellectual disability children. *World of Sciences Journal*, 1(7), 115- 23.
7. Behrozian, S., & Ahmadi, E. (2013). The assessment of self-efficacy and the dimension of quality of life on smokers and non-smokers. *The Journal of Urmia University of Medical Sciences*, 24(4), 257-262.
8. Chachamovich, J.R, Chachamovich, E., Ezer, H., Fleck, M.P., Knauth, D., & Passos, EP. (2010). Investigating quality of life and health-related quality of life in infertility: a systematic review. *J Psychosom Obstet Gynaecol*. 31(2):101–10
9. Chachamovich, Juliana LR. Chachamovich, E., Ezer, H., Fernanda P Cordova, F.P., Fleck, M.P., Knauth, D.R., & Passos, E.P. (2010). Psychological distress as predictor of quality of life in men experiencing infertility: a cross-sectional survey, *Reproductive Health*, 7(3), 1-9.
10. Chandra, A., Copen, C. E., & Stephen, E .H.(2014). Infertility service use in the United States: data from the national survey of family growth, 1982–2010, *National Health Statistics Reports*, 73(22), 1-21.
11. Coffey, S., Bano, G., & Mason, H.D. (2006). Health-related quality of life in women with polycystic ovary syndrome: a comparison with the general population using the polycystic ovary syndrome questionnaire (PCOSQ) and the Short Form- 36 (SF-36), *Journal Gynaecological Endocrinology*, 22(2), 80-86.
12. Cousineau, T. M., Green, T. C., Corsini, E. A., Barnard, T., Seibring, A. R, & Domar, A. D. (2006). Development and validation of the infertility self-efficacy scale. *Fertility & Sterility*, 85(6), 1684-1696.
13. Cramm, J.M., Strating, M. M. H., Roebroek, M.E., & Nieboer, A.P. (2013). The importance of general self-efficacy for the quality of life of adolescents with chronic conditions, *Soc Indic Res*. 113, 551–561.
14. Cwikle, J., Gidron, Y., & Sheiner, E. (2004) Psychological interactions with infertility among women. *European Journal of Obstetrics and Reproductive Biology*, 117(2), 126-131.
15. De Berardis, D., Mazza, M., Marini, S, Del Nibletto, L., Serroni, N., Pino, MC. Valchera, A., Ortolani, C., Ciarrocchi, F., Martinotti, G., & Di Giannantonio, M. (2014). Psychopathology, emotional aspects and psychological counselling in infertility: a review. *Clin Ter*. 165(3):163–9.
16. Drosdzol, A., & Skrzypulec, V. (2008). Quality of life and sexual functioning of Polish infertile couples. *European Journal of Contraception and Reproductive Health Care*, 13(3), 271-281.
17. El Kissi, Y., Romdhane, A.B., Hidar, S., Bannour, S., Idrissi, K.A., Khairi, H., & Ali, B.B. (2013). General psychopathology, anxiety, depression and self-esteem in couples undergoing infertility treatment: a comparative study between men and women. *Eur J Obstet Gynecol Reprod Biol*. 167(2):185–9.
18. Faramarzi.M. Pasha, H., Esmailzadeh, S., Kheirkhah, F., Hajian-ilaki, K., & Salmalian, H. (2014). A survey of correlation infertility self-efficacy with behavioural health scales in infertile women, *Health*, 6(10), 943-949.
19. Faramarzi, M., Pasha, H., Esmailzadeh, S., Kheirkhah, F., Heidary, S., & Afshar, Z. (2013). The effect of the cognitive behavioural therapy and pharmacotherapy on infertility stress: a randomized controlled trial. *Int J FertilSteril*, 7(3), 199-206.
20. Fekkes, M., Buitendijk, S.E., Verrips, G.H, Braat D, D., Brewaeys, A.M., Dolfin, J.G., Kortman, M., Leerentveld, R.A., & Macklon, N.S. (2003). Health-related quality of life in relation to gender and age in couples planning IVF treatment. *Hum Reprod*, 18, 1536-1543.
21. Galhardo, A., Pinto-Gouveia, J., Cunha, M., & Matos, M. (2011). The impact of shame and self-judgment on psychopathology in infertile patients. *Hum Reprod*. 26(9):2408–14.
22. Ghafari, G. H., Karimi, A., & Nozari, H. (2012). Process of the study on quality of life in Iran. *Journal of Social Studies*, 1(3), 107-134.
23. Greil, A, L., McQuillan, J., Lowry, M., & Shreffler, KM. (2011). Infertility treatment and fertility-specific distress: a longitudinal analysis of a population-based sample of US women. *Soc Sci Med*. 73(1):87–94.
24. Greil, A.L., Slauson-Blevins, K., & McQuillan, J. (2010). The experience of infertility: A review of recent literature. *Social. Health Illn*, 32(1), 140-162.
25. Hassanin, I, M. A., Abd-El-Raheem, T., & Shahin, A.Y. (2010). Primary infertility and health-related quality of life in Upper Egypt, *International Journal of Gynaecology and Obstetrics*, 110, 118–121.
26. Hearn, M. T., Yuzpe, A. A., Brown, S. E., & Casper, R. F. (1987). Psychological characteristics of in vitro fertilization participants. *Am J ObstetGynecol*, 156(2), 269-274.
27. Herrmann, D., Scherg, H., Verres, R., Hagens, C., Strowitzki, T., & Wischmann, T. (2011). Resilience in infertile couples acts as a protective factor against infertility-specific distress and impaired quality of life, *J Assist Reprod Genet*, 28, 1111–1117.
28. Inhorn, M.C., & Buss, K.A. (1994). Ethnography, epidemiology and infertility in Egypt. *SocSci Med*, 39(5), 671-86.
29. Jamshidimanesh, M., Alimanesh, N., Behbodi Moghaddam, Z., & Haghani, H. (2015). Effect of an Educational package on self-efficacy of infertile women, *Journal of the Iranian Institute for Health Sciences Research*, 2, 227-237.
30. Jebraeili, H., Hashemi, J., & Nazemi, A. (2016). Comparative study of resiliency, meta emotions and psychological well-being in fertile-infertile women, *Fundamentals of Mental Health*, 18(5), 259-264.
31. Jisha, P, R., & Thomas, I. (2016). Quality of life and infertility: influence of gender, years of marital life, resilience, and anxiety, *Psychol Stud*. DOI 10.1007/s12646-016-0358-6.
32. Kagan, L., Psaros, C., Alert, M.D., Styer, A.K., Shifren, J.L., & Park, E.R. (2011). Improving resilience among infertile women: a pilot study. *Fertil Steril*, 96(3), 151.

33. Khayata, GM., Rizk, DE., Hasan, MY., Ghazal-Aswad, S., & Asaad, M.A. (2003). Factors influencing the quality of life of infertile women in United Arab Emirates. *Int J Gynaecol Obstet*, 80(2), 183-8.
34. Khetarpal, A., & Singh, S. (2012). Infertility: why can't we classify this inability as disability? *Australian Medical Journal*, 5(6), 334-339.
35. Kiaei, MZ, Ferdosi, M., Moradi, R., Chelongar, Q., Ahmadzadeh, M.S., & Bahmanziari, N. (2016). Association of self-efficacy and quality of life in women with breast cancer undergoing chemotherapy. *J Qazvin Univ Med Sci*, 20 (2), 58-65.
36. Lau, J.T., Wang, Q., Cheng, Y., Kim, J.H., Yang, X., & Tsui, H.Y. (2008). Infertility-related perceptions and responses and their associations with quality of life among rural Chinese infertile couples. *J Sex Marital Ther*, 34, 248-267.
37. Lee, G.L., Blyth, ED., & Lai-Wan Chan, C. (2012). Understanding the patterns of adjustment to infertility of IVF users using narrative and autobiographical timeline. *Asian Pac J Reprod*, 1(2), 125-34.
38. Matsubayashi, H., Hosaka, T., Izumi, S. I., Suzuki, T., Kondo, A., & Makino, T. (2004) Increased depression and anxiety in infertile Japanese women resulting from lack of husbands support and feelings of stress. *General Hospital Psychiatry*. 26(5):398-404
39. Monga, M., Alexandrescu, B., Katz, S. E., Stein, M., & Ganiats, T. (2004). Impact of infertility on quality of life, marital adjustment and sexual function. *Urology*, 63(1):126-130.
40. Motl, R.W., & Snook, E.M. (2008). Physical activity, self-efficacy, and quality of life in multiple sclerosis, *ann. behav. med.* 35, 111-115.
41. Nejat, S., Montazeri, A., Holakouie, K., Mohammad, K., & Majdzadeh, S. (2006). The world health organization quality of life (WHOQOL-BREF) questionnaire: translation and validation study of the Iranian version (Persian). *Journal of School of Public Health and Institute of Public Health Research*, 4(4), 1-12.
42. Nene, U.A., Coyaji, K., & Apte, H. (2009). Infertility: a label of choice in the case of sexually dysfunctional couples. *Patient Educ Couns J*, 59(3), 234-8.
43. Newman, R. (2003). Providing direction on the road to resilience. *Behavioral Health Management*, 23(4), 42-43.
44. Nilforooshan, P., Latifi, Z., Abedi, M., & Ahmad, A. (2006). Comparing the different aspects of quality of life in fertile and infertile women. *Journal of Behavioral Sciences*, 4(8), 66-70.
45. Ohaeri, J.U., Awadalla, A.W., & Gado, O. M. (2009). Subjective quality of life in a nationwide sample of Kuwaiti subjects using the short version of the WHO quality of life instrument. *Social Psychiatry and Psychiatric Epidemiology*, 44(8), 693-701.
46. Onat, G., & Beji, N.K. (2012). Effects of infertility on gender differences in marital relationship and quality of life: a case-control study of Turkish couples, *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 165, 243-248.
47. Pahlavani, H., Malakouti, K. & Shahrokh Tehrani Nejad, E. (2002) Stressors, their coping strategies and relation to mental health in infertile individuals. *Iranian Journal of Psychiatry and Clinical Psychology*, 7, 87-79.
48. Rafii, F., Naseh, L., & Yadegary, M.A. (2012). Relationship between self-efficacy and quality of life in ostomates, *Iran Journal of Nursing (IJN)*. 25(76), 64-76.
49. Ragni, G., Mosconi, P., Baldini, MP., Somigliana, E., Vegetti, W., Caliari, I., & Nicolosi, AE. (2005). Health-related quality of life and need for IVF in 1000 Italian infertile couples. *Hum Reprod*, 20, 1286-1291.
50. Rashidi, B., Montazeri, A., Ramezanzadeh, F., Shariat, M., Abedinia, N., & Ashrafi, M. (2008). Health-related quality of life in infertile couples receiving IVF or ICSI treatment. *BMC Health Serv Res*. 8, 186.
51. Rezaie, R., Nazari, AM., Zaharakar, K., & Smaeelifar, N. (2013). Effectiveness of existential psychotherapy in increasing the resiliency of mentally retarded children's mothers. *International Journal of Psychology and Behavioral Research*, 2(2), 59-64.
52. Ridenour, A., Yorgason, J., Peterson, B. (2009). The infertility resilience model: assessing individual, couple, and external predictive factors. *Contemp Fam Ther*. 31, 34-51.
53. Samani, S., Jokar, B. A., & Sahragard, N. A. (2006). Resiliency, mental health and life satisfaction. *Journal of Psychiatry and Clinical Psychology*, 3(3), 290-295.
54. Sami, N., & Tazeen S.A. (2012). Perceptions and experiences of women in Karachi, Pakistan regarding secondary infertility: results from a community-based qualitative study. *Obstetrics and Gynecology International*, 10, 235-41.
55. Schweikert, B., Hunger, M., Meisinger, C., Konig, H. H., Gapp, O., & Holle, R. (2008). Quality of life several years after myocardial infarction: comparing the MONICA/KORA registry to the general population. *European Heart Journal*, 30(4): 436-443.
56. Sexton, MB., Byrd, M.R., & Kluge, S. (2010). Measuring resilience in women experiencing infertility using the CD-RISC: Examining infertility-related stress, general distress, and coping styles. *J Psychiatr Res*. 44(4), 236-41.
57. Sule, R., Gupte, S., & De Sousa, A. (2017). A study on quality of life and psychopathology in couples with infertility, *Journal of Psychosocial Rehabilitation and Mental Health*, 4(1), 19-22.
58. Takaki, J., & Hibino, Y. (2014). Family-related opinions and stressful situations associated with psychological distress in women undergoing infertility treatment. *Int J Environ Res Public Health*, 11(9), 9068-9081.
59. Tamannaefar, M.R. (2011). The comparative study of mental health, marital adjustment and coping responses in fertile-infertile women, *Clinical Psy & Personality Journal Of Shahed University, Third Year, No.4*, 51-60.
60. Tiet, Q. Q., & Huizinga, D. (2002). Dimensions of the construct of resilience and adaptation among Inner - city youth. *Journal of Adolescent Research*, 17(3), 260-276.
61. Tovliat, V., & Tamannaefar, M.R. (2015). A comparison of stress reactions, coping styles, subjective well-being and its sub-scales in fertile and infertile women, *Journal of Advanced Medical Sciences and Applied Technologies*, 1(2), 93-97.

62. Trent, M .E., Rich, M., Austin, B., & Gordon, CM. (2002). Quality of life in adolescent girls with polycystic ovary syndrome. *Arch Pediatr Adolesc Adolesc Med.* 156(6), 556-60.
63. Van den Broeck, U., Emery, M., Wischmann, T., &Thorn, P. (2010). Counselling in infertility: individual, couple and group interventions. *Patient EducCouns.* 81(3), 422–8.
64. Van der Akker, OB. (2005). Coping, quality of life and psychological symptoms in three groups of subfertile women. *Patient EducCouns.* 57(2):183–9.
65. Van der Slot, W. M., Nieuwenhuijsen, C., van den Berg-Emons, R. J., Wensink - Boonstra, A. E., Stam, H. J., & Roebroek, M. E. (2010). Participation and health-related quality of life in adults with spastic bilateral cerebral palsy and the role of self-efficacy. *Journal of Rehabilitation Medicine,* 42, 528–535.
66. Verhaak, C.M., Smeenk, J.M.J., Evers, A.W.M., Kremer, J.A.M., Kraaimaat, F.W., & Braat, DM. (2007). Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update.* 13(1):27–36.
67. Wagnild, GM., & Young, HM. (1993). Development and psychometric evaluation of the Resilience Scale. *J Nurs Meas.* 1, 165–78.
68. Xiaoli, S., Mei, L., Junjun, B., Shu, D., Zhaolian, W., & Jin, W. (2016). Assessing the quality of life of infertile Chinese women: a cross-sectional study, *Taiwanese Journal of Obstetrics & Gynecology,* 55, 244-250.

Brain MRI Findings in Children (2-4 years old) with Autism

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Abstract

Autism is a neurodevelopmental disorder with a range of clinical presentations, from mild to severe, that is now classified in a broader class of disease called "autism spectrum disorders" (ASD). The aim of this study was to investigate Brain MRI findings in children (2-4 years old) with autism. The sample of the study included 40 autistic children aged 2 to 4 years whose disease was confirmed by a fellow psychiatrist based on the diagnostic criteria of autism spectrum disorders DSM IV-R. Having explained the study to parents and after obtaining their consent, a questionnaire was completed and a three-dimensional brain MRI was performed for each patient in the radiology department of Ghaem or Imam Reza hospitals. From among the 40 patients, 25 patients had a history of convulsion. Among the other patients, 4 patients (10%) suffered from simple febrile convulsion (simple FC), 2 cases from complex febrile convulsion (complex FC), 6 cases (15%) from TCG and 3 (7.5%) from Landau-Kleffner syndrome (LKS). Of the 15 patients with a history of convulsion disorders, 5 patients (12.5%) used phenobarbital, 4 patients (10%) took valproate and 2 patients (5%) were treated with multi-drug regimen. Although, we did not measure white matter connections, lesions in such neuroanatomic pathways may be causal factors of behavioral and

emotional dysfunctions in autistic patients. Finally, it is also important to understand how WMH severity changes over time.

Key words: MRI, Brain, Children, Autism

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Introduction

Autism is neurodevelopmental disorder with a range of clinical presentations, from mild to severe, that is now classified in a broader class of disease called "autism spectrum disorders" (ASD). The most common clinical ASD sign is impaired social interaction, which is associated with verbal and non-verbal communication deficits and stereotyped behaviors [2]. In most cases, it is not presently possible to detect a known or specific etiology; these are referred to as non-syndromic autism [1]. The clinical relevance of MR scanning in children with ASD is still an open question and must be considered in light of the evolution of this technology. In 2000, MRI was judged to be of insufficient value to be included in the standard clinical evaluation of autism according to the guidelines of the American Academy of Neurology and Child Neurology Society [1]. This consensus stated that the prevalence of lesions detected by MRI in children with autism has been reported to be similar to normal control subjects [2]. However, this statement was based on results obtained from small samples of patients and, more importantly, included mostly insufficient MRI sequences. An adequate brain MRI interpretation must include at least three different sequences (T1, T2, FLAIR) in three different planes. Yet, there are few clinical radiological studies with complete clinical MRI examinations in children with ASD. For example, in some small groups of children with ASD, some radiological MRI anomalies were described, such as accentuated Virchow–Robin space [3], acrocortical syndrome [3], pachygyria [3] macrogyria and polymicrogyria [3]. However, until now, no reliable data has been available regarding the prevalence of MRI abnormalities in a large sample of patients with non-syndromic ASD.

In addition, in order to determine if the MRI abnormalities detected in the present population of children with non-syndromic AD could be also observed in a normal population of children. The aim of this study was to investigate Brain MRI findings in children (2–4 years old) with autism.

Methods

The sample of the study included 40 autistic children aged 2 to 4 years whose disease was confirmed by a fellow psychiatrist based on the diagnostic criteria of autism spectrum disorders DSM IV-R. Having explained the study to the parents and obtained their consent, a questionnaire was completed and a three-dimensional brain MRI was performed for each patient in the radiology department of Ghaem or Imam Reza hospitals. Then brain MRIs were studied by fellow radiologist and the executor of the project. Brain MRIs of each patient were compared with the brain MRI of a child of the same age who did not have autism spectrum disorders and was under imaging for any other reason (trauma, infection, headache, etc.). The volume of frontal lobes and amygdala in each side were specified and then analyzed.

Quantitative analysis (Statistical Parametric Mapping = SPM) was employed for volumetry. In this method,

quantitative analysis was Voxel-based analysis, i.e. Voxels situated in the same spatial location were compared with each other, and the value of each voxel represented the probability of belonging to GM, WM or CSF. The method was implemented in a toolbox with the same name, SPM version 8.0. A very important step in quantitative analysis method of SPM was Normalization. On the basis of the existing atlases in SPM, MRI images of healthy and diseased individuals were normalized in such a way that all images of this stage were overlapped in terms of spatial coordinates. To do this step, SPM used Affine transformation matrix that was specific to each person under study (healthy and diseased) (44).

Software WFU_PickAtlas version 3.0 and software Easy Volume were of the features available in the toolbox SPM. This software was applied for creating standard mask images based on Talairach and Tournoux Atlases and calculating the volume of gas. Among the areas in WFU_PickAtlas, it could be referred to the areas considered in the study that included: Amygdala, Frontal Lobe and whole brain. The atlas was based on MRI images of a mature and healthy adult. In this study, the population under study was 2–4 years old children. That was why the Hammers Atlas was used here, because it was applied for 2–4 years old children and was available in NIHPD database (NIH Pediatric MRI Database). Using the Atlas, indexes of the intended areas were extracted and standard mask images were created using image processing toolbox in MATLAB. Changes in the shape and size (deformation) of the standard masks had to be so that it could be specifically used for volumetric of MRI images of patients under study. For this purpose, affine transformation matrix described earlier was employed for reverse conversion. In other words, this matrix that was specific for each person in the study was implemented on standard masks to create specific masks. When these steps were completed, the software Easy Volume was used to determine the volume of specific masks.

All children were evaluated by a pediatric neurologist, a clinical geneticist and a child psychiatrist. In addition, the recommended biological and medical screenings for ASD were performed, including high-resolution karyotyping, DNA analysis of FRA-X and normal standard metabolic testing (plasma and urine amino and organic acid analysis, urine glycosaminoglycans (GAG) quantitation, urine oligosaccharide, purine and pyrimidine analysis, and creative guanidoacetate urine analysis).

MRI was performed with a 1.5 Tesla (Sigma General Electric) scanner using the following sequences: 3D T1-weighted FSPGR sequence (TR/TE/TI/NEX: 10.5/2.2/600/1, flip angle 10u, matrix size 2566192, yielding 124 axial slices and a thickness of 1.2 mm, field of view 22 cm), axial and coronal FSE T2-weighted imaging (TR/TE: 6000/120, 4 mm slices, 0.5 mm gap, field of view 22 cm) and coronal FLAIR sequences (TR/TETI: 10000/150/2250, 4 mm slices, 1 mm gap, field of view 24 cm). MRI studies were performed during sleep induced by premedication (7 mg/kg of sodium pentobarbital) for all AD children to obtain immobility during scans. Signal intensities on T1, T2, and

proton density-weighted images relate to specific tissue characteristics. For example, the changing chemistry and physical structure of hematomas over time directly affects the signal intensity on MR images, providing information about the age of the haemorrhage. The most common pulse sequences are the T1-weighted and T2-weighted spin-echo sequences. The T1-weighted sequence uses a short TR and short TE (TR, 1000msec, TE, 30msec). The T2-weighted sequence uses a long TR and long TE (TR, 2000msec, TE, 80msec). The T2-weighted sequence can be employed as a dual echo sequence. The first or shorter echo (TE, 30msec) is proton density (PD) weighted or a mixture of T1 and T2. This image is very helpful for evaluating periventricular pathology, such as multiple sclerosis, because the hyperintense plaques are contrasted against the lower signal CSF. More recently, the FLAIR (Fluid Attenuated Inversion Recovery) sequence has replaced the PD image. FLAIR images are T2-weighted with the CSF signal suppressed. When reviewing an MR image, the easiest way to determine which pulse sequence was used, or the "weighting" of the image, is to look at

the cerebrospinal fluid (CSF). If the CSF is bright (high signal), then it must be a T2-weighted imaged. If the CSF is dark, it is a T1-weighted or FLAIR image. Pathologic lesions can be separated into 4 major groups (solid mass, cyst, blood, fat) by their specific signal characteristics on the three basic images: T2-weighted, FLAIR, and T1-weighted. Since studies have shown that T2-weighted images are most sensitive for detecting brain pathology, patients with suspected intracranial disease should be screened with T2-weighted spin-echo and FLAIR images. T1-weighted images are needed only if the preliminary scans suggest hemorrhage, lipoma, or dermoid. The axial plane is commonly used because of the familiarity with the anatomy from CT. Coronal views are good for parasagittal lesions near the vertex and lesions immediately above or below the lateral ventricles, temporal lobes, sella, and internal auditory canals. The coronal plane can be used as the primary plane of imaging in patients with temporal lobe seizures. Sagittal views are useful for midline lesions (sella, third ventricle, corpus callosum, pineal region), and for the brainstem and cerebellar vermis.

Results

Table 1

Variable	Patient group (mean)			Control group (mean)
	Boys	Girls	Total	
Age (month)	45.21±12.99	41.41±13.69	44.07±13.15	44.97±12.95
Age of first symptoms (months)	23.07±6.99	21.58±5.48	22.62±6.54	
Age of diagnosis (month)	36.25±9.22	29.83±5.49	34.32±8.73	
Percentage of round head (%)	76.14±16.54	78.17±11.91	76.75±8.73	49.95±21.41
Frontal Lobe Size (Cc)	599.09±72.17	564.71±77.38	588.77±74.49	466.99±56.73
Amygdala volume (cc)	3.56±0.55	3.17±0.73	3.44±0.63	3.59±0.66
Total brain volume	1418.52±135.58	1398±99.01	1412.46±123.31	1183.04±123.42
Frontal volume ratio to total brain (%)	42.19±2.62	40.33±4.27	41.63±3.26	39.51±2.80
Amygdala Amount to Brain Total Amount (%)	0.25±0.038	0.230±0.054	0.24±0.044	0.300±0.039

Age at the onset of symptoms and age of diagnosis

Age at the onset of autism symptoms was between 12 and 42 months with an average of 6.54 ± 22.62 months. Age at the onset of symptoms in autistic boys was between 12 and 42 months with an average of 6.99 ± 23.07 months and in autistic girls, between 16 and 36 months with average of 5.48 ± 21.58 months.

Mann-Whitney nonparametric test revealed a statistically significant difference ($p=0.422$) in average age at the onset of symptoms between girls and boys with autism.

Recent studies have shown that autistic boys and girls exhibit different behaviors so this could be the reason.

Age at diagnosis of autism was between 22 to 59 months with an average 73.8 ± 32.34 months. Age of diagnosis of autism among boys realized to be 24 to 59 months with an average of 9.22 ± 36.25 months and among girls, between 22 to 36 months with an average 5.49 ± 29.83 months.

Comparison of average age at diagnosis between girls and boys with autism using the Mann-Whitney nonparametric test demonstrated a statistically significant difference between the two groups ($p = .039$). On average, the age of diagnosis in girls was lower.

History of prenatal problems

Out of the 40 patients, 26 patients (65%) had a history of prenatal complications. From among other patients, 2 patients (5%) had a history of neonatal jaundice, 1 patient (5.2%) of preterm birth, 2 patients (5%) of low Apgar score, three patients (5.7%) of labor problems and six others (15%) of several simultaneous problems.

In the control group, 32 out of 40 patients (80%) had a history of prenatal complications. From among the other patients, 5 cases (12.5%) had a history of neonatal jaundice, 2 cases (5%) of preterm birth, and one patient (2.5%) of low Apgar score at birth.

Comparing the two groups in terms of the history of peripartum problems using chi-square test showed a statistically significant difference between them ($p = .021$).

Family history

Out of the 40 patients, 10 patients (25%) had a family history of autism spectrum disorders, while in the control group, only 3 (7.5%) had a positive family history of autism spectrum disorders. A comparison between two groups in terms of family history of autism spectrum disorders using the chi-square test indicated a statistically significant difference between the two groups ($p = .034$).

Speech disorders and echolalia

In the group of patients, a total of 40 patients showed a range of speech disorders. 20 out of 40 patients (50%) suffered from echolalia. In the control group, 4 patients (10%) had a speech disorder that was associated with hearing impairment. None of the control group had echolalia.

Comparing the two groups in terms of speech disorders and echolalia using chi-square test showed a statistically significant difference ($p < .001$).

Head circumference

The investigation of the two groups in terms of head circumference percentiles showed that head circumference percentile was between 46 and 99 percentiles with an average of 15.17 ± 76.75 percentile in the experimental group and between 12 to 96 percentiles with an average of 21.41 ± 49.95 in the control group, respectively.

Independent t-test indicated that mean head circumference percentiles between the two groups was significantly different ($p < .001$).

The mean head circumference percentile was equal to 16.54 ± 76.14 and in the range of 46 to 99 and to 11.91 ± 78.17 and in the range of 60 to 98 among autistic boys and girls, respectively.

Comparison of mean head circumference percentile of autistic girls and boys with autism using independent t-test showed a statistically significant difference ($p = .704$).

As a result of the comparison of mean head circumference percentile between autistic and normal boys using independent t-test, it was found that there is a statistically significant difference between them ($p < .001$).

Comparison of mean head circumference percentile among girls with autism and normal girls using independent t-test indicated a statistically significant difference ($p < .001$).

The amygdala

Investigation of the two groups in terms of the volume of the amygdala revealed that the volume of the amygdala was between 1.13 to 4.21 ml with an average of 0.63 ± 3.44 ml in the experimental group and between 55.2 to 47.5 ml with an average of 0.66 ± 3.59 ml in the control group.

Comparison of mean amygdala volume between the two groups using independent t-test showed a statistically significant difference between them ($p = .322$).

The mean volume of the amygdala in autistic boys was 0.55 ± 3.56 ml in the range of 1.23 to 4.21 ml and in autistic girls equal to 0.73 ± 3.17 ml in the range of 1.13 to 3.70 ml.

Comparing the mean volume of amygdala between autistic girls and boys using Mann-Whitney test showed statistically significant difference between the two groups ($p = .049$).

Comparing the mean volume of the amygdala between autistic patients with non-verbal disorder and other autistic patients using the Mann-Whitney test demonstrated a statistically significant difference between the two groups ($p = .049$).

Mann-Whitney test showed that there was a statistically significant difference ($p = .018$) in the mean volume of the amygdala between autistic patients with echolalia and other autistic patients.

Independent t-test revealed a statistically significant difference ($p = .697$) in the mean volume of the amygdala between autistic and normal boys.

Comparison of the mean volume of the amygdala between autistic and normal girls using independent t-test showed a statistically significant difference between the two groups ($p = .153$).

Conclusion

From among the 40 patients, 25 patients had a history of convulsion. Among the other patients, 4 patients (10%) suffered from simple febrile convulsion (simple FC), 2 cases from complex febrile convulsion (complex FC), 6 cases (15%) from TCG and 3 ones (7.5%) from Landau-Kleffner syndrome (LKS). Of the 15 patients with a history of convulsion disorders, 5 patients (12.5%) used phenobarbital, 4 patients (10%) took valproate and 2 patients (5%) were treated with multi-drug regimen (4).

Only 8 cases (20%) of the 40 patients in the control group had complex FC. Of these, only one was using phenobarbital. Comparison between the two groups in terms of convulsion disorders using chi-square test showed a statistically significant difference between them ($p < .001$) (5)

To our knowledge, the present retrospective study reports the largest series of systematic visual analyses of MRI from patients with non-syndromic AD. These patients have been carefully screened to exclude known medical disorders associated with autism. We observed an unexpectedly high prevalence of brain abnormalities (48%). This unexpectedly high level of anomalies contrasts with the generally accepted view that MRI is close to normal in children with AD [6]. This could be explained by methodological improvement, including here, of considering MRIs containing all the acquisitions necessary to detect brain abnormalities. We found three types of brain anomalies, including white matter hyperintensity on T2-FLAIR sequences, temporal lobe signal abnormalities and dilated Virchow-Robin spaces (7). Such abnormalities were not found in any child in the comparison group, which is in agreement with a recent MR study in a large group of normal children [8]. These abnormalities cannot be detected when only a T1 sequence is acquired. It is important to note that this high prevalence of abnormalities was found despite a stringent definition for an abnormal MRI. Indeed, all minor anomalies or normal variants (ventricular dilatation, accentuated Virchow-Robin spaces, abnormal hippocampal shape, arachnoid cysts, cerebellar atrophy, etc.) were not considered as abnormal. Similar results were found in a recent study that included a smaller sample of children with developmental disorders, including ASD, with abnormal MRI being reported in 49% of patients [9]. In addition, Taber et al. have also described high incidence of abnormal Virchow-Robin spaces in children and adolescents with ASD and normal IQ [10]. Our study was subject to a number of limitations. One intrinsic limitation is that the comparison group was not matched for IQ with the AD group, which was largely composed of children with AD and mental retardation. Therefore, we cannot say whether these MRI abnormalities are specific to autism. Nevertheless, in our series, the 23 patients with normal IQ had the same types of MRI abnormalities as did patients with AD and mental retardation. In idiopathic mentally retarded children, the most frequently reported MRI abnormalities are ventricular dilatation, arachnoid cysts, moderate subarachnoid space enlargement, cerebellar atrophy and/or cortical atrophy, partially opened septum

pellucidum and/or cavum vergae and corpus callosum anomalies [11]. These types of abnormalities are often considered to be minor MRI findings and were not reported as abnormal in the present study. Nevertheless, they were rarely observed in the AD group (3%). Another limitation is that our findings cannot be extended to persons with high-functioning AD or to the full spectrum of ASD, which covers very heterogeneous disorders. Therefore, further clinical MRI investigations are necessary in these sub-groups of patients. Finally, another important issue will be to further characterize putative clinico-radiological sub-groups in AD and future studies need to be performed. Certainly, the MRI abnormalities recognized in the present study are not specific to AD, since they have been previously reported in other neurological, metabolic or genetic childhood disorders. Posterior periventricular hyperintensity was found as a white matter signal abnormality in 18.77% of the patients. Classically, this abnormality can be found in periventricular leukomalacia, metabolic disorders, viral infections or vascular disorders [12]. White matter MRI abnormalities were recently described in a large series of patients with cerebral palsy and were categorized into three levels of severity from mild to severe; in this study the abnormalities were always linked to motor deficits [13]. The white matter abnormalities that we have found in children with autism are comparable to the mild to moderate levels described in cerebral palsy, but no motor deficits were observed in our AD patients. Isolated or associated white matter abnormalities were found in 30.77% children with autism in our series. They could represent injury to the brain parenchyma and resultant disruption of neural circuitry. The main question is which different mechanisms may be involved in the emergence of such white matter abnormalities (14). It is highly possible that these white matter hyperintensities (WMH) might simply represent the 'tip of the iceberg' in terms of structural white matter lesions. Thus, the presence and severity of white-matter hyperintensities associated with autism might be understood as an extreme consequence of underlying microstructural processes that affect brain connectivity and which may be more specifically investigated using diffusion tensor imaging methods. WMH, depending on the localization, are commonly classified as periventricular hyperintensities (PVH) or deep white matter hyperintensities (DWMH) (15). Deep white matter hyperintensities were identified as having mainly a vascular etiology, and periventricular hyperintensities could be due to ependymal loss, differing degrees of myelination and cerebral ischemia. WMH are reported to be commonly associated with older age, and cardiovascular risk factors such as hypertension and diabetes. Lesions in one specific part or disruption of interconnections among areas regulating social and communication cognition could trigger the onset of autistic symptoms. Furthermore, posterior white matter connections with the temporal regions could be of particular importance to social disturbances in autism. Although, we did not measure white matter connections, lesions in such neuroanatomic pathways may be causal factors of behavioral and emotional dysfunctions in autistic patients. Finally, it is also important to understand how WMH severity changes over time.

References

1. Association AP. Diagnostic and statistical manual of mental disorders (DSM-5®): American Psychiatric Pub; 2013.
2. Rice C. Prevalence of Autism Spectrum Disorders: Autism and Developmental Disabilities Monitoring Network, United States, 2006. *Morbidity and Mortality Weekly Report. Surveillance Summaries. Volume 58, Number SS-10. Centers for Disease Control and Prevention. 2009.*
3. Mosconi MW, Cody-Hazlett H, Poe MD, Gerig G, Gimpel-Smith R, Piven J. Longitudinal study of amygdala volume and joint attention in 2-to 4-year-old children with autism. *Archives of general psychiatry. 2009;66(5):509-16.*
4. Swaiman KF, Ashwal S, Ferriero DM, Schor NF. *Swaiman's pediatric neurology: principles and practice: Elsevier Health Sciences; 2011.*
5. Association AP, Association AP. *Diagnostic and statistical manual-text revision (DSM-IV-TRim, 2000): American Psychiatric Association; 2000.*
6. Allen DA. Autistic Spectrum Disorders: clinical presentation in preschool children. *Journal of Child Neurology. 1988;3(1 suppl):S48-S56.*
7. Baio J. Prevalence of Autism Spectrum Disorders: Autism and Developmental Disabilities Monitoring Network, 14 Sites, United States, 2008. *Morbidity and Mortality Weekly Report. Surveillance Summaries. Volume 61, Number 3. Centers for Disease Control and Prevention. 2012.*
8. Matsuishi T, Yamashita Y, Ohtani Y, Ornitz E, Kuriya N, Murakami Y, et al. Brief report: incidence of and risk factors for autistic disorder in neonatal intensive care unit survivors. *Journal of Autism and Developmental Disorders. 1999;29(2):161-6.*
9. Badawi N, Dixon GS, Felix JF, Keogh JM, Petterson B, Stanley FJ, et al. Autism following a history of newborn encephalopathy: more than a coincidence? *Developmental Medicine & Child Neurology. 2006;48(2):85-9.*
10. Juranek J, Filipek PA, Berenji GR, Modahl C, Osann K, Spence MA. Association between amygdala volume and anxiety level: magnetic resonance imaging (MRI) study in autistic children. *Journal of child neurology. 2006;21(12):1051-8.*
11. Courchesne E, Karns C, Davis H, Ziccardi R, Carper R, Tigue Z, et al. Unusual brain growth patterns in early life in patients with autistic disorder an MRI study. *Neurology. 2001;57(2):245-54.*
12. Chugani D. Role of altered brain serotonin mechanisms in autism. *Molecular Psychiatry. 2002;7:S16.*
13. Chen W, Landau S, Sham P, Fombonne E. No evidence for links between autism, MMR and measles virus. *Psychological medicine. 2004;34(03):543-53.*
14. Auranen M, Vanhala R, Varilo T, Ayers K, Kempas E, Ylisaukko-oja T, et al. A genomewide screen for autism-spectrum disorders: evidence for a major susceptibility locus on chromosome 3q25-27. *The American Journal of Human Genetics. 2002;71(4):777-90.*
15. Akshoomoff N, Farid N, Courchesne E, Haas R. Abnormalities on the neurological examination and EEG in young children with pervasive developmental disorders. *Journal of autism and developmental disorders. 2007;37(5):887-93.*

TECTA gene function and hearing loss: a review

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Abstract

Hearing loss is considered as the most prevalent impairment worldwide. It is one of the most genetically heterogeneous, which makes molecular diagnosis challenging in most cases. *TECTA* is a modular, non-collagenous protein of the tectorial membrane that plays a more dynamic role in normal hearing. Mutation in *TECTA* cause dominant and recessive forms of non-syndromic hearing loss. The clinical findings suggest stable, moderate-to-severe forms of hereditary hearing loss may be diagnostic of a mutation in *TECTA*. In this review, Directory of Open Access Journals (DOAJ), Pub Med, Google Scholar LISTA (EBSCO), Embase, and Web of Science were searched using relevant search terms to retrieve eligible publications. This paper provides an overview of (1) *TECTA* gene function, (2) the prevalence of *TECTA* related hearing loss, disease symptoms, (3) identification pattern and (4) animal models. It also summarizes how mutations in *TECTA* induced hearing loss with mid-frequency audio profile pattern.

Key words: Hearing loss, Mutation, *TECTA* gene

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Introduction

Sensory and neurological diseases are one of the largest medical complex problems and (1, 2), hearing loss is the most common neural sensory disorder in human (3, 4). In developing countries one out of 500 neonates are born deaf (5). In 50-60 percent of patients the cause of the disease is deterioration in the function of a single gene (3). 70% of all hereditary hearing loss is non-syndromic and 30% is syndromic (6). Non-syndromic hearing impairment is extremely heterogeneous; 68 autosomal recessive loci (DFNB), 52 autosomal dominant loci (DFNA), 5 involved loci on X chromosome and 2 involved loci on Y chromosome has been reported so far (7). Hearing loss caused by *TECTA* mutations are inherited in two forms of autosomal dominant (DFNA8/12MIM 601543-MIM601842) and autosomal recessive (DFNB21). Mutation in the *TECTA* gene is the cause of 4% of all non-syndromic autosomal dominant hearing loss and has been reported in various kinds of hearing impairments in different populations (8). The most mutations related to DFNB21 have been found in Iran (9). Patients 'audiometric pattern' is flat or U shaped in the mild or mild to severe frequencies (10). Patients' audiograms are considered as the most important tools to identify mutations in the *TECTA* gene (10). In this review article, we aimed at investigating *TECTA* gene function; the prevalence of *TECTA* related hearing loss, disease symptoms, identification patterns and related animal models.

Materials and Methods

Scientific databases Directory of Open Access Journals (DOAJ), Google Scholar, Pub Med, LISTA (EBSCO), Embase, and Web of Science were searched using relevant search terms to retrieve eligible publications on structure and function, audiometric pattern and inheritance pattern of hearing loss and animal modeling related to the *TECTA* gene.

Result and Discussion

***TECTA* gene structure and function**

Human *TECTA* gene (MIM 602574, Gene ID 7007) has been located at 11q22–q24 and mouse *TECTA* gene is on chromosome 9 (8). Studies have revealed that *TECTA* is highly conserved in zebrafish, mice and humans (11). Alpha tectorin is encoded by the *TECTA* gene and is one of the most important non-collagen parts of the tectorial membrane of the inner ear (12). The *TECTA* gene contains 23 exons and renders a protein of 2155 amino acids (13). Tectorial membrane is a fiber extended to extracellular matrix and is connected to stereocilia clusters of sensory hair cells (Figure 1). Sounds cause the movement of tectorial membrane related cells (14). Stereocilia motions give rise to the transforming of sound waves into neural pulse. Tectorial membrane is highly expressed in the inner ear and is found in three forms of collagenic (alpha-tectorin), non-collagenic (beta-tectorin) and glycoprotein (otogelin). Alpha-tectorin is a large glycoprotein containing several domains including Entactin G1 (ENT) domain, the large area of Zonadhesin (ZA) which includes three factors of von Willebrand factor type C or D (vWFD V1, V2, V3, V4), N-terminal entactin G1-like domain and C-terminal Zona Pellucida and also three trypsins inhibiting cysteine-rich domains (Figure 2) (12, 14). These domains have formed a network by disulfide bonds and in association with beta-tectorin have established the non-collagenic matrix in tectorial membrane (11).

Audiometric pattern in hearing loss associated with *TECTA* deficiency

A large number of mutations associated with hearing loss have been reported so far. Using audiogram pattern is an appropriate step to select the presumably mutated genes. To reduce costs and save time, surveying audio profile of the deafness families is an effective step to screen families for linkage analysis. Studies have revealed that any mutation in *TECTA* gene which inactivates the gene products is associated with non-syndromic autosomal recessive hearing loss. Autosomal recessive mutations in *TECTA* gene lead to a moderate to severe deafness and display an audiogram pattern in a flat or U shape at all frequencies. Fortunately, this pattern helps to identify *TECTA* gene as the cause of some kinds of hearing loss. While all missense mutations in *TECTA* gene cause autosomal dominant type of hearing loss, depending on the involved domain harboring the mutation, clinical manifestations are different (10). Mutations in the ZP domain cause a dominant negative phenotype giving

rise to a disrupted connection between different tectorin polypeptides, so deteriorate tectorial membrane structure. Any defect in this membrane results in a reduction in the quality of sounds transferred to stereociliary fibers of hair cells and eventually cause hearing loss (15). Another hypothesis explains that any instability of alpha tectorin mRNA or its destruction lead to decreased protein levels in tectorial membrane (7). Mutation in ZP domain causes non-progressive prelingual deafness at mild frequency, while any mutation in ZA domain results in progressive hearing loss at the high frequency range in childhood (16). Researchers have demonstrated that there is a significant relationship between mutations in ZP and mild hearing loss and also ZA and Progressive high frequency hearing impairment (17). Furthermore, mutation in Entactin-G1-like domain at the first repeat of vWFD and also at TIL2 repeats in ZP and ZA domain cause high-frequency hearing loss. Even the site of the mutation can affect hearing loss stability, so missense mutations occurring at cysteine repeats of ZA and ZP domain cause progressive post lingual hearing loss (18). These mutations decay disulfide bonds and destabilize the cellular matrix structure, while the rest of the mutations occurring at the other amino acids in this region cause stable hearing loss.

Deafness related to *TECTA* involved loci

Non syndromic autosomal recessive hearing loss associated with DFNB21

The first time in 1999, DFNB21 has been reported in a Lebanese family with Severe-to-Profound prelingual deafness by Mustapha et al. This mutation has been located at the donor splice site in intron 9 and results in a stop codon at 972 positions rendering a truncated protein. This variant has not been observed in 101 healthy subjects (19). In 2003, in two Iranian and Pakistani families with Severe-to-Profound sensory neural hearing loss, respectively an insertion mutation (649insC (602574.0006)) and a deletion mutation (6037delG (602574.0007)) have been reported (20). In 2007, linkage analysis using D11S1299, D11S1998 and D11S4464 markers surveying 45 GJB2 negative deaf families displayed linkage to the *TECTA* gene. Sequencing of the *TECTA* gene revealed a frame shift mutation (266delT, p.122X), a missense mutation (5211C>A, p.Y1737X) and a 9.6kb deletion in exon 10 and intron 8 and 9 (10). One year later, a 16bp deletion in exon 21 in the Iran population was reported (21). In 2012, the first compound heterozygote from a Korean population was reported using next generation sequencing approach. This missense mutation has been located in exon 15 and insertion has occurred at the donor splice site. The father and mother of this family were heterozygotes for a missense mutation and a splice site mutation respectively. Moreover, these mutations have not been observed in 120 healthy people (17). In 2016, surveying 50 Iranian families with Arab ethnicity, the last identified mutation in the *TECTA* gene was reported (22). This nonsense mutation lead to translation of a truncated protein containing 245 amino acids and was not observed in healthy volunteers (22)(Table 1).

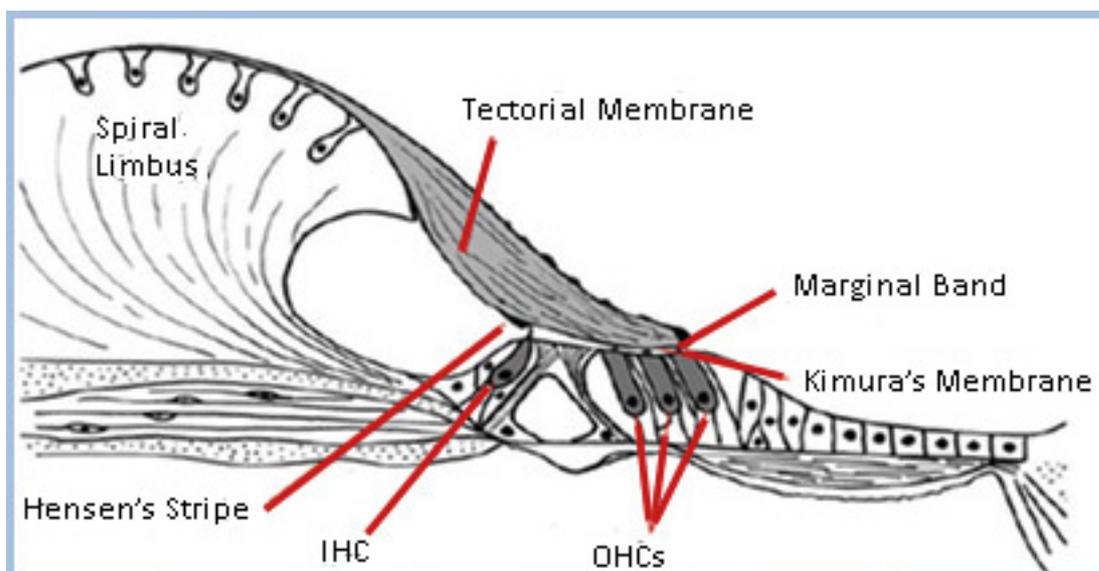


Figure 1: Organ of Corti structure and TECTA. The structure of the organ of Corti Schematic picture in the basal area of the cochlea in the human ear. TM is connected to the outer hair-cells Stereocilia via Kimura membrane, hair-cell Stereocilia via Hensen fibers and also spiral limbus (11).

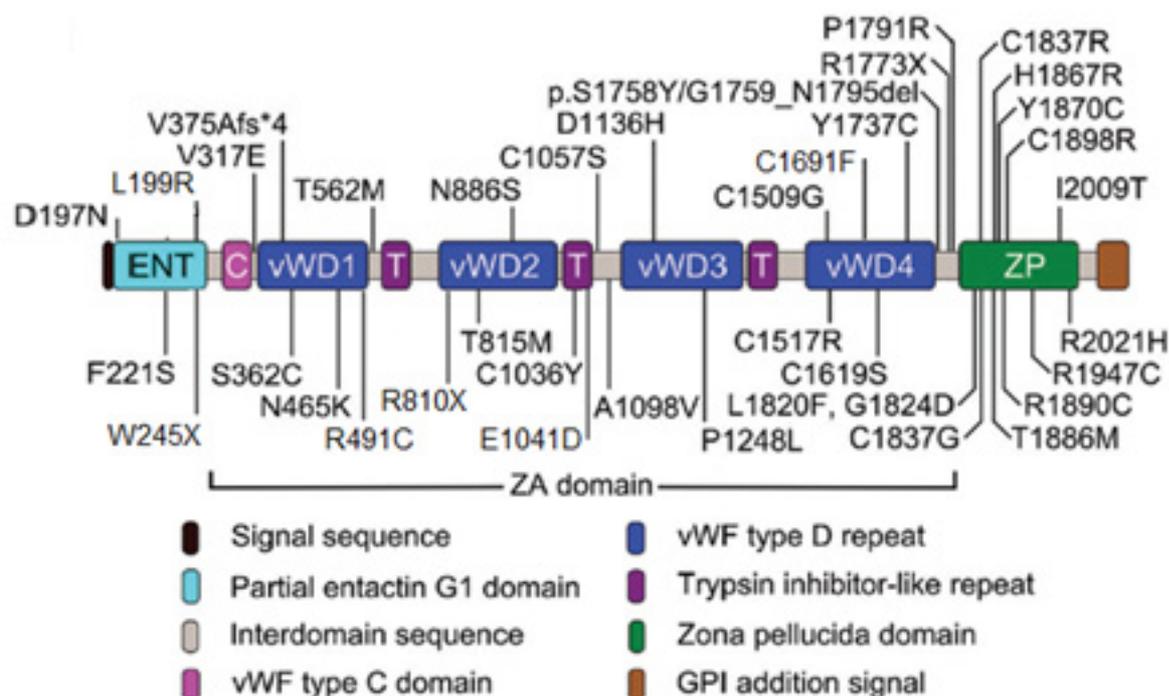


Figure 2: The structures of TECTA domains and the position of missense mutations causing hearing loss. Mutation in Entactin-G1 domain, vWFD, vWFD2 and TIL2 repeats of ZA and ZP cause to mild-frequency hearing loss, while mutation in other parts of ZA domain results in high-frequency hearing impairment.

Autosomal dominant non-syndromic hearing loss

A study accomplished in 1998 for the first time reported that two Australian and Belgian families displayed linkage to DFNB8 and DFNB12 loci at the long arm of chromosome 9, where the *TECTA* gene has been located (7). A compound heterozygous missense mutation (c.5725C>T and c.5738G>A) in the distance between 12bp located at exon 17 in a Belgium pedigree was reported in 18 patients while 40 healthy controls lacked the mutation. c.5876A>G mutation in exon 18 was reported in an Australian family while the mutation was not observed in 100 Australian and Belgian healthy people. These three

mutations have been located in the ZP domain and cause prelingual hearing loss (7). In 1999 investigating a French pedigree of mild, moderate and progressive hearing loss showed linkage disequilibrium to DFNA12. *TECTA* gene sequencing revealed a missense mutation (c.4857G>C) changing cysteine 1916 into serine (C1916S) giving rise to the removing of cysteine in CGLC motif of D4vWfin zonadhesin/vonWillebrand domain (23). CGLC motifs in D1 and D2 repeats catalyzes the polymerization of disulphide bonds in VWF and are involved in the formation of non-collagenic tectorial membrane matrix. This mutation changes the properties of sound mechanical transfer in

Exon	Mutation	Protein change	Protein domain	Frequency	Time of onset	Frequencies most affected	Ethnicity	Reference
3	c.266delT	p.Leu89Arg*34	ENT	Moderate to Severe	Prelingual	Mild	Iran	(10,36)
4	c.596delT	p.Leu199Argfs*7	ENT	Profound	Prelingual	Mid	Japan	(32,36)
5	649insC	-	ENT	-	Prelingual	Mild	Iran	(20)
5	c.651dup C	p.Asn218GlnFS*31	ENT	-	Prelingual	All frequencies	Iran	(20)
5	c.734G>A	p.W245*	ENT	-	Prelingual	All frequencies	Iran	(22)
5	IVS9 + 1 G > A	p.248X*	ENT	-	Prelingual	All frequencies	Lebanon	(19)
5	c.654_657delTTTC	p.Phe219Serfs*12	ENT	Moderate to Profound	Prelingual	-	England	(33)
6	c.990C > A	p.Tyr330*	ZA (vWFD1)	Severe	Prelingual	-	China	(33,36)
7	c.1471C > T	p.Arg491Cys	ZA (vWFD1)	Profound	Prelingual	Mid	Japan	(32,36)
9	c.2428C > T	p.Arg810*	ZA (vWFD2)	-	Prelingual	-	England	(34)
9	c.2592C > A	p.Asn864Lys	ZA (vWFD2)	Moderate to Profound	Prelingual	-	England	(33)
9	c.2941+1 G	-	ZA	-	Prelingual	All frequencies	Iran	(10)
9-10	9.6 Kb	del	ZA	Prelingual	-	Mild	Iran	(35)
10	c.3123G > C	p.Glu1041Asp	ZA	-	Prelingual	-	England	(34)
11	c.4055G > A	p.Cys1352Tyr	ZA	Moderate to Profound	Prelingual	-	England	(33)
11	c.3903C > A	p.Cys1301*	ZA (vWFD3)	Moderate	Prelingual	-	Iran	(10)
14	c.4857C > A	p.Cys1619*	ZA (vWFD4)	Profound	Prelingual	-	Palestine	(20)
15	c.5072G > T	p.Cys1691Phe	ZA (vWFD4)	Moderate to Severe	Prelingual	-	Korea	(34,37)
15	c.5211 C>A	p.Tyr1737*	ZA	-	Prelingual	Mild	Iran	(10)
Intron 15	c.5272 + 1G > A	-	ZA	Moderate to Severe	-	All	Algeria	(36)
15	c.5210A>G	p.Y1737C	ZA	-	Prelingual	Mild	Iran	(37)
Intron 20	c.6162+3insT	-	ZA (vWFD4)	-	Prelingual	Moderately	Korea	(37)
20	c.6037delG	p.2018X*	ZP	-	Prelingual	All frequencies	Pakistan	(20)
21	c. 6203-6218 del	p.lys 2068Arg*38	ZP	-	Prelingual	All frequencies	Iran	(21)

Table 1: Reported mutations in TECTA gene (DFNB21) and their audiogram pattern

Exon	Mutation	Protein change	Protein domain	Frequency	Time of onset	Frequencies most affected	Ethnicity	Reference
3	c.257-262delinsGCT	p. Ser 86Cys p. Pro88del	ENT	High	Postlingual	Stable	China	(26)
4	A>c.589G	p.Asp197Asn	ENT	Mid	Prelingual	Stable	USA	(26)
5	C>c.632T	p.Phe211Ser	ENT	Mid	Prelingual	Stable	Spain	(17)
6	A>c.950T	p.Val317Glu	ZA (none)	High	Postlingual	Unknown	Korea	(26)
6	T>c.1084A	p.Ser362Cys	ZA (VWFD1)	Mid	Postlingual	Unknown	USA	(26)
6	c.1124delT	p.Val375Alafs*4	ZA (VWFD1)	Mid	Postlingual	Unknown	Spain	(26)
7	G>c.1395T	p.Asn465Lys	ZA (VWFD1)	Mid	Postlingual	Progressive	Belgium	(26)
7	T>c.1685C	p.Thr562Met	ZA (none)	Mid	Postlingual	Unknown	USA	(26)
9	T>c.2444C	p.Thr815Met	ZA (VWFD2)	Mid	Prelingual	Unknown	USA	(26)
9	G>c.2657A	p.Asn886Ser	ZA (VWFD2)	High	Prelingual	Progressive	Europe	(26)
10	A>c.3107G	p.Cys1036Tyr	ZA (TIL2)	Mid	Postlingual	Stable	Spain	(26)
10	A>c.3169T	p.Cys1057Ser	ZA (none)	High	Postlingual	Progressive	Sweden	(26)
10	T>c.3293C	p.Ala1098Val	ZA (none)	High	Postlingual	Unknown	Spain	(26)
10	C>c.3406G	p.Asp1136His	ZA (VWFD3)	High	Postlingual	Unknown	Spain	(26)
11	T>c.3743C	p.Pro1248Leu	ZA (VWFD3)	High	Prelingual	Unknown	Spain	(26)
13	G>c.4525T	p.Cys1509Gly	ZA (VWFD4)	High	Unknown	Progressive	Turkey	(26)
13	C>c.4549T	p.Cys1517Arg	ZA (VWFD4)	High	Postlingual	Progressive	Spain	(26)
14	C>c.4856G	p.Cys1619Ser	ZA (VWFD4)	High	Postlingual	Progressive	France	(26)
16	A>c.5331G	p.Leu1777Leu	ZA (none)	Mid	Prelingual	Stable	Germany	(26)
16	G>c.5372C	p.Pro1791Arg	ZA (none)	Mid	Prelingual	Unknown	USA	(26)
Intron18	c.5383+2T.G	-	ZA (none)	Mid	Prelingual	Stable	Europe	(26)
Intron18	c.5383+5del GTGA	-	ZA (none)	High	Prelingual	Progressive	Belgium	(26)
17	T>c.5458C	p.Leu1820Phe	ZP	Mid	Postlingual	Stable	Belgium	(7)
17	A>c.5471G	p.Gly1824Asp	ZP	Mid	Postlingual	Stable	Belgium	(7)
17	G>c.5509T	p.Cys1837Gly	ZP	Mid	Postlingual	Progressive	Spain	(38)
17	G>c.5509T	p.Cys1837Gly	ZP	-	Postlingual	Progressive	Spain	(26)
17	C>c.5509T	p.Cys1837Arg	ZP	-	Postlingual	Progressive	USA	(26)
18	c.5597C>T	p.Thr1866Met	ZP	-	Postlingual	Stable	Korea	(26)
18	c.5597C>T	p.Thr1866Met	ZP	-	Postlingual	Progressive	Spain, USA	(26)
18	c.5600A>G	p.His1867Arg	ZP	-	Postlingual	Progressive	Spain	(26)
18	c.5609A>G	p.Tyr1870Cys	ZP	-	Prelingual	Stable	Australia	(7)
18	c.5668C>T	p.Arg1890Cys	ZP	-	Prelingual	Stable	Germany	(16)
18	c.5668C>T	p.Arg1890Cys	ZP	-	Prelingual	Stable	USA	(26)
18	c.5692T>C	p.Cys1898Arg	ZP	-	Postlingual	Unknown	USA	(26)
19	c.5839C>T	p.Arg1947Cys	ZP	-	Postlingual	Unknown	USA	(26)
20	c.6026T>C	p.Ile2009Thr	ZP	-	Postlingual	Stable	Japan	(26)
20	c.6062G>A	p.Arg2021His	ZP	-	Prelingual	Stable	Japan	(39)

Table 2: reported mutations in TECTA gene (DFNA8/12) and their audiogram pattern

tectorial membrane via disturbing the proper polypeptide cross-linking, resulting in hearing loss in patients (23).

Parallel to this study, C1057S mutation in one domain of zonadhesin/Von Willebrand was reported in a population of Sweden. C1057S mutation attenuates sound transmission by changing polypeptide cross linking, resulting in deafness (8). In 2001 and 2002 two missense mutations in exon 17 and 20 were reported in the Spanish (24) and Japanese (8) pedigrees respectively and from 2004-2013 in the USA (10), Turkey (18), Germany (25), Korea (26) and China, some mutations were reported which have been described in detail in Table 2.

The biggest cohort study focusing on DFNA8/12 was accomplished in 2011. In this study 835 American deaf families (autosomal dominant non-syndromic hearing loss) were investigated. According to audiometric data, 73 pedigrees that had deafness at low and high frequency were selected. Their audiograms were screened by Audio Gene software (<http://audiogene.eng.uiowa.edu/>) which contains a databank including 1926 audiograms from 17 known loci involved in ADNSHL. Based on the audiogram pattern, the software predicts which locus is involved in hearing loss (26, 27). In the next phase of the study, 372 Spanish deaf were surveyed. Audio gene prediction introduced 64 families with possibility of DFNA8/12 involvement that *TECTA* gene sequencing indicated that only 9 families carried the mutation, also 14 mutations were reported in the Spanish population (26). In 2014, in China a 9bp deletion was reported (28). In Table 2, all of the autosomal dominant mutations have been represented in detail.

Mouse Models for Human Hearing Impairment

Tecta^{ΔENT/ΔENT} mouse models have been developed by Exon Skipping, so 96 amino acids were removed from N-terminal of entactin G1 in alpha-tectorine. During the first days of the embryonic period, examining the mouse model demonstrated that the greater epithelial ridge of *TECTA* was very little growth and also was not detectable by western blot analysis. Even three weeks after the birth *TECTA* expression was negligible, while tectorial membrane in *Tecta*^{+/+} and *Tecta*^{+/ΔENT} mice was normal and TM had been connected to Spiral limbus fully. But in the mouse model, TM had been separated from spiral limbus and the organ of corti and also had no beta tectorial membrane and otogelin as the collagenic part of tectorial membrane (29). Otoconia membrane has been reduced in the models compared to heterozygotes or normal group. The mouse model was not able to do rotational movements and also there were explicit defects in their movements and behavior. In these mice, there were not any appropriate matrix filaments and sheets, but outer and inner hair cells were normal and had positioned at the right place. The results indicated that mutated alpha tectorin protein is produced and secreted in these mice but is not able to organize the matrix and is ruined rapidly (29). The next mouse model was the mice with mutation in *Tecta*^{Y1870C}.

In ZP domain, this mutation was reported in 1998 in an Australian family with prelingual hair impairment at moderate to severe frequency. In these transgenic mice, TM matrix structure was disturbed and ZA domain thickness was decreased, although these changes had no major effect on the main role of tectorial membrane according to the data obtained from the evaluating of sensitivity and frequency of cochlea mechanical response to sounds. The nervous threshold was evaluated; nervous regulation was extended resulting in a major decrease in the peak of nervous regulation curve (30). *Tecta*^{C1509G/+} mouse model harbored a missense mutation in the ZA domain which had caused a progressive mild to moderate hearing impairment in a Turkish family. Structural phenotype is more subtle, hearing response threshold of brain stem at -40 frequencies was 25dB throughout the hearing range and hearing loss occurs mostly at mild level (10-35 KHz) (31). In a study published in 2014, a three mouse model including *Tecta*^{L1820F, G1824D/+} in ZP domain which had caused deafness at mild frequency in a Belgium family, *Tecta*^{C1837G/+} in ZA domain and which had caused progressive hearing loss at mild frequency in a Spanish family and *Tecta*^{C1619S/+} in ZA domain which had caused progressive hearing loss at high frequency in a French family, were investigated. Mutations in ZA and ZP domain give rise to distinct and different changes in TM structure (28). Changes in TM is similar to the changes when *Tecta*^{Y1870C} mutation occurs and includes reduction in limbus region, the lack of striated sheet matrix, disturbance in the organization of collagenic fiber in the Sulcal region and finally the lamination of Kimura membrane. Defects in tectorial membrane in *Tecta*^{C1619S/+} mouse model is completely different from models harboring mutations in ZP domain and is similar to *Tecta*^{C1509G/+} mouse model. These defects include destroying marginal band; a major reduction in Covernet (upper layer of TM is covered by this fiber canal) and finally changes in fiber network profile give rise to the reduction in hair cells connection (11). In the case of mutations in ZP domain, the threshold of brain stem hearing response (in the range of 8-40 KHz) increased by 30-40 dB, while mice carrying mutations in ZA domain displayed a 20-30 dB increase, although TM phenotype is stable and there is no evidence implying gradual deterioration of hearing structure or function (11). Regarding the data obtained from these five DFNA8/12 related mouse models, genotype-phenotype correlation related to ZP and ZA domain can be clearly observed, so this clue can be used in the prediction of the involved domains in hearing impairment according to the hearing phenotype.

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References

1. Asgharzade S, Rabiei Z, Rafieian-Kopaei M. Effects of *Matricaria chamomilla* extract on motor coordination impairment induced by scopolamine in rats. *Asian Pacific Journal of Tropical Biomedicine*. 2015;5(10):829-33.
2. Rabiei Z, Asgharzade S, Bigdeli M. Medicinal herbs effective in the treatment of the Alzheimer's disease. *Journal of Babol University of Medical Sciences*. 2015;16(15):51-9.
3. Hashemzadeh Chaleshtori M, Simpson MA, Farrokhi E, Dolati M, Hoghooghi Rad L, Amani Geshnigani S, et al. Novel mutations in the *pejvakin* gene are associated with autosomal recessive non-syndromic hearing loss in Iranian families. *Clinical genetics*. 2007;72(3):261-3.
4. Asgharzade S, Reisi S, Tabatabaiefar MA, Chaleshtori MH. Screening of *Myo7A* Mutations in Iranian Patients with Autosomal Recessive Hearing Loss from West of Iran. *Iranian journal of public health*. 2017;46(1):76.
5. ASGHARZADE S, CHALESHTORI MH, Tabatabaiefar M, Reisi S, Modarressi MH. MUTATION IN SECOND EXON OF *MYO15A* GENE CAUSE OF NONSYNDROMIC HEARING LOSS AND ITS ASSOCIATION IN THE ARAB POPULATION IN IRAN. *Genetika*. 2016;48(2):587-96.
6. Sadeghi A, Sanati MH, Alasti F, Hashemzadeh Chaleshtori M, Ataei M. Mutation analysis of *connexin 26* gene and *del (GJB6-D13S1830)* in patients with hereditary deafness from two provinces in Iran. *Iran J Biotechnol*. 2005;3(4):255-8.
7. Verhoeven K, Van Laer L, Kirschhofer K, Legan PK, Hughes DC, Schatteman I, et al. Mutations in the human α -tectorin gene cause autosomal dominant non-syndromic hearing impairment. *Nature genetics*. 1998;19(1):60-2.
8. Balciuniene J, Dahl N, Jalonen P, Verhoeven K, Van Camp G, Borg E, et al. Alpha-tectorin involvement in hearing disabilities: one gene-two phenotypes. *Human genetics*. 1999;105(3):211-6.
9. Khosrofar M, Pourreza MR, Asgharzadeh S, Tahmasebi P, Ali Asgari E, Ghasemikah R, et al. Genetic Linkage Analysis of the *DFNB21* Locus in Autosomal Recessive Hearing Loss in large families from Khuzestan Province. *Arak Medical University Journal*. 2017;20(3):31-8.
10. Meyer NC, Alasti F, Nishimura CJ, Imanirad P, Kahrizi K, Riazalhosseini Y, et al. Identification of three novel *TECTA* mutations in Iranian families with autosomal recessive nonsyndromic hearing impairment at the *DFNB21* locus. *American Journal of Medical Genetics Part A*. 2007;143(14):1623-9.
11. Legan PK, Goodyear RJ, Morín M, Mencia A, Pollard H, Olavarrieta L, et al. Three deaf mice: mouse models for *TECTA*-based human hereditary deafness reveal domain-specific structural phenotypes in the tectorial membrane. *Human molecular genetics*. 2013;23(10):2551-68.
12. Maeda Y, Fukushima K, Kasai N, Maeta M, Nishizaki K. Quantification of *TECTA* and *DFNA5* expression in the developing mouse cochlea. *Neuroreport*. 2001;12(15):3223-6.
13. Richardson G, Forge A, Kros C, Fleming J, Brown S, Steel K. Myosin VIIA is required for aminoglycoside accumulation in cochlear hair cells. *Journal of Neuroscience*. 1997;17(24):9506-19.
14. Richardson GP, de Monvel JB, Petit C. How the genetics of deafness illuminates auditory physiology. *Annual review of physiology*. 2011;73:311-34.
15. Hashemzadeh-Chaleshtori M, Saidijam M, Jami M-S, Ghasemi-Dehkordi P. *MicroRNA-183* Family in Inner Ear: Hair Cell Development and Deafness. *Journal of audiology & otology*. 2016;20(3):131-8.
16. Plantinga RF, de Brouwer AP, Huygen PL, Kunst HP, Kremer H, Cremers CW. A novel *TECTA* mutation in a Dutch *DFNA8/12* family confirms genotype-phenotype correlation. *Journal of the Association for Research in Otolaryngology*. 2006;7(2):173-81.
17. Sagong B, Baek JI, Bok J, Lee KY, Kim UK. Identification of a nonsense mutation in the *STRC* gene in a Korean family with moderate hearing loss. *Int J Pediatr Otorhinolaryngol*. 2016;80:78-81.
18. Pfister M, Thiele H, Van Camp G, Fransen E, Apaydin F, Aydin Ö, et al. A genotype-phenotype correlation with gender-effect for hearing impairment caused by *TECTA* mutations. *Cellular Physiology and Biochemistry*. 2004;14(4-6):369-76.
19. Mustapha M, Weil D, Chardenoux S, Elias S, El-Zir E, Beckmann JS, et al. An α -tectorin gene defect causes a newly identified autosomal recessive form of sensorineural pre-lingual non-syndromic deafness, *DFNB21*. *Human molecular genetics*. 1999;8(3):409-12.
20. Naz S, Alasti F, Mowjoodi A, Riazuddin S, Sanati M, Friedman T, et al. Distinctive audiometric profile associated with *DFNB21* alleles of *TECTA*. *Journal of medical genetics*. 2003;40(5):360-3.
21. Alasti F, Sanati MH, Behrouzifard AH, Sadeghi A, De Brouwer AP, Kremer H, et al. A novel *TECTA* mutation confirms the recognizable phenotype among autosomal recessive hearing impairment families. *International journal of pediatric otorhinolaryngology*. 2008;72(2):249-55.
22. Asgharzade S, Tabatabaiefar MA, Modarressi MH, Ghahremani MH, Reisi S, Tahmasebi P, et al. A novel *TECTA* mutation causes *ARNSHL*. *International Journal of Pediatric Otorhinolaryngology*. 2017;92:88-93.
23. Alloisio N, Morle L, Bozon M, Godet J, Verhoeven K, Van Camp G, et al. Mutation in the zonadhesin-like domain of α -tectorin associated with autosomal dominant non-syndromic hearing loss. *European Journal of Human Genetics*. 1999;7(2):255-8.
24. Moreno-Pelayo MA, del Castillo I, Villamar M, Romero L, Hernández-Calvín FJ, Herraiz C, et al. A cysteine substitution in the zona pellucida domain of α -tectorin results in autosomal dominant, postlingual, progressive, mid frequency hearing loss in a Spanish family. *Journal of medical genetics*. 2001;38(5):e13-e.
25. Collin RW, de Heer A-MR, Oostrik J, Pauw R-J, Plantinga RF, Huygen PL, et al. Mid-frequency *DFNA8/12* hearing loss caused by a synonymous *TECTA* mutation that affects an exonic splice enhancer. *European journal of human genetics*. 2008;16(12).
26. Hildebrand MS, Morín M, Meyer NC, Mayo F, Modamio-Hoybjør S, Mencia A, et al. *DFNA8/12* caused by *TECTA* mutations is the most identified subtype of nonsyndromic autosomal dominant hearing loss. *Human mutation*. 2011;32(7):825-34.

26. Hildebrand MS, Morín M, Meyer NC, Mayo F, Modamio-Hoybjor S, Mencía A, et al. DFNA8/12 caused by TECTA mutations is the most identified subtype of nonsyndromic autosomal dominant hearing loss. *Human mutation*. 2011;32(7):825-34.
27. Hildebrand MS, Tack D, McMordie SJ, Deluca A, Hur IA, Nishimura C, et al. Audioprofile-directed screening identifies novel mutations in KCNQ4 causing hearing loss at the DFNA2 locus. *Genetics in Medicine*. 2008;10(11):797-804.
28. Su Y, Tang W-X, Gao X, Yu F, Dai Z-Y, Zhao J-D, et al. A novel mutation in the TECTA gene in a Chinese family with autosomal dominant nonsyndromic hearing loss. *PLoS one*. 2014;9(2):e89240.
29. Legan PK, Lukashkina VA, Goodyear RJ, Kössl M, Russell IJ, Richardson GP. A targeted deletion in α -tectorin reveals that the tectorial membrane is required for the gain and timing of cochlear feedback. *Neuron*. 2000;28(1):273-85.
30. Legan PK, Lukashkina VA, Goodyear RJ, Lukashkin AN, Verhoeven K, Van Camp G, et al. A deafness mutation isolates a second role for the tectorial membrane in hearing. *Nature neuroscience*. 2005;8(8):1035-42.
31. Xia A, Gao SS, Yuan T, Osborn A, Bress A, Pfister M, et al. Deficient forward transduction and enhanced reverse transduction in the alpha tectorin C1509G human hearing loss mutation. *Disease models & mechanisms*. 2010;3(3-4):209-23.
32. Miyagawa M, Nishio SY, Hattori M, Moteki H, Kobayashi Y, Sato H, et al. Mutations in the MYO15A gene are a significant cause of nonsyndromic hearing loss: massively parallel DNA sequencing-based analysis. *Ann Otol Rhinol Laryngol*. 2015;124 Suppl 1:158S-68S.
33. Hutchin T, Coy N, Conlon H, Telford E, Bromelow K, Blaydon D, et al. Assessment of the genetic causes of recessive childhood non-syndromic deafness in the UK—implications for genetic testing. *Clinical genetics*. 2005;68(6):506-12.
34. King DA, Fitzgerald TW, Miller R, Canham N, Clayton-Smith J, Johnson D, et al. A novel method for detecting uniparental disomy from trio genotypes identifies a significant excess in children with developmental disorders. *Genome research*. 2014;24(4):673-87.
35. Li Z, Guo Y, Lu Y, Li J, Jin Z, Li H, et al. Identification of a novel TECTA mutation in a Chinese DFNA8/12 family with prelingual progressive sensorineural hearing impairment. *PLoS one*. 2013;8(7):e70134.
36. Behloulia A, Bonnet C, Abdi S, Hasbellaoui M, Boudjenah F, Hardelin J-P, et al. A novel biallelic splice site mutation of TECTA causes moderate to severe hearing impairment in an Algerian family. *International Journal of Pediatric Otorhinolaryngology*. 2016;87:28-33.
37. Diaz-Horta O, Duman D, Foster II J, Sirmaci A, Gonzalez M, Mahdih N, et al. Whole-exome sequencing efficiently detects rare mutations in autosomal recessive nonsyndromic hearing loss. *PLoS one*. 2012;7(11):e50628.
38. Alford RL. Nonsyndromic hereditary hearing loss. *Medical Genetics in the Clinical Practice of ORL*. 70: Karger Publishers; 2011. p. 37-42.
39. Iwasaki S, Harada D, Usami S-i, Nagura M, Takeshita T, Hoshino T. Association of clinical features with mutation of TECTA in a family with autosomal dominant hearing loss. *Archives of Otolaryngology—Head & Neck Surgery*. 2002;128(8):913-7.

Mandibular canal and its incisive branch: A CBCT study

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Abstract

Objective: Prevention from damage to the mandibular canal (MC) during invasive dental procedures is essential. The aim of this study was to determine the course of MC, anterior branch and its relation to mandibular teeth.

Materials and Methods: In cross-sectional view, the MC diameter, the distance from root apex to MC, the distance of MC to mandibular lower border, the distance of MC from buccal and lingual cortical borders, from the distal root of third molar to first premolar in apex roots area of all posterior teeth were identified by using 207 CBCT images. The presence of the anterior loop, the position of mental foramen, position and diameter of incisive branch on the last visible point were also determined. Examples were divided into the groups in terms of age, sex and side and were analyzed with descriptive statistics.

Results: The nearest root to the MC was the distal root of third molar in women less than 30 years (0.38 ± 0.58 mm) and the most distant root was the second premolar tooth in men 30-50 years (6.06 ± 2.20 mm). The most common site for mental foramen, was between premolars and the area between the first premolar and canine teeth was the most common site for incisive canal on the last point of view. There was no significant differences between right and left mandibular measurements.

Conclusion: The position of MC towards mandibular posterior teeth is more influenced by age and sex. Also, the position of MC towards the bucco-lingual plate depends on the antero-posterior position of mental foramen. So any procedures in the mandibular posterior area should be performed with sufficient knowledge of the nervous canal.

Key words: Anatomy, Mandibular canal, Mental foramen, Incisive canal, CBCT

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Introduction

According to various mandibular surgeries, such as removing impacted third molar to implant placement, awareness of the position of inferior alveolar nerve is essential to ensure no damage to the nerve. (1,2). To achieve a successful treatment plan, adequate knowledge of the mandibular canal (MC) course and tooth roots is essential to reduce procedure bias (3). So, it is important to be aware of MC anatomy and possible variations in position, shape and course of canal for local anesthesia and during surgery (4). MC contains artery and inferior alveolar nerve, which have branches to the mandibular teeth and adjacent structures. MC can exhibit important anatomical variations and may be affected by inflammatory, infectious, neoplastic, idiopathic or iatrogenic lesions (5,6).

Full knowledge of anatomical structures in mental foramen area and the anterior loop is essential to prevent direct or indirect injury to the neurovascular bundle (7-9). Also, if the treatment plan includes surgical procedures in the area between mental and lingual foramen, the incisive branch of inferior alveolar nerve must be considered (9). In a study conducted in 2008 to evaluate the prognosis of mandibular molars apical surgeries, it was found that patients experienced more pain when the lesions were within 2 mm of the canal as depicted on a panoramic radiograph and there was a 19.4 % failure rate for lesions close to the canal. So, the accurate knowledge of the MC location can be useful not only during surgery, but also in the prognosis for surgery and evaluation of the patient's post-operative situation (10).

Findings from studies using cadavers may not be generalized to patient populations due to differences in age or disease. Dry skull studies often lack relevant data such as age or gender (11,12). Based on the results of studies that tried to compare the measurements made by the CBCT images and direct measurements on human samples, it was indicated that CBCT scans are excellent evaluation tools for the canal observations, which is similarly matched the anatomical measurements (10). Position of inferior alveolar canal and its connections have been described for a very long time, and many studies reported that the characteristics of these structures seem to be associated with race. For example, the mental foramen were often variable in position or even completely absent in some rare cases in different populations (13). Previous studies on human populations were more focused on the anatomical traits, while the relationship of these structures with each other and their relationship with the teeth apices have been less described (3,13-18). The aim of this study was to evaluate the MC course and its anterior branch, and the impact of factors such as age, sex and side on canal status.

Materials and Methods

In this cross-sectional study, 207 mandibular scans of patients over 18 years (110 female and 97 male) with a mean age of 45.7 ± 13.83 years, during 2013-2015 who referred to the maxillofacial radiology center were used. All scans were performed using Cranex 3D (Soredex, Helsinki, Finland) with Flat panel detector with the specifications of KVP=89, mA=6, Voxel size=0.2 mm and FOV=8 × 6 cm. The images were assessed using a personal monitor Macbook Air MD 760 (Apple Ltd, California, USA) with LCD 13-inch, Pix Resolution 900 × 1440 and assessed by Ondem and 3D Dental software.

Scans were examined by a maxillofacial radiologist to evaluate the relationship between MC and mandibular posterior teeth. Exclusion criteria included: 1. Any pathosis around teeth or in the mandibular body which can disturb the measurements 2. Supernumerary or impacted teeth in the mandible 3. Third molars with horizontal positions in the mandible 4. Single root molars in the mandible.

Measurements were started in the cross-sectional view (Interval =1 mm, Thickness =1 mm), if there was a distal root of third molar, and the MC diameter (D), the minimum distance of apex to superior border of MC (AP), the distance from inferior border of MC to the inferior border of the mandible (IC), the distance of MC from the cortical buccal border (BC) and the distance of MC from the cortical lingual border of mandible (LC) was traced (Figure 1). The bone width in the MC area (W) was also calculated by the sum of D, BC and LC. Then the same measurements were made again on the third molar mesial root and measurements continued forward on all posterior teeth roots to the first premolar. The measurements were made on both sides of the mandible. In the examination of mental foramen, its location and the presence or absence of anterior loop was evaluated. The diameter and position of incisive branch was evaluated at the last visible point.

The subjects were divided into three age groups: Group I (18-30 years = 34 patients), Group II (30-50 years = 87 patients) and Group III (over 50 years = 86 patients). The samples were separated according to gender and side. Data were analyzed using three ways (gender, age, side) by statistical tests: T-Test, ANOVA and SPSS version 18. P-value less than 0.05 was considered statistically significant.

Results

Among 207 patients under this study, the results showed that the distance of MC from posterior teeth apex, the nearest root was the distal root of third molar in women less than 30 years (0.38 ± 0.58 mm) and the most distant root was second premolar tooth in men 30-50 years (6.06 ± 2.20 mm). This distance in women was significantly less than men ($P < 0.05$) (Table 1 and Figure 2) and under age 30 years was also significantly less than other age groups ($P < 0.05$).

Minimum and maximum distance of MC from inferior mandibular cortex belonged to the distal root of the third molar in women over 50 years (4.66 ± 0.52 mm), and second premolar tooth in men over 50 years (9.29 ± 1.94 mm) respectively. This distance was lower in women than men ($P < 0.05$) (Table 1 and Figure 2) and under age 30 years was also significantly less than other age groups ($P < 0.05$).

In the assessment of MC distance from buccal and lingual cortical borders, the minimum buccal distance belonged to the second premolar tooth in women over 50 years (2.49 ± 0.94 mm), and the minimum lingual distance was located in the distal root of third molars in women over 50 years (0.90 ± 0.32 mm). These measured distances were significantly lower in women than men ($P < 0.05$) (Table 1 and Fig 2) and it was observed that the distance of canal to the buccal cortical plate in patients over 50 years was less than other age groups ($P < 0.05$).

The maximum horizontal bone width at MC area (10.22 ± 1.15 mm) was the mesial root of second molar in men under 30. Bone width in this area was significantly lower in women than men ($P < 0.05$) (Table 1); and in patients over 50 years, it was significantly less than other age groups ($P < 0.05$) (Figure 3).

It was observed that the minimum MC diameter on average was in the second premolar tooth in women 30-50 years (1.80 ± 0.37 mm), and the highest diameter on average was the distal root of the third molars in men 30-50 years (2.75 ± 0.54 mm). Over all, the MC diameter had a similar pattern in both sexes and three age groups from posterior to anterior. So that, the diameter was higher in posterior and it was reduced with a gentle slope to the anterior area (Figure 4).

The area between premolars was the most common site for the presence of mental foramen on the right (69.6%) and left (62.3%) side. Then, the second premolar apex, distal of second premolar and first premolar apex were located, respectively. 197 patients (95.2%) had anterior loop on both sides, in which, it was found that age and gender have no significant effect on the presence of loop and mental foramen position. In incisive canal examinations, it was observed that the average canal diameter on the last visible point was 1.12 ± 0.31 mm and 1.06 ± 0.28 mm on right and left side respectively. The most common area on the last point of view for incisive canal, according to its frequency, was on the right (60.4%) and left (61.4%) side between the first premolar and canine. After that, there was an area between the canine and lateral teeth. In both sides lateral incisor apex, was the lowest region to end its canal. Also, no relationship was observed between age and sex with incisive canal diameter and its location (Table 2).

Secondary findings from this study showed that 11 patients had bifid canal, in which 3 cases had two bifid canals on both sides. When this occurred the closest MC to the cortical plates was used for measurements. 12 patients had accessory mental foramen, in which 4 cases had multiple mental foramen on both sides. The MC course was started from an area near the lingual plate of posterior mandibular teeth and in the second premolar tooth reached to the mid bucco-lingual plate. In the vertical dimension, canal was closer to the posterior teeth roots than inferior cortex. Regardless of age and sex, there was no significant difference between all measured distances in the left and right sides (Figure 5).

Table 1: The prevalence and rate of incisive canal at the last visible point according to gender and position

Total	Left		Right			Dental area
	Male	Female	Total	Male	Female	
127 61/4%	63 64/9%	64 58/2%	125 60/7%	55 56/7%	70 64/2%	Between 3-4
44 21/1%	20 20/6%	24 21/8%	49 23/8%	25 25/8%	24 22/0%	Between 3-2
26 12/6%	10 10/4%	16 14/5%	25 12/1%	13 13/3%	12 11/0%	Apex 3
2 1/0%	1 1/0%	1 1/0%	4 1/9%	2 2/1%	2 1/8%	Apex 4
6 2/9%	1 1/0%	5 4/5%	3 1/5%	2 2/1%	1 1/0%	Apex 2
2 1/0%	2 2/1%	0 0/0%				Between 1-2

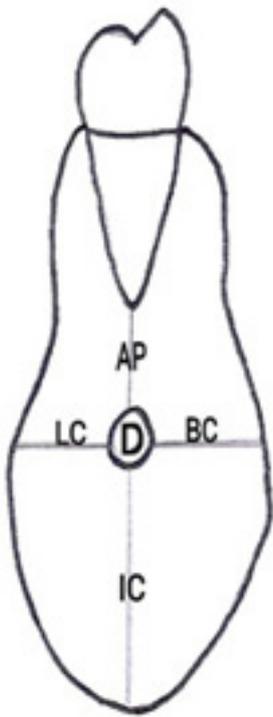


Figure 1: measurements in posterior teeth roots area in Cross-sectional view, D: MC diameter, AP: distance from root apex to superior border of MC, IC: distance from inferior border of MC to mandibular inferior border, BC: distance from MC to buccal cortical border, LC: distance from MC to lingual cortical border

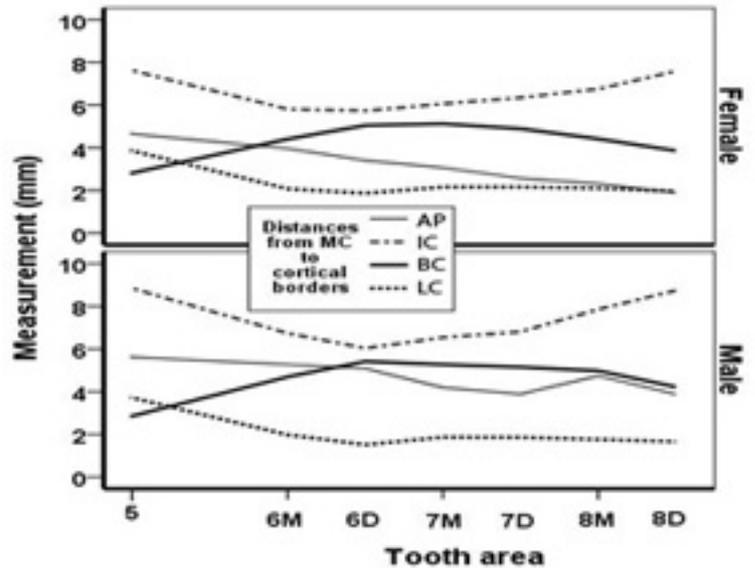


Figure 2: The path of measurements according to gender

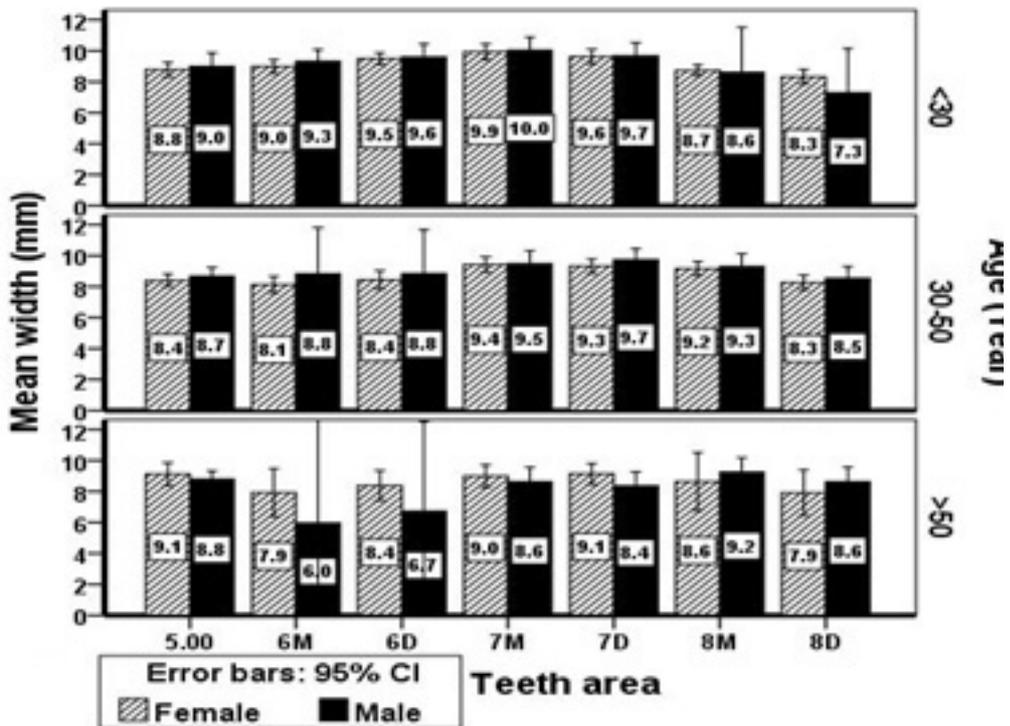


Figure 3: The mandibular width in MC area of posterior teeth according to age and gender

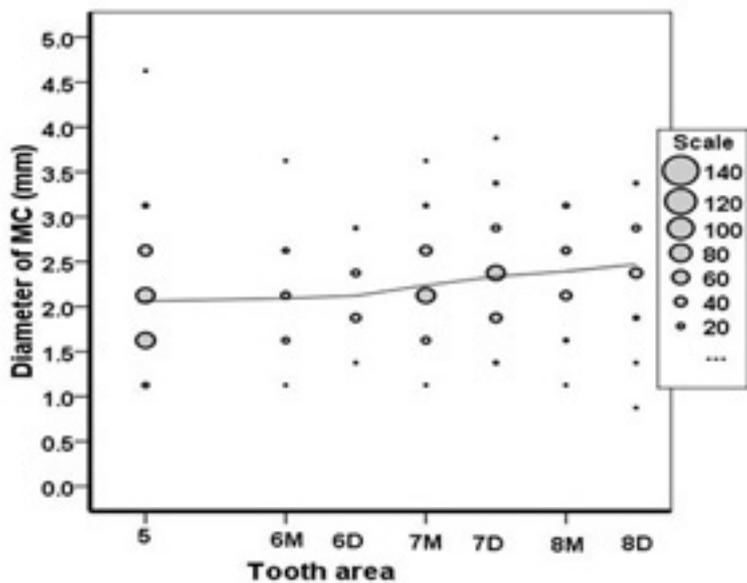


Figure 4: The mandibular canal diameter in posterior teeth

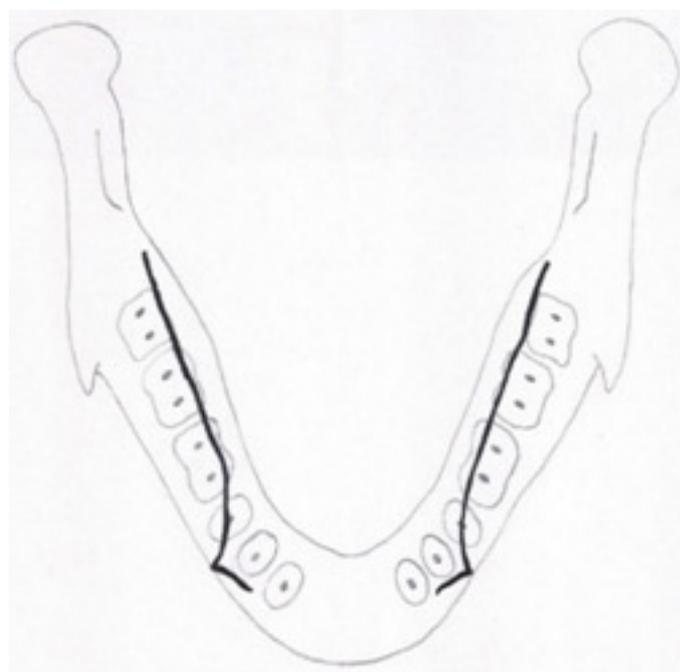


Figure 5: The course of MC in horizontal schematic view

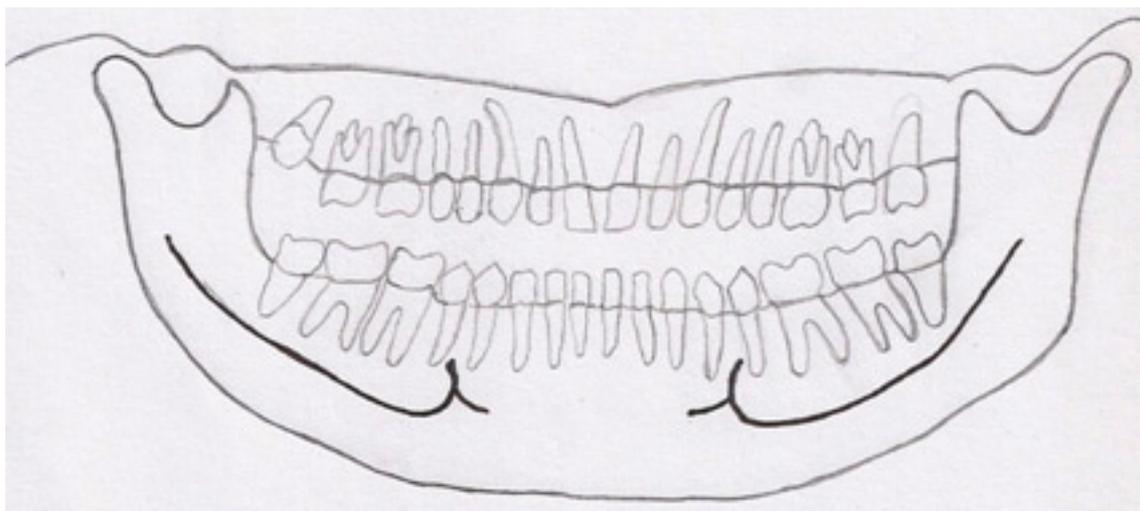


Figure 6: The course of MC in schematic panoramic view

W		LC		BC		IC		AP		
Male	Female									
8.41±1.52 n=31	8.25±1.09 n=51	1.66±0.77 n=31	1.95±1.07 n=51	4.22±1.23 n=31	3.86±1.01 n=51	8.74±2.05 n=31	7.59±2.18 n=51	3.88±2.98 n=31	1.88±2.98 n=51	D8
9.18±1.49 n=31	8.89±1.03 n=51	1.76±0.67 n=31	2.10±0.96 n=51	4.98±1.30 n=31	4.41±1.07 n=51	7.58±2.13 n=31	6.75±1.97 n=51	4.37±2.77 n=31	2.31±2.80 n=51	M8
9.32±1.64 n=48	9.38±1.37 n=90	1.85±0.76 n=48	2.16±0.81 n=90	5.15±1.30 n=48	4.89±1.35 n=90	6.81±2.36 n=48	6.35±1.47 n=90	3.88±2.66 n=48	2.57±1.79 n=90	D7
9.38±1.70 n=48	9.51±1.52 n=90	1.86±0.76 n=48	2.15±0.79 n=90	5.27±1.36 n=48	5.27±1.50 n=90	6.35±2.20 n=48	6.06±1.32 n=90	4.19±2.56 n=48	3.06±0.37 n=90	M7
9.03±1.58 n=17	9.03±1.09 n=46	1.51±0.66 n=17	1.86±0.72 n=46	5.41±1.32 n=17	5.04±1.15 n=46	6.03±1.68 n=17	5.73±1.24 n=46	5.08±2.16 n=17	3.40±1.72 n=46	D6
8.81±1.64 n=17	8.58±1.09 n=46	1.97±0.94 n=17	2.07±0.75 n=46	4.69±1.29 n=17	4.40±1.14 n=46	6.74±1.77 n=17	5.80±1.28 n=46	5.27±2.35 n=17	3.96±1.96 n=46	M6
8.76±1.55 n=82	8.67±1.58 n=124	3.71±1.36 n=82	3.85±1.23 n=124	2.85±1.13 n=82	2.81±1.08 n=124	8.84±2.04 n=82	7.62±1.70 n=124	5.61±2.33 n=82	4.64±2.22 n=124	5

Table 2: The prevalence and rate of incisive canal at the last visible point according to gender and position

Discussion

The results of this study on the distance of MC from posterior teeth roots showed that the distal root of third molar was the closest root to canal, so that, the average distance between the left and right sides was 2.88 and 2.49 mm, respectively. By moving towards the anterior area, the canal gets farther away from posterior teeth apex, so that, the average distance of mesial root of the first molar on the left and right sides was, 3.96 to 4.64 mm, respectively. Fewer studies were performed to examine the distance of the third molars roots from MC, and most studies in this field only tried to examine the canal course in the impacted and unerupted third molar area (19, 20). Chong et al. on 272 second mandibular molars, reported that in 55% of cases, the distance between the root apex and inferior alveolar nerve was less and equal to 3 mm, which is close to the results of this study (21). Simonton in a study reported that the distance of MC from mesial root of first molar was 4.9 mm in women and 6.2 mm in men, which is closely consistent with the results of this study (22).

In this study, MC distance from the inferior mandibular cortex in the distal root of third molar area was 7.52 to 8.41 mm on the right and left sides respectively, and this distance decreased gradually by moving forward to the mesial root of first molar and increased again in the premolar area. Rajchel et al. in a study on cadavers reported that this distance was mm10 in the third molar area (23); with respect to the fact that mandibular form vary in different people and in different age ranges, so the differences in measurement seems normal. Also in this study, it was observed that MC was closer to the apex of posterior teeth rather than the inferior mandibular cortex. Sato in a study on panoramic images indicated that the MC course in the vertical dimension was closer to the apex of first and second molars rather than inferior mandibular cortex (24).

The MC distance from buccal and lingual cortical borders, it was observed that distal root of third molar was the closest root to lingual plate and the second premolar tooth was the closest root to buccal plate. The average distance of MC to the lingual cortical plate in the distal root of third molar was 1.64 and 1.98 mm on the right and left sides, respectively. In Rajchel's study, the canal in the third molar area had approximately 2mm distance from the lingual plate, which is very close to our results (23). In the present study the average distance of MC from buccal cortex in the mesial root of the first molar was 4.44 and 4.53 mm on the right and left sides, respectively. Leith et al. in a study on 157 CBCT images of patients with a mean age of 48 years, this distance was 4.4 mm in 75% of cases, which is very close to the results of this study (5).

For the MC diameter, it was observed that the average minimum and maximum canal diameter was 1.80 and 2.75mm in second premolar and the distal root of third molar, respectively. Canal diameter from the posterior to the anterior decreased with a gentle slope. Rajchel demonstrated that when proximal to the third molar, MC diameter was 2 to 2.4 mm. on measurements obtained from 105 mandibular cadavers; Obradovic et al. also found that the mean MC diameter in its horizontal part was 2.6 mm, which is closely consistent with these results (23). One of the common but inadvertant complications in the anterior mandible during implant placement is neurosensory alteration. Mental foramen shows many anatomical variations in shape, size and position. In the present study, 95.2% of patients had anterior loop and the area between premolars on both sides was the most common site for that. Investigations that compared radiographic and cadaveric dissection data with respect to identifying the anterior loop reported that radiographic assessments result in a high percentage of false-positive and false-negative findings (25).

Perhaps these varied results may be attributed to different criteria used to define the anterior loop and dissimilar diagnostic techniques. Arzouman showed 92 to 96% of direct measurements on cadavers had detected anterior loop, while only 56 to 76 % of the panoramic machines showed the loop (25). With regard to the mental foramen, apex of the second premolars or the area between premolars have been reported as the most common site for that. In the study by Haqhanifar et al. on panoramic images, the area between premolars was the most common area for mental foramen, which is consistent with the results of this study (14).

The mean incisive canal diameter in the last visible point was 1.12 ± 0.31 mm on the right and 1.06 ± 0.28 mm on the left side. Jacobs et al. examined 230 spiral CT where the incisive canal was identified in 93% of the cases, and they reported the average inner diameter was 1.1 mm, which is consistent with our results (25).

For assessing the amount of incisive branch progression, an area between the first premolar and canine teeth was observed as the most common visible area for that on both sides. Most studies have investigated quantitative measures of incisive nerve length and there is no study that has tried to investigate the progression level of the canal compared to other surrounding anatomic structures. Mardinger et al. have examined anatomical and radiographic course of incisive canal in 46 cadaver mandibles, they found that the canal walls in some cases were complete, some incomplete and in others without corticated limits. They concluded that there are correlations between the anatomical structure and visible radiographic limits (26). The visibility or invisibility of incisive canal largely depends on racial differences, radiologists' experiences and radiographic technique. Pieres et al. showed that the incisive canal is better seen in CBCT images rather than panoramic radiography. They reported the average length of incisive canal was about 7 ± 3.8 mm (27). This distance is almost where the mandibular canine apex can be placed. The results of this study are very close to our results.

For the assessment of gender effect on the measured distances, it was found that the overall pattern of MC course was similar in both genders, but in general women have lesser distances than men, which is consistent with results of other studies in this domain (22, 28). About the influence of age on the measured points, it was observed that the average distance of MC from root apex and from the lower mandibular border was significantly less in under 30 years than other age groups; Given that skeletal growth in these patients is not yet complete, this result is justified. It was also observed that in patients over age 50, bone width was slightly less than other age groups, and according to the first molar was the most missing tooth in this age group; reduced bone width was more evident in this area. Simonton et al. have also reported reduced bone width in patients in their 50s-60s (22). Perhaps the rationale reason is that older patients have generally less bone mass than the younger age groups.

It should be mentioned, CBCT images in horizontal and vertical planes can help in the examination of the MC course, because the canal can pass different courses in each view for different patients. Anderson et al. in a study on panoramic radiographs found that the MC may slowly come down from anterior to posterior or have a gentle progressive curve, or even a combination of these two (23). Also, in the horizontal plane the canal course extends from lingual to the buccal border, which in most cases, the canal in the first molar area is in the middle distance between the bucco-lingual plates (23). In the present study, the second premolar apex was located in the middle of bucco-lingual plates; given that in this study, the most common area for mental foramen was between premolar teeth, it is justified. As Simonton said that as the mental foramen became more distally positioned, the MC became more buccally located within the mandible, and in relation to the roots of the mandibular first molar (22).

This study was conducted on adult patients most images taken due to the replacement of single edentulous area and there are a few studies that tried to examine the relationship between canal and all mandibular posterior teeth by CBCT imaging, and this is one of the salient points of this study. However, given that in this study, measurements were performed on patients with partial and complete tooth, and classification of the age groups needed more details, this limitation cannot be forgotten. It is recommended to perform further investigation with a greater sample size with complete teeth and considering panoramic and CBCT images can have many clinical benefits during surgical procedures in this area. The appropriate sensitivity and specificity of CBCT in the detection of these alterations reinforces its use in oral and maxillofacial radiology, and since the bone dimensions are not fixed in one's life, providing CBCT before surgery is necessary.

Conclusion

According to this study an important consideration in pre-surgical planning is that the measurements obtained from a CBCT scan will not stay constant throughout a person's lifetime, and a current CBCT might be recommended before surgical treatment. Collectively these data indicate that both age and gender have a marked effect on anatomic relationship and should be considered in pre-surgical treatment.

References

1. Main Q, Yaxiong L, Ling W, Jiankang H, Ming X, Chengge H. Design and optimization of the fixing plate for customized mandible implant. *J CMFS*. 2015 DOI: org/10.1016/i.icmfs. 20150060003
2. Schneider T, Filo K, Kruse AL, Locher M, Gratz KW, Lubbers HT. Variations in the anatomical positioning of impacted mandibular wisdom teeth and their practical implications. *J Research and Science*. 2014; 5: (124): 520-529.
3. Torres A, Jacobs R, Lambrechts P, Brizuela C, Cabera C, Concha G et al. Characterization of mandibular molar root and canal morphology using cone beam computed tomography and it's variability in Belgian and Chilean samples. *J Imaging science in dentistry*. 2015; 45: 95-101
4. Khojastepour L, Mirbeigi S, Mirhadi S, Safaee A. Location of mental foramen in a selected Iranian population: a CBCT assessment. *Iranian Endodontic journal*. 2015; 10(2): 117-21
5. Leite MF, Lana JP, Machado VC, Manzi FR, Souza PEA, Horta MCR. Anatomic variations and lesions of the mandibular canal detected by cone beam computed tomography. *J SurgRadiol Anat*. 2013; DOI: 10.1007/s 00276-013-1247-5
6. Tyler K, Mansur A, Walter RB. Proximity of the mandibular canal to the tooth apex. *JOE*. 2011; 37: 311-315
7. Yoshioka I, Tatsuro T, Khanal A, Habu M, Kito S, Kodama M, et al. Relationship between inferior alveolar nerve canal position at mandibular second molar in patient with prognathism and possible occurrence of neurosensory disturbance after saggital split ramus osteotomy. *J Oral Maxillofacial Surg*. 2010; 68: 3022-27
8. Orhan K, Aksay S, Bilecenoglu B, Sakul UB, Paksoy CS. Evaluation of bifid mandibular canals with cone-beam computed tomography in Turkish adult population: a retrospective study. *J SurgRadiol Ant*. 2011; 33: 501-7
9. Kyoung YS, Kim S, Kang SG, Kim JH, Lim KO, Hwang SI et al. Morphological assessment of the anterior loop of the mandibular canal in Koreans. *J Anatomy and Cell Biology*. 2015; DOI: Org/10.5115/acb.2015.48.1.75
10. Kim TS, Caruso JM, Christensen H, Torabinejad M. A comparison of cone-beam computed tomography and direct measurement in the examination of the mandibular canal and adjacent structures. *JOE*. 2010; 36: 1191-94
11. Angel JS, Mincer HH, Chaudhry J, Scarbecz M. Cone-beam computed tomography for analyzing variations in inferior alveolar canal location in adults in relation to age and sex. *J Forensic Sci*. 2011; 56(1): 216-19
12. Levin MH, Goddard AL, Dodson TB. Inferior alveolar nerve canal position: a clinical and radiographic study. *J Oral Maxillofacial Surg*. 2007; 65(3): 470-90
13. Yun X, Ning S, Xiufen T, Fei L, Guangxin Z, Xiaoran L et al. Anatomic study on mental canal and incisive nerve canal in interforaminal region in Chinese population. *J SurgRadiol Ant*. 2014; DOI: 10.1007/s00276-014-1402-7
14. Haghanifar S, Rokouei M. Radiographic evaluation of mental foramen in a selected Iranian population. *J Indian Jur of Dent Research*. 2009; 20: 150-52
15. Green RM. The position of the mental foramen: a comparison between the southern (Hong Kong) Chinese and other ethnic and racial groups. *J Oral Surg Oral Med Oral Pathol*. 1987; 63(3): 287-90
16. Guo JL, Su L, Zhao JL, Yang L, Lv DL, Li YQ et al. Location of mental foramen based on soft and hard tissues landmarks in a Chinese population. *J Craniofac Surg*. 2009; 20(6): 2235-37
17. Santini A, Alayan I. A comparative anthropometric study of the position of the mental foramen in three populations. *Br Dent J*. 2012; 212(4): E7
18. Santini A, Land M. A comparative of the position of the mental foramen in Chinese and British mandibles. *ActaAnat J*. 1990; 137(3): 208-12.
19. Dalili Z, Mahjoub P, Khalighi AS. Comparison between cone beam computed tomography and panoramic radiography in the assessment of the relationship between the mandibular canal and impacted class c mandibular third molars. *J Dental Research*. 2011; 8(4): 203-210
20. Jung YH, Nah KS, Cho BH. Correlation of panoramic radiographs and cone beam computed tomography in the assessment of a superimposed relationship between the mandibular canal and impacted third molars. *J Imaging Science in Dentistry*. 2012; 42:121-7
21. Chong BS, Quinn A, Pawar RR, Makdissi J, Sidhu Sk. The anatomical relationship between the roots of mandibular second molars and the inferior alveolar nerve. *J International Endodontic*. 2014; DOI:10.1111/iej.12348
22. Simonton JD, Azevedo B, Schindler WG, Hargreaves KM. Age and gender related differences in the position of the inferior alveolar nerve by using cone beam computed tomography. *JOE*. 2009; 35(7):944-49
23. Joudzbalys G, Wang HL, Sabalys G. Anatomy of mandibular vital structures. Part II : Mandibular canal and inferior neurovascular bundle in relation with dental implantology. *J Oral Maxillofac Res*.2010;DOI:10.5037/jomr.2010.1102
24. Sato I, Ueno R, Kawai T, Yosue T. Rare courses of the mandibular canal in the molar regions of the human mandible: a cadaveric study. *J Okajimas Folia AnatJpn*. 2005; 82(3):95-101. DOI:10 2535/ ofaj. 82.95
25. Joudzbalys G, Wang HL, Sabalys G. Anatomy of mandibular vital structures. Part II: Mandibular incisive canal, mental foramen and associated neurovascular bundles in relation with dental implantology. *J Oral Maxillofac Res*.2010; DOI:10.5037/jomr.2010.1103
26. Mardinger O, Chaushu G, Arensburg B, Taicher S, Kaffe I. Anterior loop of mental Canal: an anatomical – Radiologic Study. *Implant Dent*. 2009; 9(2): 120-5.
27. Pieres CA, Bissada NF, Becker JJ, Kanawati A, Landres MA. Mandibular Incisive Canal: Cone Beam Computed Tomography. *Clin Implant Dent Relat Res*. 2009 Aug6; Dol:10.1111j.1708-8208. 2009.00228.n
28. Adiguzel O, yigit-ozler S, Kaya S, Akkus Z. Patient specific factors in the proximity of the inferior alveolar nerve to the tooth apex. *J Med Oral Pathol Oral Cir Bucal*. 2012; Dol:10.4317/medoral.18190

The role of Astronomy education in daily life

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Abstract

This research has been done in the interests of preparing a thorough guidance curriculum for astronomy education in secondary educational level. So the present research has a developmental goal and methodologically it has been done by diacritical analytical method. It has been devised according to the culture and civilization of Islam and proportionate to the daily needs of modern world science in order to be able to explore future scientific, economical and social needs. We are faced with these four elements on the cultural, religious and educational level in this study too. So the present study tries to interpret the commercial situation of astronomy, religious culture and curriculum. For data gathering we used library and documental techniques in this research. The used documents include finished project reports, articles, books, theses, national curriculum and finally basic evolution of the educational system in the Islamic Republic of Iran. Meanwhile the most important concluding findings are the creation of preparations for the needed science for the compilation of astronomy affecting daily life with the other curriculum.

Key words: Astronomy education, daily life, curriculum Guidance, secondary.

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Introduction

Throughout History humans have looked to the sky to navigate the vast oceans, to decide when to plant their crops and to answer questions of where we came from and how we got here. It is a discipline that opens our eyes, gives context to our place in the Universe and that can reshape how we see the world. When Copernicus claimed that Earth was not the centre of the Universe, it triggered a revolution. A revolution through which religion, science, and society had to adapt to this new world view.

Astronomy has always had a significant impact on our world view. Early cultures identified celestial objects with the gods and took their movements across the sky as prophecies of what was to come. We would now call this astrology, far removed from the hard facts and expensive instruments of today's astronomy, but there are still hints of this history in modern astronomy. Take, for example, the names of the constellations: Andromeda, the chained maiden of Greek mythology, or Perseus, the demi-god who saved her.

Now, as our understanding of the world progresses, we find ourselves and our view of the world even more entwined with the stars. The discovery that the basic elements that we find in stars, and the gas and dust around them, are the same elements that make up our bodies has further deepened the connection between us and the cosmos. This connection touches our lives, and the awe it inspires is perhaps the reason that the beautiful images astronomy provides us with are so popular in today's culture.

There are still many unanswered questions in astronomy. Current research is struggling to understand questions like: "How old are we?", "What is the fate of the Universe?" and possibly the most interesting: "How unique is the Universe, and could a slightly different Universe ever have supported life?" But astronomy is also breaking new records every day, establishing the furthest distances, most massive objects, highest temperatures and most violent explosions. Pursuing these questions is a fundamental part of being human, yet in today's world it has become increasingly important to be able to justify the pursuit of the answers.

Although we live in a world faced with the many immediate problems of hunger, poverty, energy and global warming, we argue that astronomy has long term benefits that are equally as important to a civilized society. Several studies have told us that investing in science education, research and technology provides a great return, not only economically, but culturally and indirectly for the population in general, and has helped countries to face and overcome crises. The scientific and technological development of a country or region is closely linked to its human development index, a statistic that is a measure of life expectancy, education and income (Truman, 1949).

There are other works that have contributed to answering the question "Why is astronomy important?" More recently, C. Renée James wrote an article outlining the recent technological advances that we can thank astronomy for, such as GPS, medical imaging, and wireless internet (Renée James, 2012). In defence of radio astronomy, Dave Finley in Finley (2013) states, "In sum, astronomy has been a cornerstone of technological progress throughout history, has much to contribute in the future, and offers all humans a fundamental sense of our place in an unimaginably vast and exciting universe."

Astronomy and related fields are at the forefront of science and technology; answering fundamental questions and driving innovation. It is for this reason that the International Astronomical Union's (IAU) strategic plan for 2010–2020 has three main areas of focus: technology and skills; science and research; and culture and society (International Astronomical Union, 2012).

Although "blue-skies research" like astronomy rarely contributes directly with tangible outcomes on a short time scale, the pursuit of this research requires cutting-edge technology and methods that can on a longer time scale, through their broader application make a difference.

A wealth of examples show how the study of astronomy contributes to technology, economy and society by constantly pushing for instruments, processes and software that are beyond our current capabilities. The fruits of scientific and technological development in astronomy, especially in areas such as optics and electronics, have become essential to our day-to-day life, with applications such as personal computers, communication satellites, mobile phones, Global Positioning Systems, solar panels and Magnetic Resonance Imaging (MRI) scanners.

Several reports in the US (National Research Council, 2010) and Europe (Bode et al., 2008) indicate that the major contributions of astronomy are not just the technological and medical applications, but a unique perspective that extends our horizons and helps us discover the grandeur of the Universe and our place within it. On a more pressing level, astronomy helps us study how to prolong the survival of our species. For example, it is critical to study the Sun's influence on Earth's climate and how it will affect weather, water levels etc. Only the study of the Sun and other stars can help us to understand these processes in their entirety. In addition, mapping the movement of all the objects in our

Solar System, allows us to predict the potential threats to our planet from space.

Educating on astronomy

Astronomy has always had a significant impact on our world view. Early cultures identified celestial objects with the gods and took their movements across the sky as prophecies of what was to come. We would now call this astrology, far removed from the hard facts and expensive instruments of today's astronomy, but there are still hints of this history in modern astronomy. Take, for example, the names of the constellations: Andromeda, the chained maiden of Greek mythology, or Perseus, the demi-god who saved her. Now, as our understanding of the world progresses, we find ourselves and our view of the world even more entwined with the stars. The discovery that the basic elements that we find in stars, and the gas and dust around them, are the same elements that make up our bodies has further deepened the connection between us and the cosmos. This connection touches our lives, and the awe it inspires is perhaps the reason that the beautiful images astronomy provides us with are so popular in today's culture. There are still many unanswered questions in astronomy. There are other works that have contributed to answering the question "Why is astronomy important?" Dr. Robert Aitken, director of Lick Observatory, shows us that even in 1933 there was a need to justify our science, in his paper entitled *The Use of Astronomy* (Aitken, 1933). His last sentence summarizes his sentiment: "To give man ever more knowledge of the universe and to help him 'to learn humility and to know exaltation', that is the mission of astronomy." More recently, C. Renée James wrote an article outlining the recent technological advances that we can thank astronomy for, such as GPS, medical imaging, and wireless internet (Renée James, 2012). In defence of radio astronomy, Dave Finley in Finley (2013) states, "In sum, astronomy has been a cornerstone of technological progress throughout history, has much to contribute in the future, and offers all humans a fundamental sense of our place in an unimaginably vast and exciting universe."

Shekarbaghani et al (2009) on the feasibility of astronomy education based on Islamic culture and civilization in general and secondary education, favorable conditions for the study of astronomy education, the situation in the various sectors of education, ground for the implementation of the astronomy education in all countries, the global challenges and astronomy education program were examined. According to the findings of this study, the best method for the teaching of astronomy in schools is to utilize various departments of the Ministry of Education, including the Institute for the Intellectual Development of Children and Young Adults and research centre which should be equipped with the various tools which are necessary for Astronomy education for students. Using the capabilities of the private sector, including astronomy Amateur, Astronomy Association and the Association for the training courses will help in the shortest possible time to provide astronomical education for the students of the country. In survey research facilities, student research center we

found that, there are many films on astronomy education, replicas, posters, maps and an astronomical atlas of the night sky, are available from which many of them are taken and distributed by amateur astronomy associations. Zühtü Okulu et al (2009), show that applied education of Astronomy in civilized life is one of the important goals. It means that this process can be used for identifying Astronomy and the goals of Astronomy education. It means that there is an answer for the other question in this research.

Krumenaker (2009), looked at fully independent, self-contained astronomy courses available to students in grades 9-12, with the mixed-methods study. Therefore, courses, such as physics or earth science, that contain some astronomy units were not considered in this study. The data came from high school astronomy teachers via a survey available to them on a Webpage and as a Word file. The study mirrored but greatly enlarged the scope of the Sadler study. Quantitative and categorical questions included diverse topics such as instructors' back-grounds, planetarium and telescope availability, financial support, course content, student demographics, school AYP status, and other items. Also included were open-ended survey questions, such as requests for recommendations about ways to go about starting a course, and these responses were coded and treated with qualitative or quasi-quantitative analyses.

- Alvandi(2010) studied the evolution of astronomy education in Iran from Dar ul-Funun up to now. Findings from this study indicate that: the population of the study consisted of 1,090 volumes of books on the topics of physics, geography, geology and geometry. Of these, 363 were selected for the sample as a sample of the 7 was not available in the archives of 356 cases that were analyzed. In addition, the entire collection of books at Dar-Al fonon school, also were added, including 15 titles: "7 titles in Physics, 4 as geometry, 2 as geography and 2 as knowledge of the earth (geology)", with the description of the sample population of this study being 386 titles. The present collection of textbooks may all be relevant. These studies revealed that the titles of textbooks in the discussion on astronomy education firstly depended on the largest share of physics and secondly geography in Iran.

- Shekarbaghani(2010) did a Comparative study of Astronomy education between Iran and the target countries to study astronomy education programs in order to provide various and appropriate benchmarks in the field to provide full coverage. This is included in the findings of the final report of the project:

- The United States of America is one of the target countries in this comparative study. In the United States, in the context of science education standards, programs are intended for astronomy education in school. It is clearly defined as to what kind of educational content should be understood by students in these standards and what kind of process skills in the different age levels determined need to be learned. These standards allow the educational

system to use the content of astrophysics and astronomy to improve the conception and learning of the students. One of the other countries in this comparative study for astronomy education is the United Kingdom. The Curriculum of the school pays attention to the students' expertise so at the first per subject there are some activities for training of experts, knowledge and conception for the use of science and then these experts and this awareness is articulated in separate content. There are also universities in Australia who specialise in these fields and one provides graduate students (PhD) for places at NASA.

Turkey is one of the other chosen countries for this comparative study about Astronomy education. By educational re-organization in Turkey in 2005-2006, the Intermediate level of education increased from three years to four. In this framework intermediate level is related to 14-17 years old students. The goals of intermediate level in Turkey are "to present the public culture to the students, to make the students familiar with the individual and societal problems. Problem solving education, increases their awareness for promoting participation in the socio-cultural development in the country, prepare students for higher and expert education and their life and business according to their interests and experts."

China is the other member of this comparative study. The knowledge of astronomy has a rapid development in this country since 1977. thus in this country mass media like radio and television uses like heavens showers since the knowledge of astronomy to be known and famous. Astronomy present as physics and Geography in Chinese high schools. In the last year of high school a subject like the knowledge of the earth and the sky combined in Geography.

Our comparative study has another members in the name of Malaysia. There is no separate lesson as Astronomy in this country's curriculum most of this educational content is presented in Physics. Of course Geography does feature it in its Curriculum too. Of course in Malaysian schools Curriculum Quality is more important than quantity.

Indian educational system does not have a special curriculum for Astronomy education. Astronomical subjects present in physics at grade 11 and 12 at high school too in order to create a suitable conception about the nature and material. Specifically some lessons in Astronomical education have been presented in Physics books of grade 11 at high school.

Since in the school of our country there is no effort to present Astronomy education. Astronomy curriculum education is limitedly present at secondary school. Most of the teachers are employed in one of the main branch of natural sciences so they are not able to teach the subjects of Astronomy curriculum (Shekarbaghani, 2014, Casey & Slater, 2003).

Ahmadi (2011) did a survey of science, physics, geography, geology and mathematic according to the general and

intermediate level and provided a suitable framework. Astronomy education for general and intermediate level according to Iranian culture has been surveyed in this research. Then a suitable framework according to the educational level has been created. We can use it for examining the structure and organizing the content of Astronomy education. It provides, as such an answer to one of the questions of the present research.

In the past few years, the Philippines have been gradually developing their research and educational capabilities in astronomy and astrophysics. In terms of astronomy development, it is still lagging behind several neighboring Southeast Asian countries such as Indonesia, Thailand and Malaysia, while it is advanced with respect to several others. One of the main issues hampering progress is the scarcity of trained professional Filipino astronomers, as well as long-term visions for astronomy development. Here, we will be presenting an overview of astronomy education and research in the country. We will discuss the history and current status of astronomy in the Philippines, including all levels of education, outreach and awareness activities, as well as potential areas for research and collaborations. We also discuss issues that need to be addressed to ensure sustainable astronomy development in the Philippines. Finally, we discuss several ongoing and future programs aimed at promoting astronomy research and education. In essence, the work is a precursor of a possible white paper which we envision to submit to the Department of Science and Technology (DOST) in the near future, with which we aim to further convince the authorities of the importance of astrophysics. With the support of the International Astronomical Union (IAU), this may eventually lead to the creation of a separate astronomy agency in the Philippines (Sese, et al, 2015).

The past several years have presented the astronomy education research community with a host of foundational research dissertations in the teaching and learning of astronomy. These PhD candidates have been studying the impact of instructional innovations on student learning and systematically validating astronomy learning assessment instruments (Slater, 2008).

For over 40 years, the international astronomy education community has given its attention to cataloging the substantial body of "misconceptions" in individual's thinking about astronomy, and to addressing the consequences of those misconceptions in the science classroom. Despite the tremendous amount of effort given to researching and disseminating information related to misconceptions, and the development of a theory of conceptual change to mitigate misconceptions, progress continues to be less than satisfying. An analysis of the literature and our own research has motivated the CAPER Center for Astronomy & Physics Education Research to advance a new model that is allowing us to operate on students' astronomical learning difficulties in a more fruitful manner. Previously, much of the field's work discarded erroneous student thinking into a single construct, and from that basis, curriculum developers and instructors addressed student

misconceptions with a single instructional strategy. In contrast this model suggests that "misconceptions" are a mixture of at least four learning barriers: incorrect factual information, inappropriately applied mental algorithms (e.g., phenomenological primitives), insufficient cognitive structures (e.g., spatial reasoning), and affective/emotional difficulties. Each of these types of barriers should be addressed with an appropriately designed instructional strategy. Initial applications of this model to learning problems in astronomy and the space sciences have been fruitful, suggesting that an effort towards categorizing persistent learning difficulties in astronomy beyond the level of "misconceptions" may allow our community to craft tailored and more effective learning experiences for our students and the general public (Slater et al, 2015).

Research Questions

According to the mentioned goals the mentioned plan would answer the following questions:

- 1) What are the goals of astronomy education affecting everyday life?
- 2) What is the total guidance of the Astronomy education affecting everyday life?

Research Method

Documentary method has been used for data gathering in the present research. Particularly, superior finished reports of projects, papers, books, thesis, international documents and plans have been used in this research.

Some of the used resources are as follows:

- English and Persian books about the curriculum and education of Astronomy. Data sites about education and curriculum of Astronomy.
- Informational sites about the curriculum and education of Astronomy is needed.
- Educational books of schools about Astronomy measuring
- Superior documents include the fundamental evolution documentary of education in the Islamic Republic of Iran (IRI) and national educational curriculum of IRI.
- National reports of universal reports in curriculum and education of Astronomy
- The results of four finished research studies with the below contents(which in fact the present research is related to them):

1. Feasibility measuring of Astronomy education founded on the Islamic culture and civilization in general and intermediate educational level.
2. The comparative study of Astronomy education for Islamic republic and the goals countries require.
3. The survey and reinvestigation of the educational books like science, geography, geology and mathematics in the light of the education of Astronomy and to present the appropriate framework. Survey the evolutionary process of Astronomy education from Dar ul-Funun that has been studied up to now. We have the expert's opinion about the elements of Astronomy education and still require guidance for astronomy education. In fact the questions of

the research have been answered by description, analysis and interpretation of the named documentation. The prepared educational guidance for the education of Astronomy has been validated by the questionnaire which is filled out by the teachers of physics and the other various lessons which are related to Astronomy (Shekarbaghani: 2014).

The Guidance of the Curriculum and education of Astronomy framework

The framework of the Astronomy curriculum for intermediate level includes the books which are obtained from the literature of the research. This framework shows the theoretical elements of curriculum. Its framework shows the general directions of curriculum for astronomy and it is a source for guidance, preparation and preparing the curriculum of Astronomy for intermediate levels. Teaching plan and educational designation for education of Astronomy has been prepared according to Islamic culture and civilization. We will present a sample of designated lessons of astronomy. Also we prepared this issue based on the Islamic culture and civilization and it is related to the concepts of the geography book of the first grade of the intermediate course.

The name of the lesson: **Astronomy**

Lesson: Geography

Educational concepts: "Qiblah" (direction to which Mohammedans turn in praying) and "Qiblah" finding

The goals of lesson:

Pay attention to the sky and investigating in it at night

How to look at the sky and register your observations?

Pay attention to shining direction of the sun for "Qiblah" finding.

Teaching time: 100 minutes during a sunny day (teaching expert 20', learning activities 50', assignment, asking and answering questions 10' minutes, evaluating 10').

Addressees: The students of grade one in intermediate level, girls/boys.

Activity format: Individual and collective (students divide to different groups with five members and start their activity. A group will inform the students who are interested in individual activities). Initiation of teaching skills (laying the groundwork and establish the learning situation): This skill begins with questioning and answering. Teacher asks his/her students about the class about the "Qiblah" situations in different locations, and then provides a conclusion for these answers. After that the student should be driven to the school courtyard and by doing collective and individual activities learn how to place the "Qiblah" direction.

The validation of the curriculum of Astronomy Guidance

Researcher built questionnaire (consists of thirteen closed questions) has been used for validation of the gained elements. Realities of this questionnaire confirmed by content validation which is done by the subjective experts consulting group.

At first a brief quality of surveyed elements which are needed to be assembled as the suggested curriculum of astronomy would be sent to the selected teachers (before

they answer the questions, for their familiarity with the elements of the suggested curriculum). In fact we tried to account for the validation of these elements via this.

Then we asked them to study the curriculum carefully and after that to answer the questions. For doing this we gave out 50 questionnaires to 50 teachers.

We gathered all 50 questionnaires. Thus the final version prepared by the teachers' answers to the questions (by using the analytical method for the presented answers according to the guidance of curriculum). For surveying the reliability of the questions we use Cronbach coefficient equal to 0.708.

Briefly the general curriculum of astronomy had been prepared by this way:

1. To understand the theoretical fundamental and conceptual framework of the astronomy curriculum attitudes and the universal experiences for the education of Astronomy.
2. Gathering the needed data in the area of the guidance of the curriculum of Astronomy and to study the previous plans which have been done in IRI.
3. Adding up the field data and to survey prerequisites for preparing the general curriculum for education of astronomy and to survey the upper documents like the document of national curriculum of natural sciences which includes Astronomy; and to answer the questions of the research for assigning philosophy, goals and attitudes of Astronomy education.
4. Assigning the offering arguments for entrance of the Astronomical subjects in educational books.
5. Survey of primary plan for the guidance of the curriculum of Astronomy and gaining the deliberative views of the subjective experts
6. To present suggested guidance of the curriculum of Astronomy for secondary schools.

Finding the validity of suggested guidance for the curriculum of Astronomy and at last the founding of the research and the final results presented.

Discussion and Results

This study has been done to help the experts and staff of curriculum and the others to practically think about Astronomy education affecting everyday life. So they need to make some changes in books and create an appropriate curriculum and train expert teachers, prepare a suite of instruments and library for this subject and finally conduct these lessons at schools. So the suggested elements of guidance for Astronomy in general education using the results of this research are briefly present below:

- Desired attitude of general guidance curriculum for astronomy education:

A composing from monotheism naturism along with cognitive development attitude, the attitude of Curriculum as technology and development of self-dehiscence are suggested.

- General and minor goal followed by training school with respect to desired attitude:

Consists of creation of scientific spirit and interest to research for students, study and survey of Astronomical phenomena in human daily life, study and understanding of social facts in different areas and scientific understanding of Astronomical phenomena, thoughts, habits, opinions, tendencies, rituals, values and traditions with respect to element, criteria, combatting superstitions, imagination.

- The general goals of Astronomy education in our country are to know the surrounding phenomena like moon circling around the earth, earth circling around the sun, appurtenance.
- The particular goals of Astronomy education to the students of Islamic Republic of Iran (IRI) concludes some religious lawful facts like rising of the sun, sunset and lunar month for social and cultural evidence.
- The content structure of Astronomy curriculum in appropriate attitude:

This structure according on a deductive and inductive basis and comparative attitude in curriculum books most common like geography, history, social science, mathematics, geometry, physics, geology, and continued presentation of Astronomy at educational duration, the students' ages, and with an interdisciplinary method is suggested.

- Educational method for Astronomy education at first and second intermediate durations:

This curriculum should have the teachers create educational presentations and doing evaluation of curriculum in the class and planning for scientific and practical development for the students. The teaching of Astronomy has not only been based on information presentation, since this lesson can help the students in learning and researching. The teacher has to create a suitable environment for students' abilities and talents. Teacher causes the communications to be facilitated inter human and communication with their environments and promote this.

- Exploration methods for the subjects of Astronomy at first and second intermediate durations:

This method has continually been done to be an opportunity for the students 'situation and also prepare a suitable environment for their ability improvements. Presentation of the exercises should be proportionate to their mental ability. The Exploration should accompany the usage of instruments of leading technology.

- Educational technologies for the education of Astronomy for intermediate course:

Such technologies includes the use of the existing sky maps for night and day, the use of photography and film using Skye, use of computers and computer imagery,

to use cameras and various kinds of telescopes in the planetariums and to visit the observatories. Through performing spatial phenomena, the students of the intermediate course gain the opportunity to survey in a good atmosphere and watch the interesting astronomical phenomena which is performed outside. By internet and communication with various sites especially with NASA we can directly connect to Hubble telescope and survey Sky phenomena on the earth.

Of course the purpose of paying attention to Astronomy is not monopolistic to the use of telescopes! There are many landscapes in the night sky which the students can access by going to their house yard and looking at them in sky. The numbers of these landscapes are even more than what we consider. It is correct that a telescope or binocular camera is a useful instrument yet for education of Astronomy and to be familiar with the beauties of sky their acquisition is not necessary.

- One of the other results of this research is the teachers' lack of interest or knowledge in Astronomy education. Conception of the knowledge content is very important to teaching the curriculum of astronomy. Although it may be found that what you learn today is not applicable for the next year.

Thus, and the more importantly the teachers have to know how to prepare themselves for teaching Astronomy which consist of contextual and skills knowledge. The teachers of the connected lessons to Astronomy such as mathematics, physics, geometry, geology, and geography and history are part of astronomy education and should be included in training classes.

Although the study of astronomy has provided a wealth of tangible, monetary and technological gains, perhaps the most important aspect of astronomy is not one of economical measure. Astronomy has and continues to revolutionize our thinking on a worldwide scale. In the past, astronomy has been used to measure time, mark the seasons, and navigate the vast oceans. As one of the oldest sciences astronomy is part of every culture's history and roots. It inspires us with beautiful images and promises answers to the big questions. It acts as a window into the immense size and complexity of space, putting Earth into perspective and promoting global citizenship and pride in our home planet.

On a more pressing level, astronomy helps us study how to prolong the survival of our species. For example, it is critical to study the Sun's influence on Earth's climate and how it will affect weather, water levels etc. Only the study of the Sun and other stars can help us to understand these processes in their entirety. In addition, mapping the movement of all the objects in our Solar System, allows us to predict the potential threats to our planet from space.

On a personal level, teaching astronomy to our youth is also of great value. It has been proven that pupils who engage in astronomy-related educational activities at a

at a primary or secondary school are more likely to pursue careers in science and technology, and to keep up to date with scientific discoveries (National Research Council, 1991). This does not just benefit the field of astronomy, but reaches across other scientific disciplines.

References

1. Ahmadi, A. (2011). The survey of the curriculum of books like science, physics, geography, geology and mathematics according to Astronomy education and present suitable frame work, full research reports, research and curriculum organization Tehran.
2. Alvandi, H. (2010). The evolution route of Astronomy education in Iran from Dar al Fonon up to now full research reports, research and curriculum organization Tehran.
3. Aitken, R.G. (1933). The Use of Astronomy. *Astronomical Society of the Pacific*. Leaflet 59, December 1933, 33-36.
4. Bode, Cruz & Molster. (2008). The ASTRONET Infrastructure Roadmap: A Strategic Plan for European Astronomy, http://www.eso.org/public/archives/books/pdfsm/book_0045.pdf, August 2013.
5. Casey, T. L. and Slater, T. F. (2003). A Comparison of Group and Individually Completed Course Evaluations in Introductory Astronomy, *the Astronomy Education Review*, 2(1) 1-4.
6. Finley, D., Value of Radio Astronomy. <http://www.nrao.edu/index.php/learn/radioastronomy/radioastronomyvalue>,. Retrieved November 2013.
7. International Astronomical Union. (2012). IAU Astronomy for Development Strategic Plan 2010–2012. http://www.iau.org/static/education/strategicplan_2010-2020.pdf, June 2013.
8. Krumenaker, L. (2009). The Modern U.S. High School Astronomy Course, Its Status and Makeup, in the Era of No Child Left Behind. *Astronomy Education Review*, 8, 1, (December).
9. National Research Council. (1991). Working Papers: Astronomy and Astrophysics Panel Reports, Washington, DC: The National Academies Press
10. National Research Council. (2010). *New Worlds, New Horizons in Astronomy and Astrophysics*. Washington, DC: The National Academies Press.
11. Renée James, C. (2012). What has astronomy done for you lately?, www.astronomy.com, May 2012,30-35
12. Sese, R. M. D.; Kouwenhoven, M. B. N. Thijs. (2015). Developing Astronomy Research and Education in the Philippines. *Science.gov (United States)*.
13. Shekarbaghani, A. (2014). The survey and Explanation of the total curriculum of astronomy education in the curriculum of various educational level, full research reports, Educational research Studies, Tehran.
14. Shekarbaghani, A. (2010). The comparative study of Astronomy education in Iran and the others countries, research and curriculum organization Tehran.
15. Shekarbaghani, A.; Badrian, A.; RastegarNasab, G. (2008). Feasibility of Astronomy Education According to Islamic Culture and Civilization for general and inter Mediate courses, Full Research report, research and curriculum organization Tehran.
16. Slater, Timothy F.; Slater, Stephanie J. (2015). Refocusing International Astronomy Education Research Using a Cognitive Focus Science. *Gov (United States)*.
17. Slater, Timothy F. (2008.) The First Big Wave of Astronomy Education Research Dissertations and Some Directions for Future Research Efforts. *Science.gov (United States)*.
18. Truman, H. (1949). Inaugural Presidential Speech, http://www.trumanlibrary.org/whistlestop/50yr_archive/inagural20jan1949.htm, June 2013.
19. Zühtü Okulu, H.; OĞuz-Ünver, A. (2009). Determination of the teacher candidates' Attitudes towards astronomy ISSN 1308 – 8971 Special Issue: Selected papers presented at WCNTSE Western Anatolia Journal of Educational Sciences (WAJES), DokuzEylul University Institute, Izmir, Turkey ISSN 1308-8971 107.

Human brain functional connectivity in resting-state fMRI data across the range of weeks

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Abstract

Around 15 years after the invention of fMRI, Functional Connectivity, FC, in the human brain has emerged as a major issue in neuroimaging studies. The reason is that the brain regions are a complex network of functional communication that plays a key role in cognitive processes. FC is defined as the temporal correlation of neural activation across different regions of the brain. Functional connectivity of a single subject seems to be affected by their situation. The results of the other studies demonstrate that healthy brain function shows rich dynamics over the course of time. So it may be a good idea to investigate the FC network as a summary of repeatedly measured fMRI sessions over more than one time point. Few studies have been done on the coordination of neural activity over longitudinal sessions. This study evaluates the FC cross-subject averaging of a single individual repeatedly measured over 16 weeks using the My Connectome study. Resting state fMRI data were acquired in some longitudinal sessions. A variance based linear model, proposed by Fiecas et al. was employed to conduct statistical inference on FC patterns of a single human averaged across time. This model estimates the autocorrelation structure in a session-specific manner, and estimates the variance due to the heterogeneity across sessions.

Key words: Resting State fMRI, Functional Connectivity, Variance Components Mode

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Introduction

Resting state fMRI, called rs-fMRI, is a method of functional magnetic resonance imaging, of fMRI, which is used to evaluate brain activation that occurs when a subject is not performing a typical task (1). Brain activity is observed through changes in Blood Oxygen Level Dependent, BOLD, signals in the brains' voxels. Brain activity is present even in the absence of an external task, so BOLD signals will change in brain regions during a resting state.

One of the important tasks, which has received interest in recent years, is detecting of brain areas' connectivity. In general, connectivity investigates how brain regions interact with each other (2). Functional connectivity, FC, identifies regions of the brain showing similar temporal characteristics. In other words, it can be defined as the temporal correlation between spatially different brain regions. Usually, functional connectivity is determined during the resting state fMRI and it is analyzed in terms of correlation and spatial clustering based on temporal similarities in BOLD signals (3).

In fact, the statistical inference for functional connectivity are based on statistical measures of dependency among brain areas. In this way, some methods are based on temporal correlations between Regions of Interest, ROIs, or between a 'seed' region and other voxels throughout the brain (4). The other common approaches are clustering and multivariate statistical methods. Clustering approaches partition the brain into regions that exhibit similar BOLD signal characteristics over time. Multivariate methods are used for dimension reduction, such as Principal Components Analysis, PCA, and Independent Components Analysis, ICA. These methods determine spatial patterns that include most of the variability in the BOLD time-series

(5–7). In addition, there are some specific approaches such as Graphical Lasso, GLasso, and Bayesian non-parametric models (1,8,9).

It is a fact that functional connectivity changes over time (10). Therefore, it may be a good idea that the functional connectivity is considered during some sessions. So we investigated the FC network as a summary of repeatedly measured fMRI sessions over more than one time point, by averaging of a single individual repeatedly measured over 16 weeks using the My Connectome study (11).

Recently, Fiecas et al. have presented a variance-based method for comparing the FC networks between a group of patients and a group of healthy controls in a multi-subject resting-state fMRI data set (12). They introduced a variance components framework for modeling the FC networks that accounts for the autocorrelation inherent in the ROI time series of each subject and for subject heterogeneity. We have used their approach, by replacing the subjects with repeated sessions. Therefore, we have applied their model and estimated a functional connectivity pattern for a single subject based on repeated resting state fMRI acquired across some weeks.

Material and Methods

1. Statistical Inference

To perform statistical inference on the FC network, we used the proposed model by Fiecas et al. (12). We applied their approach by considering sessions instead of subjects. In this way, the model accounts for the temporal correlation in the time series within the subject, the covariance between the different pairs of ROIs within the subject, and the variability due to the sampling across sessions. Suppose data include p ROIs, across N sessions. So the number of paired ROIs are $q=p(p-1)/2$ for each session. Then the model is in the following form

$$Y_{(Nq \times 1)} = X_{(Nq \times q)} \beta_{(q \times 1)} + \epsilon_{(Nq \times 1)} + \Psi_{(Nq \times 1)} \tag{1}$$

Where the $Y=(r_{_11}, \dots, r_{_q1}, r_{_12}, \dots, r_{_q2}, \dots, r_{_1N}, \dots, r_{_qN})$ is the vector of sample correlation coefficients stacked vertically across the sessions. The ϵ and Ψ are vectors with dimension $Nq \times 1$.

The q elements of vector β are the parameters of interest that capture the true FC. The model has two error terms. The first one is used to model variance and covariance related to the temporal autocorrelation in the ROI time series within the subject. The second one represents the amount of variability that can be attributed due to sampling across weeks.

Parameters estimated were obtained using the approach detailed in Fiecas et al. (12).

2. Database

We used data from the My Connectome study that consists of 89 sessions of resting state fMRI data on a single healthy human. The My Connectome project has characterized how the brain of one person changes over the course of more than one year. This data was obtained from the Open fMRI database. Its accession number is ds000031. We considered resting state fMRI data repeatedly measured over 16 weeks. The rs-fMRI acquiring was performed in 89 sessions throughout the data collection period in the production phase, using a multi-band EPI sequence (TR=1.16ms, TE=30ms), voxel size=2.4*2.4*2mm. Starting with session 27 (December 12 2012). The size of images was 2.4*2.4*2.4. Image pre-processing was carried out with the FMRI Software Library, FSL software (<https://fsl.fmrib.ox.ac.uk/fsl/fslwiki>) (13). Resting state processing included motion correction (14), removal of non-brain structures (15), spatial smoothing (5 mm FWHM), and high-pass temporal filtering.

The goal of this study was to provide comprehensive patterns of FC cross-session averaging. We specify the ROIs based on Brodman atlas including 42 ROI. Time courses for each ROI were obtained by averaging across all voxels within the ROI. Three ROIs were discarded from the analysis, because their time series had not been reached. Then we considered all the pairwise correlations between the ROI time series, 741 pairwise.

Table 1: A list of the ROIs and their numbers in analyzing process.

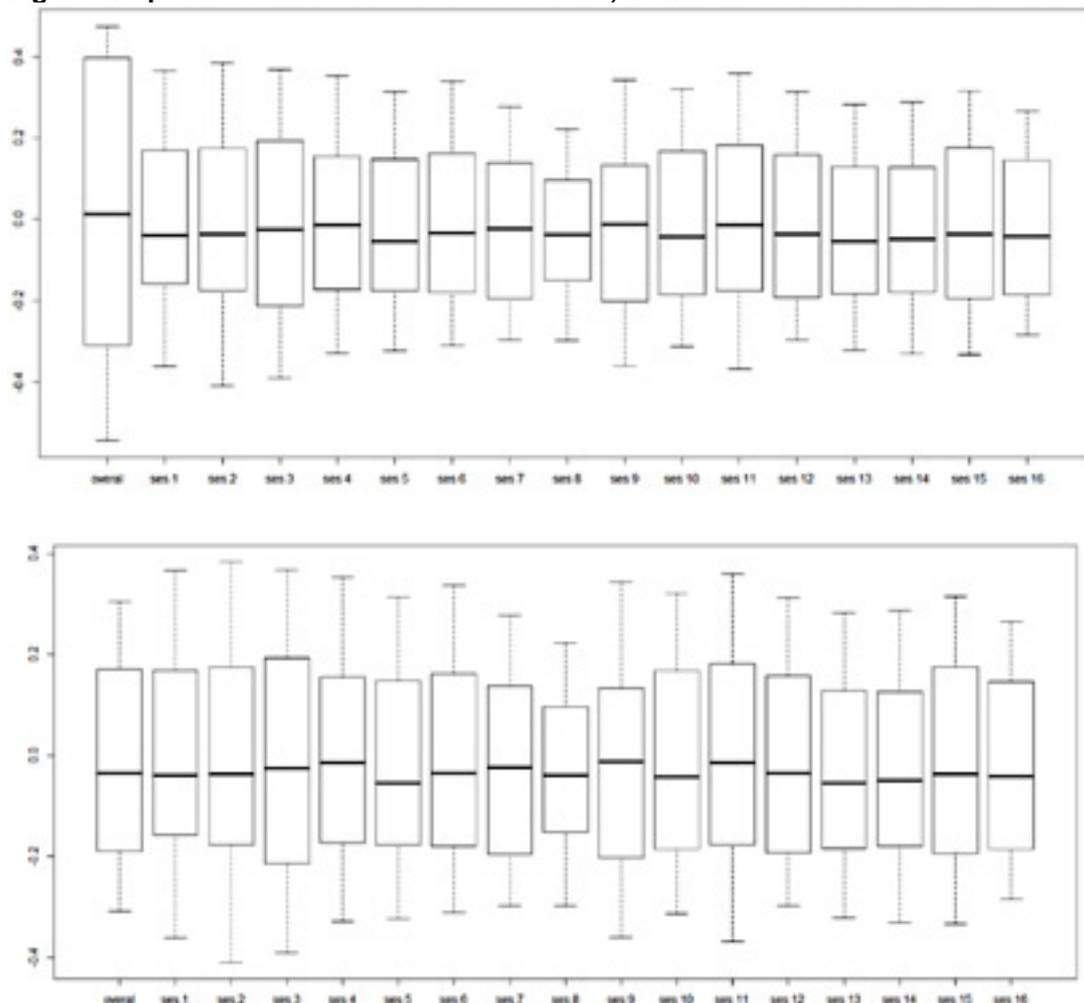
Num	Region of interest						
1	Brodmann area 1	11	Brodmann area 13	21	Brodmann area 27	31	Brodmann area 39
2	Brodmann area 2	12	Brodmann area 17	22	Brodmann area 28	32	Brodmann area 40
3	Brodmann area 3	13	Brodmann area 18	23	Brodmann area 29	33	Brodmann area 41
4	Brodmann area 4	14	Brodmann area 19	24	Brodmann area 30	34	Brodmann area 42
5	Brodmann area 5	15	Brodmann area 20	25	Brodmann area 31	35	Brodmann area 43
6	Brodmann area 6	16	Brodmann area 21	26	Brodmann area 32	36	Brodmann area 44
7	Brodmann area 7	17	Brodmann area 22	27	Brodmann area 33	37	Brodmann area 45
8	Brodmann area 8	18	Brodmann area 23	28	Brodmann area 35	38	Brodmann area 46
9	Brodmann area 9	19	Brodmann area 24	29	Brodmann area 36	39	Brodmann area 47
10	Brodmann area 10	20	Brodmann area 25	30	Brodmann area 37		

Results

An individual subject FC was generated using data from 16 resting state sessions for 39 ROIs following the procedure described in the previous section. A list of the 39 ROIs with their abbreviations is presented in Table 1. In Figure 1, we show the beta parameters that capture true FC estimated based on longitudinal sessions, and also the beta parameters for the FC networks in 16 sessions, individually. The overall betas have more variance related to the betas for each of the 16 sessions.

In addition, Figure 1 includes the correlations between ROIs averaged over the longitudinal sessions and the correlations among ROI for all 16 sessions. The image shows that the correlations between paired ROIs have different variation during the sessions.

Figure 1: Up: The estimated beta over sessions; Down: The correlations between ROI pairs over sessions.



Also, we have shown the beta parameters that capture true FC estimate based on longitudinal session and the beta parameters for session 1 and vice versa in Figure 2, in the upper triangle and lower triangle, respectively. In this image, we can see the difference between the estimated betas related to each of the ROI pairs in detail. FC networks for session's numbers 1, 8 and 16 also drawn vice versa in the overall FC network in Figure 2. These Results show that the FC networks are not static across the sessions.

Figure 2. Upper triangle: the estimated beta totally. Lower triangle: the estimated beta for Session 1

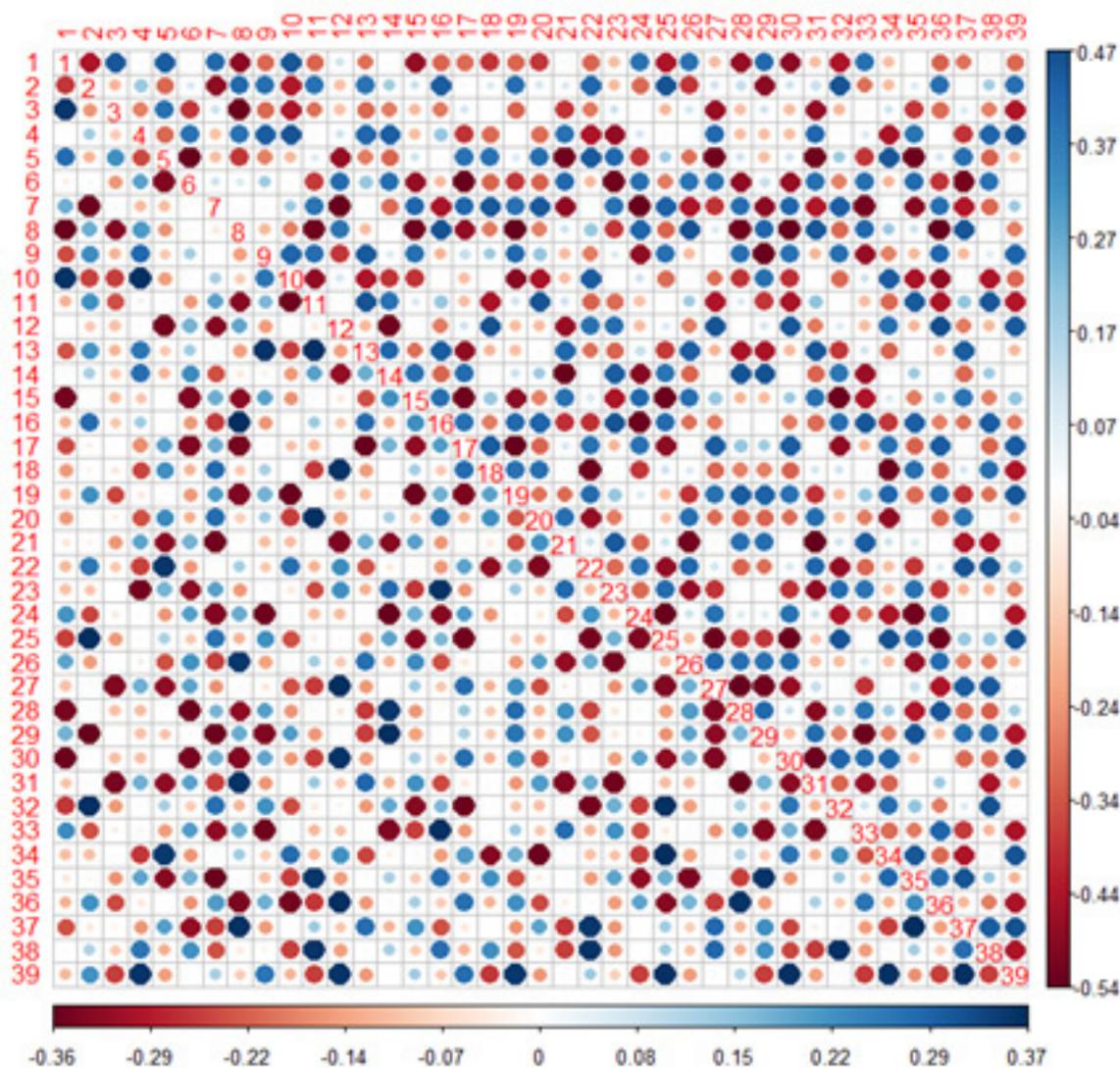
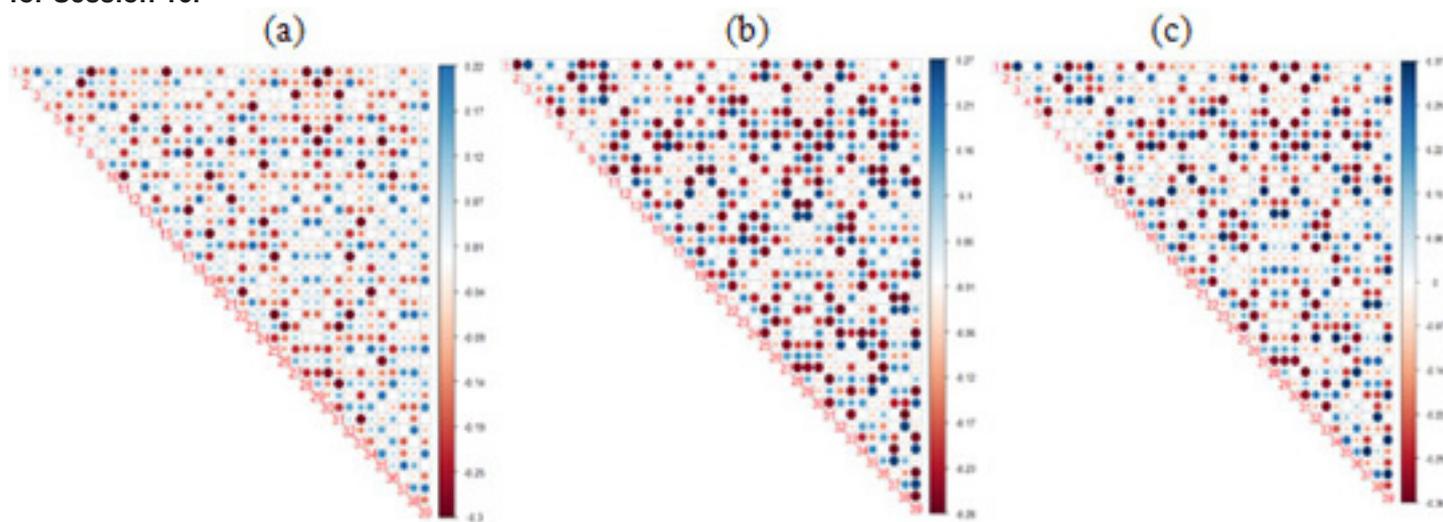


Figure 3. (a) The estimated betas for Session 1; (b) The estimated betas for Session 8; (c) The estimated betas for Session 16.



Discussion

The human brain is a network that consists of spatial regions, which are functionally linked. These regions share information with each other continually (16). Using the resting-state fMRI, we can explore the functional connections of the brain regions. Functional connectivity of rs-fMRI data is an important issue with an increasing trend of innovations in recent years. An important limitation of most rs-fMRI studies in healthy adults is reliance on functional connectivity indices calculated from an entire scan session (17). In this way, important information about within-scan temporal changes in functional connectivity may be lost.

Therefore, the present study aimed to determine the functional connectivity in a single healthy human using his repeated rs-fMRI data. The current study reveals that whole brain network properties varied within a single resting-state scan session.

Bharat et al have associated the variations of functional connectivity with the intrinsic activities of resting-state networks during a single resting state scan by comparing functional connectivity differences between the situation when a network had higher and lower intrinsic activities (18). Allen et al. have described an approach to assess whole-brain FC dynamics based on spatial independent component analysis, sliding time window correlation, and k-means clustering of windowed correlation matrices (19). There are few good review articles about dynamic FC. Hutchison et al have reviewed recent findings, methodological considerations, neural and behavioral correlates, and some directions in the emerging field of dynamic FC studies (10). In addition, Ioannides review FC results from a variety of studies, which suggest that an adequate description of brain organization requires a hierarchy of networks rather than a single one (20). Viviano et al explore the associations between dynamic functional connectivity and age differences, metabolic risk, and cognitive performance in healthy adults (21). Hutchison et al showed that the Resting-state networks have Dynamic FC in awake humans and anesthetized macaques. Their results illustrated that resting-state functional connectivity is not static (22). Marusak et al have explored the Dynamic FC of neurocognitive networks in children in a sample of 146 youth from varied sociodemographic backgrounds. They applied the Independent component analysis, sliding time window correlation, and k-means clustering to rs-fMRI data. Their results showed six dynamic FC networks that re-occur over time (23). Bhattacharya et al have proposed a nonparametric Bayesian approach to model effective connectivity assuming a dynamic non-stationary neuronal system (24).

However a large number of ROIs is possible for the variance model, but we needed to make modifications to the proposed method to accommodate the larger number of ROIs. The reason was that the number of parameters in our model were very large compared with respect to the number of ROIs. To solve this problem we ignored the

covariance terms in the between-subject covariance matrix. Because of a small number of sessions, we considered only the scaled identity structure for the between-subject covariance matrix, since by this structure the model has a small number of parameters. Using larger sample sizes, one can consider structures that are more complex.

References

1. Zhang L, Guindani M, Vannucci M. Bayesian models for functional magnetic resonance imaging data analysis. *Wiley Interdisciplinary Reviews: Computational Statistics*. 2015 Jan 1;7(1):21-41.
2. Friston KJ. Functional and effective connectivity in neuroimaging: a synthesis. *Hum Brain Mapp* 1994, 2:56–78.
3. Friston KJ. Functional and effective connectivity: a review. *Brain Connectivity* 2011, 10:13–36.
4. Zalesky A, Fornito A, Bullmore E. On the use of correlation as a measure of network connectivity. *Neuroimage* 2012, 60:2096–2106.
5. Andersen AH, Gash DM, Avison MJ. Principal component analysis of the dynamic response measured by fMRI: a generalized linear systems framework. *Magn Reson Imaging* 1999, 170:795–815.
6. Calhoun VD, Adali T, Pearlson GD, Pekar JJ. A method for making group inferences from functional MRI data using independent component analysis. *Hum Brain Mapp* 2001, 140:140–151.
7. McKeown M, Makeig S, Brown G, Jung T, Kindermann S, Bell A, Sejnowski T. Analysis of fMRI data by blind separation into independent spatial components. *Hum Brain Mapp* 1998, 6:160–188.
8. Cribben I, Haraldsdottir R, Atlas LY, Wager TD, Lindquist MA. Dynamic connectivity regression: determining state-related changes in brain connectivity. *Neuroimage* 2012, 61:907–920.
9. Varoquaux G, Gramfort A, Poline JB, Thirion B, Zemel R, Shawe-Taylor J. Brain covariance selection: better individual functional connectivity models using population prior. In: Zemel R, Shawe-Taylor J, eds. *Advances in Neural Information Processing System*.
10. Hutchison RM, Womelsdorf T, Allen EA, Bandettini PA, Calhoun VD, Corbetta M, et al. Dynamic functional connectivity: Promise, issues, and interpretations. *Neuroimage* [Internet]. Elsevier Inc.; 2013;80:360–78. Available from: <http://dx.doi.org/10.1016/j.neuroimage.2013.05.079>
11. Poldrack RA, Laumann TO, Koyejo O, Gregory B, Hover A, Chen MY, Gorgolewski KJ, Luci J, Joo SJ, Boyd RL, Hunicke-Smith S. Long-term neural and physiological phenotyping of a single human. *Nature communications*. 2015 Dec 9;6:8885.
12. Fiecas M, Cribben I, Bahktiari R, Cummine J. A variance components model for statistical inference on functional connectivity networks. *Neuroimage* [Internet]. Elsevier; 2017;149:256–66. Available from: <http://dx.doi.org/10.1016/j.neuroimage.2017.01.051>
13. Smith SM, Jenkinson M, Woolrich MW, Beckmann CF, Behrens TE, Johansen-Berg H, Bannister PR, De Luca M, Drobnjak I, Flitney DE, Niazay RK. *Advances in functional*

and structural MR image analysis and implementation as FSL. *Neuroimage*. 2004 Dec 31;23:S208-19.

14. Jenkinson M, Bannister P, Brady M, Smith S. Improved optimization for the robust and accurate linear registration and motion correction of brain images. *Neuroimage*. 2002 Oct 31;17(2):825-41.

15. Smith SM. Fast robust automated brain extraction. *Human brain mapping*. 2002 Nov 1;17(3):143-55.

16. van den Heuvel MP, Hulshoff Pol HE. Exploring the brain network: A review on resting-state fMRI functional connectivity. *Eur Neuropsychopharmacol* [Internet]. Elsevier B.V.; 2010;20(8):519–34. Available from: <http://dx.doi.org/10.1016/j.euroneuro.2010.03.008>

17. Chang C, Glover GH. Time–frequency dynamics of resting-state brain connectivity measured with fMRI. *Neuroimage*. 2010 Mar 31;50(1):81-98.

18. Di X, Biswal BB. Dynamic brain functional connectivity modulated by resting-state networks. *Brain Struct Funct*. 2013;220(1):37–46.

19. Allen EA, Damaraju E, Plis SM, Erhardt EB, Eichele T, Calhoun VD. Tracking whole-brain connectivity dynamics in the resting state. *Cereb Cortex*. 2014;24(3):663–76.

20. Ioannides AA. Dynamic functional connectivity. *Curr Opin Neurobiol*. 2007;17(2):161–70.

21. Viviano RP, Raz N, Yuan P, Damoiseaux JS. Associations between dynamic functional connectivity and age, metabolic risk, and cognitive performance. *Neurobiol Aging* [Internet]. Elsevier Inc.; 2017; Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0197458017302580>

22. Hutchison RM, Womelsdorf T, Gati JS, Everling S, Menon RS. Resting-state networks show dynamic functional connectivity in awake humans and anesthetized macaques. *Hum Brain Mapp*. 2013;34(9):2154–77.

23. Marusak HA, Calhoun VD, Brown S, Crespo LM, Sala-Hamrick K, Gotlib IH, et al. Dynamic functional connectivity of neurocognitive networks in children. *Hum Brain Mapp*. 2017;38(1):97–108.

24. Bhattacharya S, Maitra R. A nonstationary nonparametric Bayesian approach to dynamically modeling effective connectivity in functional magnetic resonance imaging experiments. *Ann Appl Stat*. 2011;5(2 B):1183–206.

A brief report on the components of national strategies for suicide prevention suggested by the World Health Organization

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“Preventing suicide: A global imperative” by the World Health Organization (WHO) is a landmark paper which helps member states to design a robust national strategies for suicide prevention. Based on this report a well-designed national strategy for suicide prevention should have at the very least twelve components (1). In order to not forget these twelve vital components I have made an acronym i.e. “MATTE COMPASS”.

In the “MATTE” part:

M refers to “Media i.e. promoting implementation of media guidelines for responsible reporting of suicide”,

A to “Awareness i.e. establishing public information campaigns to support suicide prevention programs”,

T to “Training and education i.e. maintaining comprehensive training programs for suicide prevention”,

T to “Treatment i.e. improving the quality of clinical care for individuals who present to hospital following a suicide attempt” (1).

E to “Economics” i.e. governments being financially able, or politically willing, to provide the budget for the above initiatives.

In the “COMPASS” part,

C refers to “Crisis intervention i.e. having the capacity to respond to crises”,

O to “Oversight and coordination i.e. establishing institutions to promote and coordinate”,

M to “Means restriction i.e. reducing the availability of the means to suicide”,

P to “Postvention i.e. improving caring for those affected by suicide behaviors”,

A to “Access to services i.e. promoting increased access to comprehensive services for vulnerable to suicidal behaviors”,

S to “Surveillance i.e. increasing the quality and timeliness of national data on suicide behaviors”,

S to “Stigma reduction i.e. reducing discrimination against people using mental health services” (1).

Each of these twelve components has a vital role in designing a successful national suicide prevention strategy. Nevertheless, most of them are aiming at secondary and/or tertiary prevention. Whilst an effective national strategy for suicide prevention should also have the efficient components that aim at primary prevention to deal with the root causes of suicide in each country. Such components may at the very least address eradication of poverty, eradication of illiteracy, reduction of unemployment and job insecurity, providing social, economical and cultural support for and empowerment of women especially within low and middle income countries (2 & 3).

References

1. World Health Organization. Preventing Suicide: a Global Imperative. World Health Organization: Geneva, Switzerland. 2014.
2. Rezaeian M. The Age and Sex Suicide Pattern in the Eastern Mediterranean Region Based on the Global Burden of Disease estimates for 2000. *East Mediterr Health J* 2007; 13 : 10-17.
3. Rezaeian M. Suicide among young Middle Eastern Muslim females: The perspective of an Iranian epidemiologist. *Crisis* 2010; 31 :36-42.

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Evaluating the Process of Recruiting Faculty Members in Universities and Higher Education and Research Institutes Affiliated to Ministry of Health and Medical Education in Iran

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Abstract

Introduction: Given the vital and constructive role of faculty members in universities, recruiting qualified faculty members is considered as one of the priorities of each university. Thus, the current research was conducted to evaluate the process of recruiting faculty members in universities and higher education and the Research Institute of the Ministry of Health and Medical Education in Iran.

Methodology: This study was conducted using descriptive and analytical method. Research data were collected through administrative and recruitment regulations of the faculty members of the universities and higher education institutes affiliated to the Ministry of Health, their reforms and circulars and subsequent guidelines, and searching the papers published in well-known sites in Iran and foreign countries.

Results: There are 65 universities and independent faculties of medical sciences, 8,000 faculty members, and 200,000 students in the Ministry of Health and Medical Education in Iran at present. Faculty members are recruited through recruitment recall of faculty members in a competitive space and after approval of the scientific and general competencies of candidates at relevant authorities. Faculty members are recruited full-time geographically (working at least 54 hours per week, without permission of specialized profit-making activities out of university), and full-time (working at least 40 hours per week and with permission of specialized profit-making activities out of university) and in different recruiting forms, including formal, committed to service, soldier, and contractual.

Conclusion: Shortage of faculty members and lack of consistency between number of professors and student, and their lack of interest to continue working in deprived regions are some of the challenges of the Ministry of Health in this regard.

Key words: Recruiting; Faculty Member; Ministry of Health; University; Iran.

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Introduction

One of the most distinctive characteristics of the ancient civilization of Iran is paying attention to medical knowledge, which in its turning point was the establishment and development of Jundishapur Medical University in the north of Khuzestan province (Dezful city) (1-2). It was established 1,746 years ago. Development of human resources will not be possible without considering the faculty members and transforming them from independent elements into effective elements and without increasing their efficiency, and maintaining and increasing their motivation and innovation (3). Universities in any country undertake the critical function of educating the specialized and committed forces required by the given community (4). Studies suggest that medical, dentistry, pharmacy, and other related fields of study are among the fields of study (5), which are more demanded by candidates of universities and higher education institutes in Iran. Approximately 70% of university candidates are female (6). In total, there are 65 universities or independent medical science faculties in Iran. During Iran's fifth development plan (2012-2015) and given the increasing number of students, especially at post-graduate period, reforming and promoting the ratio of professors to the students was prioritized in educational deputy programs of Iran Ministry of Health and Medical Education. Accordingly, it was planned that one faculty member for two specialized PhD students, one professor for 6 master students, and one professor for 10 to 12 bachelor students were to be recruited. Total number of students of medical sciences universities affiliated to Iran Ministry of Health and Medical Education has followed an increasing trend from 2013-2014 to 2015-2016, so that it has reached from 171,022 in 2012-2013 to 189,967 in 2015-2016. The number of faculty members also has followed an increasing trend since 2008 to 2015, and it has experienced a growth of 55%. In 2015, the number of faculty members reached 16,863. This index has increased by 26.19% during the last four years, and the index of ratio of professors to students has increased from 10:3 in 2009-2010 to 10:7 in 2015-2016 (7). Nowadays, given the increasing amount of medical science information and rapid changes in the information (doubling information every 20 months and violating 50% of information every 5 years), the issue of life-long learning of faculty members has found special importance. The consistency in the ratio of professor to student is one of the indices taken into consideration around the world to make educational systems efficient. Educational and research activities of faculty members in each university play a key role in increasing the university rank in the domestic and international areas. Thus, function and success of medical science universities largely depends on efficiency of their faculty members (3). For this reason, recruiting and employing qualified faculty members is one of the priorities of each university and higher education institute (8). Accordingly, the current research was carried out to evaluate the process of recruiting faculty members in universities and higher education and research institutes of Ministry of Health in Iran.

Methodology

This research was conducted using descriptive and analytical method in 2017 to evaluate the process of recruiting the faculty members in universities and higher education and research institutes of the Ministry of Health and Medical Education. Research data were collected through searching the papers published in valid Iranian and International sites including SID, MAGIRAN, PubMed, Scopus, ISI, and administrative and employment regulations of the faculty members of the universities and higher education institutes affiliated with the Ministry of Health (9), and their reforms and circulars and subsequent guidelines.

Results

Given the high status of science and knowledge in Iran's culture and civilization and the need to protect the high dignity of the higher education institutes and given the critical and constructive role of faculty members and the need to use the knowledge of well-educated, efficient and committed professors, and in order to create a unified process in evaluating the qualifications of those who are candidates to be faculty members, executive boards of recruiting faculty members of universities and higher education institutes were established in Science, Research and Technology Ministry, and Health, Medical, and Education Ministry of Iran. Given unoccupied posts and according to the employment permission obtained annually from the Ministry of Health, Iran medical sciences universities can recruit faculty members twice per year, usually in September and March months in the form of recruiting faculty member recall. Faculty members of the Ministry of Health and Medical Education in Iran are recruited first in the form of contractual recruiting through recruiting the faculty members recall in a competitive space among qualified applicants who have at least a specialized Ph.D. degree or higher (Master degree is also allowed in exceptional conditions and for universities having less numbers of faculty members). At time of recruitment, faculty members recruited as assistant professors or higher will be full time geographically and educators will be full time. A geographically full-time faculty member is a person who works for a university full-time and at least 54 hours per week and he/she is not permitted to perform profit-making activities out of university (including work in personal office, personal pharmacy, laboratory, personal diagnostic centers, educational centers, charity and private hospitals, etc.). A full-time faculty member (non-geographically full time) is a person who works for a university for at least 40 hours per week according to the university program. In exceptional conditions, when universities and higher education institutions have urgent need, the recruitment of non-geographically full time faculty members will be feasible with the approval of the Board of Trustees and with conditions determined by University Council. Currently, faculty members are "contractual and formal" (geographically full time) in terms of type of recruitment. In order to recruit and for continuous service of faculty

members, a notarized pledge is taken from them for at least 5 years based on the University Council diagnosis. The contract term of faculty members will be between 1 and 3 years at first, and in the case of university satisfaction of their educational, research and therapeutic activities, it can be extended. If promoted to higher ranks (assistant professors and associate professors), faculty members' contracts can be transformed to experimental formal contract by observing the relevant rules and standards, and after 3 years, their recruitment status will be transformed to permanent formal contract in the case of acquiring the base annual qualifications. In addition to recruiting faculty members, universities and higher education institutes under the Ministry of Health can compensate a part of their requirements for faculty members with the framework of rules and through recruiting people with legal services (committed to service, K coefficient, human resource design, and faculty member soldier). After beginning of the commitments, these people can participate in the recruitment recall of the university for which they serve. Participation in recall of other universities will be possible by approval of the Source University and Ministry of Health. Participation in recruitment recall of a faculty member soldier is possible after 20 months of military training. Specialist performing their K coefficient obligations as medical staff they can participate in the recruitment recall of the university for which they served after one year of serving at the university and approval of the same university. In addition, universities and higher education institutes under the Ministry of Health can recruit temporarily, at most up to 18 months, faculty members with at least specialized PhD degree and higher in the contractual form. Finally, non-faculty member employees of universities and higher education institutes can become a faculty member, in the case of having qualifications and participating in recall.

The seven activities of faculty members that they are obliged to perform include educational, research, and cultural activities, individual development, executive and managerial activities, providing health and medical services, health promotion, and specialized activities

outside of university specified by the university. Acceptable service also refers to active presence of faculty member at university or higher education and research institute and performing the seven activities and participating in committees and councils of institute and other executive affairs assigned for him/her by the university or institute.

General conditions required to recruit a faculty member:

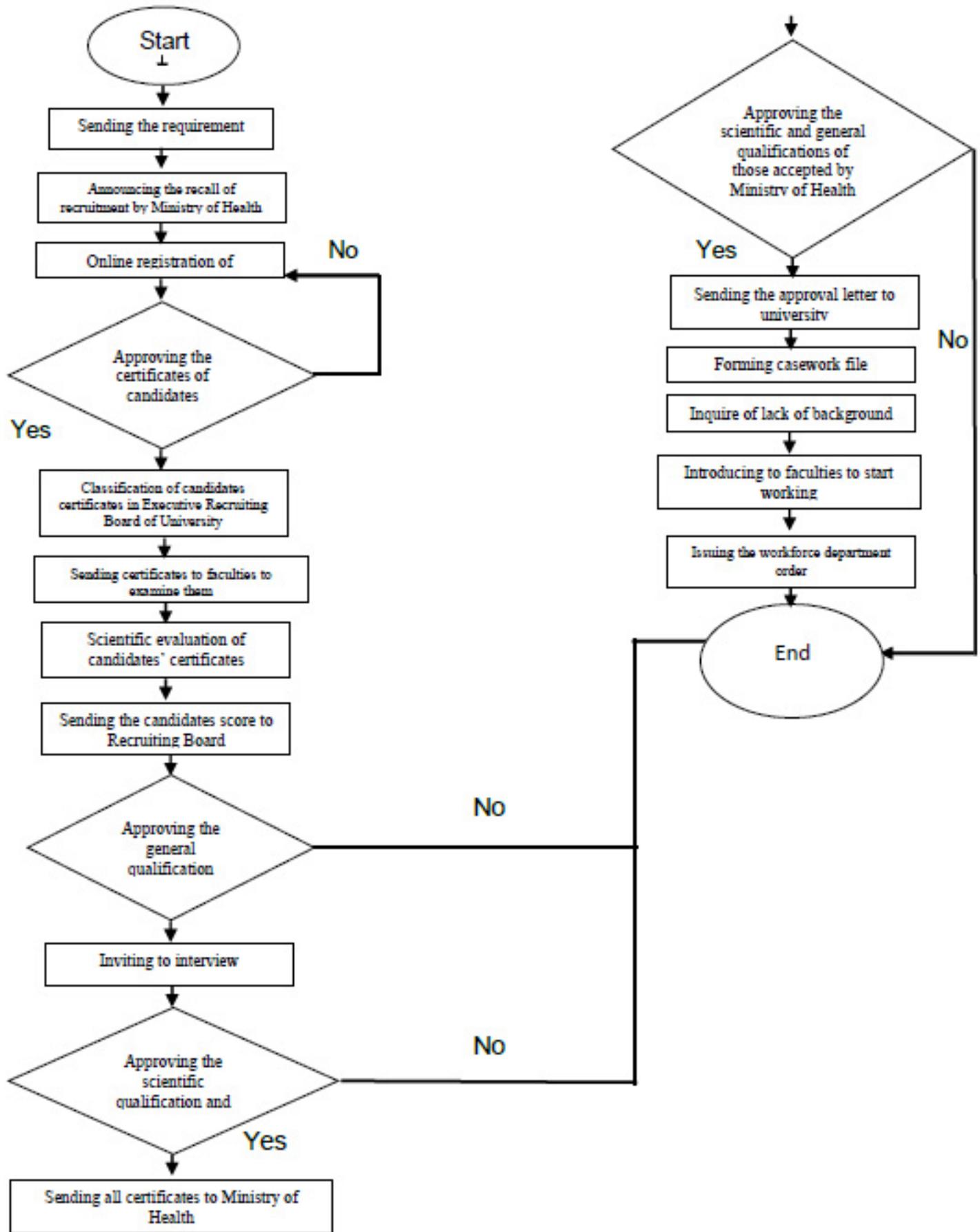
- A)** Nationality of Islamic Republic of Iran
- B)** To complete military service or having legal exemption or completing the necessary period (for men)
- C)** Non-convicted to being deprived of government employment and lack of effective criminal conviction, and lack of dismissal and termination of service under legal authorities verdict
- D)** Non-addiction to tobacco, narcotics and psychotropic substances.
- E)** General and scientific qualifications of candidates approved by the executive board of the university and approved by the central board of the Ministry of Health, according to standards approved by the Supreme Council of the Iranian Cultural Revolution.

F) Aged less than 35 years at time of recruitment to acquire the educator rank and 45 years for educational degrees of Ph.D., specialist encyclopedia and higher (in exceptional conditions and in the case of having educational, research and management experience of candidates to be recruited as faculty member and with approval of Central Board of Trustees established in the Ministry of Health for up to 5 years will be added to age limit). Special privileges have been considered for those injured (referred to as warriors) in the war between Iran and Iraq that occurred from 1970 to 1988, in recruiting the faculty member. The conditions for their entry and recruitment as faculty members have been facilitated.

Table 1: Academic ranks of educational and research faculty members

Educational (educational, research)	Research
Educator	Research Educator
Assistant professor	Research Assistant Professor
Associate professor	Research Associate Professor
Professor	Research Professor

Conceptual model of recruiting contractual faculty member in the Ministry of Health and Medical Education



Discussion

Faculty members are recruited through recall of recruitment of faculty members in a competitive space and after approval of the scientific and general competencies of candidates at relevant authorities. Faculty members are recruited full-time geographically (working at least 54 hours per week, without permission of specialized profit-making activities out of university), and full-time (working at least 40 hours per week and with permission of specialized profit-making activities out of university) and in different recruiting forms, including formal, committed to service, soldier, and contractual. There are 65 universities and independent faculties of medical sciences. In addition, 200,000 students are studying at different educational levels from associate to specialized clinical fellowship in different fields of study at the level of Iran University of Medical Sciences. In addition, 18,000 faculty members are working in Iran University of Medical Sciences, of whom 4,000 have committed to service faculty members working temporarily or as merely legal commitment of free educating in universities. According to the Head of Faculty Member Affairs of Health Ministry, about 1,200 people have been recruited as faculty members of the Health Ministry during the last four years. It has been also planned that 1,500 people are to be recruited as faculty members in medical universities of Iran (10). According to the Educational Deputy of Health Ministry, more than 1,200 faculty members have been recruited in the medical universities of Iran. Despite all efforts, there is a wide gap between the current ratio of professor to student in most medical universities and the ideal ratio, and this is more evident in clinical education, which requires special considerations. Since the beginning of implementation of the Development and Innovation Plan in medical science education in Iran, much effort has been made to promote the body of faculty members in the medical universities of Iran. Based on the faculty members' status in universities and studying 200 top universities in the world, the need of the health area for faculty members has been estimated (11). According to the Iranian Health Ministry's current policy and for the purpose of educational innovation and transformation, the issue of internationalization of universities has been proposed and serious steps have been taken during the last three years. In this regard, Iranian universities have taken measures to accept students from various countries and it has had good cooperation with European and Iranian universities out of Iran to exchange faculty members (10).

Conclusion

The performance and success of the medical universities greatly depends on efficiency of its faculty members. Given the development of specialized fields of study and increasing PhD studies in medical universities and considering the lack of faculty members in clinical training, the nursing, midwifery and medical fields of study require recruiting more faculty members (more than 8,000 people). Finally, considering the shortage of faculty members and their early retirement requests, lack of consistency

between numbers of professors and students, especially in deprived regions, one of the challenges of the Health Ministry is recruiting and retaining faculty members.

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References

1. Gilavand A. A Study of the Growth and Flourish of Ahvaz Jundishapur University of Medical Sciences; A Cultural History. *Int J Med Res Health Sci.* 2016; 5(11): 83-86.
2. Gilavand A. Ahvaz Jundishapur University of Medical Sciences over Years; the History of AJUMS, Jundishapur J Helath Res. 2016 ;7 (5):e42677. doi: 10.17795/jjhr-42677.
3. Gilavand A. Pathology of Faculty Members' rank Promotion in Universities and Higher Education Institutions Affiliated to the Ministry of Health and Medical Education of the Islamic Republic of Iran. *Int J Med Res Health Sci.* 2016; 5(9S): 25-30.
4. Gilavand A. Quality Assessment of Staff in-service training from View Points of Employees Ahvaz Jundishapur University of Medical Sciences. *Future Med Educ J.* 2016; 6 (2): 42-46. doi: 10.22038/fmej.2016.7516
5. Gilavand A. The Comparison of Iranian and Foreign Students' Motivations to Choose Dentistry Field of Study. *Int J Pediatr.* 2016;4 (6):1993-2010. doi: 10.22038/ijp.2016.6861
6. Gilavand A., Espidkar F. Investigating the Barriers to Women's Promotion to managerial positions in Iranian Universities and Higher Education Institutions: A Review. *IndoAm. J. P. Sci,* 2017; 4(08) 2574-2582. doi:.org/10.5281/zenodo.853173.
7. The Most Recent 4 Years Past Efforts of the Ministry of Health in the Field of Medical Education. At available: <http://www.iribnews.ir/fa/news/1782234>
8. Gilavand A .Hosseinpour M. Analyzing Research Productivity of Humanities Faculty Members in Universities of Ahvaz, southwest of Iran. *Indo Am. J. P. Sci,* 2017; 4(09) 2949-2958. doi.org/10.5281/zenodo.892394.
9. The Administrative and Employment Regulations of the Faculty Members of the Universities and Higher Education Institutes Affiliated with the Ministry of Health and Medical Education in Iran. 2011; 2-8
10. The Lack of 8,000 Faculty Members at Iranian Medical Sciences Universities. At available: <http://www.irna.ir/fa/News/82641833>
11. The Recruitment Program of a New Faculty Member in Iran's Medical Sciences Universities .At available: <http://dolat.ir/detail/293197>

Comparison of spiritual well-being and social health among the students attending group and individual religious rites

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Abstract

Background and Aim: Spiritual well-being and social health are considered important health aspects that have yet been less frequently investigated. The present study was conducted to compare spiritual well-being and social health between the students attending group religious rituals and those attending individual religious rituals.

Methods: In this cross-sectional study, 160 students who were assigned to two groups, individual religious rituals and group religious rituals, were studied in 2016. The students who performed religious rituals individually (Group 1) were selected according to purposive sampling and those who attended group religious rituals (Group 2) selected by convenience sampling. Data were gathered by a demographics questionnaire, Student Spiritual Well-Being Scale, and Social Health Scale and analyzed by SPSS v 22.

Findings: The spiritual well-being and social health scores of group 2 was significantly higher than those of group 1 ($p=0.001$ and 0.002 , respectively). The mean scores for all spiritual well-being subscales in group 2 were significantly higher than those in group 1 ($p<0.05$). Moreover, social health subscales, except for family ($p=0.56$), in group 2 were significantly higher than those in group 1 ($p<0.05$).

Conclusion: The mean scores for spiritual well-being and social health were higher in the group who attended group religious rituals.

Key words: Spiritual well-being, social health, student

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Introduction

Spiritual aspect of health is one of the most recently introduced concepts into the definition of health. Regarding the significance of spiritual aspects of health, we can argue that this aspect is one of the integral parts of health that was introduced into the health definition after a meeting of regional leaders of the Eastern Mediterranean (1), such that according to the WHO, health refers to a dynamic state of complete physical, mental, spiritual and social well-being and not just the absence of disease and disability (2). Most researchers argue for bi-dimensionality of spirituality, i.e. religious and existential. Religious spirituality refers to individual concept of existence of or ultimate reality expressed, according to religious style, and the second aspect, i.e. existential spirituality, is concerned with special psychological experiences that are not indeed associated with the sacred or ultimate existence (3). Spiritual well-being is one of the aspects of spirituality and advocates of the role of spirituality in promotion of mental health argue that spiritual well-being has been derived from a combination of two terms, health and spirituality (4).

Spiritual well-being plays a peerless role in maintaining and promoting health, because this aspect of spirituality is addressed as one of the integral and related components to quality of life and health promotion (5-8). Moreover, spirituality can be used to promote quality of life and mental health among patients with hard-to-treat diseases (9, 10).

Life satisfaction, general health, social function, and social relationships are some of the important predictors of spiritual well-being (5, 11). Therefore, social health and other aspects of health are integral parts of spiritual health (12). This concept is not dissimilar to other aspects of health and has unique characteristics that can be derived from simultaneous combination of a community's thoughts and individual characteristics (13). Indeed, social health, as one of the health aspects, refers to ability to conduct social roles effectively and efficiently without any damage to others (14). This aspect of health is influenced by certain determinants such as economic policies and systems, development plans, social norms, social policy, and economic systems (15). In Iran, promotion of social health is included in planning for reduction of poverty, reduction of violence and unemployment rate, increase in literacy levels, and increase in insurance coverage (16).

Meanwhile, it is necessary to investigate religious and spiritual aspects among the youth particularly students, and conduct necessary interventions (17). Students, as one of the pioneering strata to achieve scientific purposes in any country, are considered to be the community's fulcrum to optimize the cycle of knowledge generation (18). Therefore, paying attention to their health tenets is inevitable for prosperity and scientific growth of the country. Social health and spiritual health are some of the important factors for student's health that deserve further attention (19-21). It is essential to investigate these two aspects of health that have already been less frequently studied. Moreover, no study has yet been conducted to investigate this issue. The present study was conducted

to compare spiritual well-being and social health between the students attending group religious rituals and those performing religious rituals individually.

Materials and Methods

In this cross-sectional study, 160 students of a medical university in Shahrekord, southwest Iran in 2016, were enrolled. The students who performed religious rituals individually (group 1) were selected according to purposive sampling and those who attended group religious rituals (group 2) selected by convenience sampling. To achieve this purpose, we detected the students who performed religious rituals individually with the help of a religious sciences lecturer and enrolled them in the study. The inclusion criteria for students attending group religious rituals was being 19-30 years, actively and regularly attending group religious rituals such as congregation prayers and supplication, and attending congregation prayer (at least one of the Fajr, Maghrib, or Isha prayers) and supplications. The inclusion criteria for students attending individual religious rituals was being 19-30 years, not attending group religious rituals, and not suffering from depression and social phobia, according to medical diagnosis, and any particular disease that makes one feel irritable in public.

Uncertainty about the virtues of congregation prayers Imam for the students who performed their rituals individually and lack of consent to participate in the study were considered the exclusion criteria.

Data were gathered by a three-section questionnaire. The first section of the questionnaire consists of certain items such as age, gender, marital status, economic status of the respondent and his/her family, and field of study. The second section is a student spiritual well-being scale that consists of forty items to investigate four subscales, i.e. relationship with God, relationship with self, relationship with others, and relationship with nature. The items are rated by 5-point Likert scale from absolutely agree to absolutely disagree with minimum and maximum possible score of 40 and 200, respectively. This scale was developed by Dehshiri et al. and its validity and reliability have been investigated for students. Dehshiri et al. reported Cronbach's alpha coefficient to be 0.81, 0.89, 0.81, and 0.80 for subscales relationship with God, relationship with self, relationship with others, and relationship with nature, respectively, and 0.86 for the entire scale (22).

The third section of the questionnaire investigates Iranians social health questionnaire in three domains; family, surrounding people except for family (relatives, friends, etc.), and community. This questionnaire consists of 33 items that are rated by a 5-point Likert scale from very little to very much. The minimum and maximum possible score for this questionnaire is 33 and 165, respectively. This questionnaire has been 'nativized' to Iran and has acceptable validity and reliability. The Cronbach's alpha coefficient of this questionnaire has been derived 0.86 (23).

After ethical approval and code (no.IR.SKUMS.REC.1395.47) were provided for the study protocol, the questionnaires were administered to the participants. Data were analyzed by descriptive statistics and independent t-test, Pearson correlation coefficient, ANOVA, and chi-square test.

Findings

A total of 160 people, assigned to two groups of 80 each, participated in this study. The mean age of group 1 (performing religious rituals individually) was 23.70±5.62 (range: 18-49) years and that of group 2 (attending group religious rituals) 23.98±6.44 (18-51) years. Independent t-test indicated no significant difference in demographic characteristics between the two groups (P>0.05) (Table 1).

Table 1: Frequency distribution of demographic characteristic in the two groups of study

Variables	Range	Group 1		Group 2		p-value
		Number	Percent	Number	Percent	
Sex	Female	23	28.8	18	22.5	0.365
	Male	57	71.3	62	77.5	
Marriage status	Single	66	82.5	65	81.3	0.837
	Married	14	17.5	15	18.8	
Family economic status	Weak	4	5	3	3.8	0.632
	Moderate	36	45	33	41.3	
	Good	37	46.3	43	53.8	
	Excellent	3	3.8	1	1.3	
Field of study	Nursing	13	16.3	16	20	0.067
	Medicine	18	22.5	8	10	
	Health	34	42.5	29	36.3	
	Paramedicine	10	12.5	14	17.5	
	Dentistry	5	6.3	13	16.3	

Table 2: Comparison the mean of the subscale of spiritual well-being and social health of the two groups

Variables		Group 1	Group 2	p-value
		Mean±SD	Mean±SD	
Spiritual wellbeing subscales	Relationship with god	41.89±5.19	44.80±4.33	0.001*
	Relationship with self	38.18±6.34	42.08±5.05	0.001*
	Relationship with others	40.38±5.40	42.66±4.96	0.006*
	Relationship with nature	39.43±6.38	42.65±4.98	0.001*
Total score of spiritual wellbeing		160±20.08	172.20±17.20	0.001*
Social health subscales	Family domain	23.56±4.98	25±4.45	0.056
	Surrounding people (except for family)	32.75±4.43	35.38±3.53	0.001*
	Social domain	56.16±14.08	61.08±13.87	0.027*
Total score of social health		112.47±18.15	121.47±17.27	0.002*

Significant at P<0.05

The mean scores for all spiritual well-being subscales and total score for spiritual well-being in group 2 were significantly higher than those in group 1. Moreover, the scores for social health subscales, except for family ($p=0.56$), in group 2 were significantly higher than those in group 1 ($p<0.05$).

In group 1, spiritual well-being and its subscales were directly and significantly correlated with social health and its subscales except for relationship with God with surrounding people domain (Table 4).

In addition, spiritual well-being and its subscales were directly and significantly correlated with social health and its subscales except for relationship with God with surrounding people, relationship with nature with surrounding people, family domain with surrounding people domain, and community domain with surrounding people domain (Table 4).

Regarding association of demographic characteristics with spiritual well-being and its subscales, the findings demonstrated that in group 1, there was a significant association between family's good economic status and relationship with others ($p=0.002$), but there was no significant association between spiritual well-being subscales and gender, marital status, and field of study. Besides that, in group 1, there was a significant association between family's good economic status and family domain ($p=0.011$) and surrounding people domain ($p=0.023$), but there was no significant association with social health subscales and gender, marital status, and field of study ($p>0.05$).

In group 2, a significant association between relationship with God and gender was seen ($p=0.017$), and no significant association of spiritual well-being subscales was seen with marital status and field of study ($p>0.05$). In group 2, a significant association was seen between community domain and gender ($p=0.037$). Moreover, family's economic status was significantly associated with community domain ($p=0.042$) and total score for social health ($p=0.018$). In group 2, social health subscales were not significantly associated with marital status and field of study ($p>0.05$).

Table 3: The correlation coefficients of spiritual and social health and well-being subscales in group 1

Variables	2	3	4	5	6	7	8	9
1-Relationship with god	0.572**	0.683**	0.632**	0.341**	0.670**	0.220	0.824**	0.428**
2-Relationship with self	1	0.619**	0.715**	0.566**	0.748**	0.374**	0.858**	0.629**
3-Relationship with others		1	0.693**	0.417**	0.780**	0.224*	0.861**	0.479**
4-Relationship with nature			1	0.403**	0.764**	0.220*	0.894**	0.468**
5-Total score of spiritual wellbeing				1	0.641**	0.347**	0.507**	0.656**
6-Family domain					1	0.140	0.863**	0.480**
7-Surrounding people (except for family)						1	0.305**	0.905**
8-Social domain							1	0.587**
9-Total score of social health								1

* $p<0.01$

** $p<0.001$

Table 4: The correlation coefficients of spiritual and social health and well-being subscales in group 2

Variables	2	3	4	5	6	7	8	9
1-Relationship with god	0.705**	0.758**	0.756**	0.528**	0.795**	0.114	0.897**	0.391**
2-Relationship with self	1	0.747**	0.680**	0.526**	0.837**	0.304**	0.885**	0.552**
3-Relationship with others		1	0.688**	0.510**	0.782**	0.226*	0.898**	0.473**
4-Relationship with nature			1	0.419**	0.672**	0.092	0.879**	0.319**
5-Total score of spiritual wellbeing				1	0.492**	0.346**	0.556**	0.636**
6-Family domain					1	0.157	0.867**	0.458**
7-Surrounding people (except for family)						1	0.210	0.924**
8-Social domain							1	0.490**
9-Total score of social health								1

* $p < 0.01$; ** $p < 0.001$

Discussion

The present study was conducted to compare spiritual well-being and social health between the students attending group religious rituals and those performing religious rituals individually. In this study, the means scores for spiritual well-being and social health were higher in students who attended group religious rituals. Abbasi et al. study on nursing students demonstrated that spiritual well-being in the fourth year was not different from that in the first years of education. This reflects a gap between education system and promotion of spiritual well-being among students, which deserves further attention (24). A study on veterans demonstrated that life satisfaction and spiritual well-being were directly and notably associated with mediators of life satisfaction of mental health among the veterans and social health was indirectly associated with these mediators (25).

Besides that, Gonzalez et al. investigated the effect of spiritual well-being on depression. Spiritual well-being is a coping mechanism to reduce depression symptoms in cancer survivors (10). Desai et al. found that performing religious rituals could be effective on mental and social health among the studied students (26). Therefore, regarding the cited studies, it can be argued that different aspects of health are closely related to each other and disturbance in each aspect of health can influence other aspects. In this study, it is clear that social health as one of the important and influential factors for health is likely to lead to the students' attending group religious rituals, which can be associated with higher levels of spiritual well-being.

However, it is not clear whether students' lack of attending group religious rituals is due to underlying psychiatric or social problems such as depression or sociophobia. This issue needs to be investigated in future studies.

In the present study, spiritual well-being and its subscales were directly and significantly correlated with social health and its subscales, but in group 1, this correlation was not significant for relationship with God and surrounding people (except for family) domain. In group 2, spiritual well-being and its subscales were significantly correlated with social health and its subscales except for relationship with God, relationship with nature, family domain, and community domain with surrounding people domain. A study found that lack of family support was associated with declined spiritual well-being particularly peace domain. Therefore, promotion of system of cancer patient's caregivers can improve spiritual well-being (27).

Regarding the above mentioned, social relationships in the students are likely to be weaker at surrounding people domain than certain domains such as family relationships, which may influence the findings of the current study.

Conclusion

The present study demonstrated that the scores of spiritual well-being and social health in students who attended group religious rituals were higher than those in the students who performed these rituals individually. This finding was also applicable to different aspects of spiritual well-being and social health (except for family domain).

Therefore, it is recommended to perform religious rituals in the universities in groups as much as possible so that the levels of spiritual and social health among the students may be enhanced.

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References

- Nagase M. Does a Multi-Dimensional Concept of Health Include Spirituality? Analysis of Japan Health Science Council's Discussion on WHO's 'Definition of Health' (1998). *International Journal of Applied Sociology*. 2012;2(6):71-7.
- Dhar N, Chaturvedi S, Nandan D. Spiritual health scale 2011: Defining and measuring 4th dimension of health. *Indian Journal of Community Medicine*. 2011;36(4):275.
- Hartz GW. *Spirituality and mental health: Clinical applications*. New York: Psychology Press; 2005.
- Safayi R, Karimi L, Shomoossi N, Ahmadi Tahour M. The relationship between spiritual well-being and mental health of university students. *Quarterly Journal of Sabzevar university of Medical Sciences*. 2011;17(4):274-80.
- Jafari N, Farajzadegan Z, Zamani A, Bahrami F, Emami H, Loghmani A, et al. Spiritual Therapy to Improve the Spiritual Well-Being of Iranian Women with Breast Cancer: A Randomized Controlled Trial. *Evidence-based Complementary and Alternative Medicine : eCAM*. 2013;2013:353262. PubMed PMID: PMC3759260.
- Dalmida SG, Holstad MM, Dilorio C, Laderman G. Spiritual Well-Being and Health-Related Quality of Life Among African-American Women with HIV/AIDS. *Applied research in quality of life*. 2011;6(2):139-57. PubMed PMID: PMC3128373.
- Jafari N, Farajzadegan Z, Loghmani A, Majlesi M, Jafari N. Spiritual Well-Being and Quality of Life of Iranian Adults with Type 2 Diabetes. *Evidence-based Complementary and Alternative Medicine : eCAM*. 2014;2014:619028. PubMed PMID: PMC3926225.
- Salsman JM, Yost KJ, West DW, Cella D. Spiritual well-being and health-related quality of life in colorectal cancer: a multi-site examination of the role of personal meaning. *Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer*. 2011 04/20;19(6):757-64. PubMed PMID: PMC4474154.
- Pirasteh Motlagh A, Nikmanesh Z. The Role of Spirituality in Quality of Life Patients with AIDS/HIV. *The Journal of Shahid Sadoughi University of Medical Sciences*. 2013;20(5):571-81.
- Gonzalez P, Castañeda SF, Dale J, Medeiros EA, Buelna C, Nuñez A, et al. Spiritual Well-Being and Depressive Symptoms among Cancer Survivors. *Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer*. 2014 04/02;22(9):2393-400. PubMed PMID: PMC4324591.
- Peirano AH, Franz RW. Spirituality and Quality of Life in Limb Amputees. *The International Journal of Angiology : Official Publication of the International College of Angiology, Inc*. 2012;21(1):47-52. PubMed PMID: PMC3444036.
- Riley BB, Perna R, Tate DG, Forchheimer M, Anderson C, Luera G. Types of spiritual well-being among persons with chronic illness: their relation to various forms of quality of life. *Archives of physical medicine and rehabilitation*. 1998 Mar;79(3):258-64. PubMed PMID: 9523776. Epub 1998/04/02. eng.
- Russell RD. Social health: an attempt to clarify this dimension of well-being. *International Journal of Health Education*. 1973;16(2):74-84.
- Stain HJ, Brønnick K, Hegelstad WTV, Joa I, Johannessen JO, Langeveld J, et al. Impact of Interpersonal Trauma on the Social Functioning of Adults With First-Episode Psychosis. *Schizophrenia Bulletin*. 2014 11/26;40(6):1491-8. PubMed PMID: PMC4193690.
- World Health Organization. *Social determinants of health* Geneva 2016 [cited 2016 4/Jan]. Available from: http://www.who.int/social_determinants/en/.
- Amini Rarani M, Rafiye H, Khedmati Morasae E. Social Health Status in Iran: An Empirical Study. *Iranian Journal of Public Health*. 2013;42(2):206-14. PubMed PMID: PMC3595657.
- Rahimi N, Nouhi E, Nakhaee N. Spiritual Well-being and Attitude toward Spirituality and Spiritual Care in Nursing and Midwifery Students. *Iran Journal of Nursing*. 2013;26(85):55-65.
- Harb N, El-Shaarawi A. Factors affecting business students' performance: the case of students in United Arab Emirates. *Journal of Education for Business*. 2007;82(5):282-90.
- Babapour Kheiroddin J, Toosi F, Hekmati I. Study of Determinant Factors Role of Students' Social Well-Being. *Journal of Psychology* 2010;4(16):8-26.
- M. Farahaninia, M. Abbasi, A. Givari, H. Haghani. Nursing Students' Spiritual Well-Being and Their Perspectives Towards Spirituality and Spiritual Care Perspectives. *Iran Journal of Nursing*. 2006;18(44):7-14.
- Dastgheib Z, Gharlipour Z, Ghobadi Dashdebi K, Hoseini F, Vafaei R. Association of between mental health and spiritual health among students in Shiraz University. *Journal of Shahid Beheshti School of Nursing & Midwifery*. 2014;24(84):53-9.
- Dehshiri GR, Najafi M, Sohrabi F, Taraghijah S. Development and Validation of the Spiritual Well-being Questionnaire among University students *Quarterly Journal of Psychological Studies*. 2013;9(4):73 -98.
- Abachizadeh K, Tayefi B, Nasehi AA, Mmaryan N, Rassouli M, Omidnia S, et al. Development of a scale for measuring social health of Iranians living in three big cities. *Medical journal of the Islamic Republic of Iran*. 2014;28:2. PubMed PMID: 25250247. Pubmed Central PMCID: Pmc4154288. Epub 2014/09/25. eng.
- Abbasi M, Farahani-Nia M, Mehrdad N, givari A, Haghani H. Nursing students' spiritual well-being, spirituality and spiritual care. *Iranian Journal of Nursing and Midwifery Research*. 2014 May-Jun;19(3):242-7. PubMed PMID: PMC4061623.
- Soltani MAT, Karaminia R, Hashemian SA. Prediction of war veteran's mental health based on spiritual well-being, social support and self-efficacy variables: The mediating role of life satisfaction. *Journal of Education and Health Promotion*. 2014 06/23;3:57. PubMed PMID: PMC4114000.
- Desai P, Wanjari A, From 5th World Ayurveda Congress Bhopal MPID. PA01.04. Assessment of acharrasayan in domain of physical, mental & social health in Ayurveda students. *Ancient Science of Life*. 2012;32(Suppl 1):S53-S. PubMed PMID: PMC3800933.
- Adams RN, Mosher CE, Cannady RS, Lucette A, Kim Y. Caregiving experiences predict changes in spiritual well-being among family caregivers of cancer patients. *Psycho-Oncology*. 2014;23(10):1178-84.

A Comparative Study of Motivation for Major Choices between Nursing and Midwifery Students at Bushehr University of Medical Sciences

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Abstract

Introduction: Motivation, especially in the choice of majors in medical sciences, is of particular sensitivity. Considering the fact that the awareness of students' motivation in major choices makes a great contribution to the quality of students' achievement and education in the future, this study aimed at investigating motivational factors in major choices among the nursing and midwifery students of Bushehr University of Medical Sciences in the academic year 2014-2015.

Materials and Methods: In this cross-sectional study, 204 nursing and midwifery students of Bushehr University of Medical Sciences in the second semester of 2014-15 were selected by convenience sampling method. The data collection instrument in this study was a researcher-constructed questionnaire that consisted of two parts. The first part of this questionnaire encompassed demographic questions and the second part included 14 questions, which assessed three domains of motivational factors (material, spiritual, and social dimensions). After the approval of the face validity and the content validity of the questionnaire by 10 experts, the internal reliability of the questionnaire was determined via Cronbach's alpha coefficient. For data analysis, SPSS version 18 was used.

Results: The mean value of the research units' age was equal to 21.56 ± 1.69 years. In terms of the comparison of motivation, nursing and midwifery students enjoyed a higher level of spiritual motivation (75.94 ± 19.77). A significant difference was reported between nursing and midwifery students in terms of social motivation ($P = 0.045$). There was

a higher level of spiritual motivation in male nursing students than that in female students ($P = 0.046$). In addition, a significant difference was observed between the nursing students in different academic semesters in terms of material motivation ($P = 0.027$). In terms of social motivation, there was a significant difference between married and unmarried midwifery students ($P = 0.031$) and between midwifery students in different academic semesters ($P = 0.014$). Moreover, there was a significant difference between midwifery students of different maternal education levels in terms of spiritual motivation ($P = 0.036$).

Conclusion: The presence of high spiritual motivation in nursing and midwifery students compared to other types of motivation is regarded as a strong point in the education of students. On the other hand, the significant difference between midwifery students and nursing students in social motivation for major choices and also the significance of the difference in this motivation between married and unmarried midwifery students have revealed the need for the assignment of midwifery professors and authorities' higher attention to the strengthening of spiritual dimensions and introduction of the actual status of this sacred profession and its critical role in the health system.

Key words: motivation, major, students, nursing, midwifery

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Introduction

Motivation is the factor for doing a wide range of activities, including learning. In fact, motivation energizes learners and directs their activities (1). There are different theories about the origin of motivation. Maslow was the first scholar who gave attention to psychological, social, and physical needs and considered them to be the source of motivation. This means that an unsatisfied need creates such a tension that it causes the organism to embark on doing an action (2). The availability of motivation during the process of learning and education leads to the facilitation of learning, facilitation of communication, decrease of anxiety, and production of creativity in learning (3). People have different types of motivation in performing different activities, including learning and education (2). Undoubtedly, the high level of motivation is one of the basic factors in the success and progress of each task. Studies have shown that most innovations, productions, explorations, and creativities are inspired by high motivation. Educationalists also claim that learning and behavioral change take place when learners are sufficiently and strongly motivated; thus, the ignorance of this important factor results in the waste of a significant percentage of education costs (4). Since training centers are always in contact with learners who apparently lack motivation, the understanding and identification of the factors that motivate learners will help instructors anticipate the complex environments in which motivation is formed. Given that motivation is a multifactorial phenomenon and involves a total and an inclusive learning environment, it is necessary to possibly consider all the domains in evaluating the factors effective in the generation of motivation (5). Major choices and job selection are among the most important individual decisions in life. Research has shown that there is hardly ever the possibility of occupational change in some majors after the completion of education and it takes huge amounts of cost and time. Hence, major choices at college should be followed by higher levels of precision and thought (6). Studies in this area have referred to the following as the effective motivational factors in major choice: family and educational environments, influential people in one's life, social, cultural, and economic factors, interests, values, beliefs, personality traits, and personal skills (7 and 8). Studies have indicated that background factors (gender, race, and socioeconomic status) can also have a direct impact on individuals' motivation for major choices in addition to the presence of motivational factors for students' choice of special academic disciplines (9). A number of studies have shown that students of various medical groups have different types of motivation for choosing their major (10). Abedian et al. (2012) reached the conclusion that the majority of participants referred to their motivation for selecting a nursing major as an opportunity to earn higher degrees. Moreover, the male and female students had referred to the scientific content of nursing and the acquisition of job position as their second priority (6). Ulrich et al. conducted a study on midwifery students and reported interest in this major, friends' encouragement, and even the experience of pregnancy as the factors effective in choosing the discipline (11). Alizadeh et al.'s review on

students of Islamic Azad University of Rasht showed that the main motivation of students for choosing their field of study has been the usefulness of the midwifery profession in personal life (12). Zysberg et al. argued that the main reason for the selection of nursing as the major in women is the match between individual personality and nursing personality as a profession and referred to the satisfaction of financial needs and the possibility of employment and job security as the main reason for the selection of nursing as the major in men (13). Alizadeh et al. investigated the factors related to major choices among the medical students of University of Guilan in the second semester and above in four areas of personal, occupational, economic, and social factors. In that study, the most important factors in the choice of the academic major were personal and economic factors where labor market from the economic factors, and personal interest out of personal factors, were the most relevant aspects (14). Kosgeroglu used three subscales of intrinsic motivation, extrinsic motivation, and negative motivation to determine motivation for learning goals among nursing and midwifery Turkish students. The results suggest the existence of students' intrinsic motivation for choosing these professions (15).

The identification of the factors involved in the choice of academic discipline is essential because if the choice of academic majors is in conflict with one's interest, taste, talent, and ability, it will have adverse long-term psychological, social, and economic effects. This is of particular sensitivity, especially in Medical Science disciplines since these students will be responsible for providing, maintaining, and promoting public health in the future. Therefore, this issue is of great importance and few studies, if any, have investigated nursing and midwifery students' motivation of major choices through census method. In addition, the diversity and difference of the instruments used in related studies and the need for the development of a valid tool that can measure the concept of motivation in a better way inspired the authors to examine the motivational factors in the major choices among the nursing and midwifery students of Bushehr University of Medical Sciences in the academic year 2014-15 by means of a questionnaire whose psychometric assessment had been performed in the current research population (16).

Methods

This study was a descriptive-analytical study in the category of cross-sectional research that explores the motivational factors in choosing to be nursing and midwifery students of Bushehr University of Medical Sciences in the academic year 2014-2015. The research population consisted of 230 second-semester bachelor students of Nursing and Midwifery majors in the academic year 2014-15. Sampling was conducted via census method and all the second-semester nursing and midwifery students studying in bachelor's program at Bushehr University of Medical Sciences in the academic year 2014-15 participated in the study. From the total of 230 sample units (all nursing and midwifery students studying at the university), 26 students were excluded from the study (due to absenteeism in the

classroom at the time of sampling and their rejection of the questionnaire completion) and the data pertaining to the total of 204 participants were gathered. In this study, the data were collected using a researcher-constructed questionnaire that had been designed by an integration of Waltz method and the present research methodology (16). This questionnaire consisted of two parts. The first part encompassed demographic questions (including age, gender, marital status, parents' occupation and education, and residential address) and the second part included 14 questions, which assessed three domains of material (7 items), spiritual (3 items), and social motivation (4). The measurement scale of motivational factors is scored based on a 5-point Likert scale (very high, high, moderate, low, and very low). The initial version of the questionnaire was designed based on literature review. After the confirmation of the face validity and the content validity of the questionnaire by 10 experts, the content validity index

and the content validity ratio of the scale were obtained equal to 0.92 and 0.97, respectively. Exploratory factor analysis was used to examine the construct validity of the scale and the final version of the questionnaire was obtained with 14 items in three motivational factors, namely material, spiritual, and social dimensions with the predictive power of 0.55. The internal reliability of this scale was confirmed through the conduct of a pilot study on 30 students with a Cronbach's alpha coefficient of 0.82. After obtaining the necessary permission from the faculty and the relevant professors, the researcher attended the desired classes, explained the objectives of the research, mentioned the optionality of participation in the study, and informed participants about the confidentiality of the data. Then, all students interested in participating in the study were invited. The data were analyzed in SPSS version 20 through descriptive statistics, t tests, ANOVA, and Kruskal-Wallis test, and Mann-Whitney U-test.

Results

The participants of the study were placed in the age range of 18-27 years with the mean and standard deviation of 21.56 ± 1.69 . In terms of gender, the majority of the students participating in the study were female (79%, 160 cases) and more than half of the participants were nursing students (56.9%, 116 cases) (Table 1).

Table 1: Frequency of nursing and midwifery students in the study in terms of demographic variables

Demographic variables		(Percentage) Number
Gender	Male	42 (20.8)
	Female	160 (79.2)
Field of Study	Nursing	116 (56.9)
	Midwifery	88 (43.1)
Semester	2	52 (25.5)
	4	52 (25.5)
	6	46 (22.7)
	8	53 (26.1)
Housing	Dormitory	165 (80.9)
	Home	39 (19.1)
Marital status	Unmarried	159 (77.9)
	Married	45 (22.1)

Based on the results of this study, the evaluation of the motivation of nursing and midwifery students in three dimensions of motivation (material, spiritual, and social dimensions) revealed that spiritual motivation had a higher mean value (75.94 ± 19.77) than material and social motivation (Table 2). In terms of gender, there was a significant difference in nursing students regarding spiritual motivation for the choice of nursing discipline in such a way that there was a higher level of spiritual motivation in male students than that in female students ($P = 0.046$). According to the ANOVA results, there was a significant difference between nursing students at different semesters regarding material motivation ($P = 0.027$); however, such a significant difference was not observed in other motivations (Table 3).

Table 2: Mean and standard deviation of different dimensions and total motivation of students

Dimension	Mean SD
Material motivation	63.86 ± 19.19
Social motivation	58.73 ± 20.67
Spiritual motivation	75.94 ± 19.77
Total motivation	64.97 ± 15.36

Variable	Frequency (Percentage)	Material motivation		Social motivation		Spiritual motivation		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
						Mean Rank			
Gender	Male	42 (36.5)	65.05±21.39	61.31±22.77	80.16±19.99	65.50	80.16±19.99	80.16±19.99	
	Female	72 (63.5)	61.97±19.01	52.99±21.36	73.03±20.53	52.83	73.03±20.53	73.03±20.53	
	P		0.429	0.054	0.046			0.74	
Academic semester	Semester 2	35 (30.2)	66.63±18.88	56.07±23.11	76.67±19.68	58.93	65.77±16.71	65.77±16.71	
	Semester 4	30 (25.9)	60.84±21.33	56.46±20.40	73.89±24.44	57.73	62.81±18.11	62.81±18.11	
	Semester 6	22 (19)	70.29±16.66	52.98±22.03	78.03±19.84	61.59	68.03±14.77	68.03±14.77	
	Semester 8	28 (24.1)	55.10±19.30	58.71±23.34	75.01±16.82	54.30	60.40±15.94	60.40±15.94	
	P		0.027	0.85	0.887		0.376	0.376	
Marital status	Unmarried	93 (80.2)	63.51±19.70	55.98±21.77	21.96±75.27	59.16	64.21±16.57	64.21±16.57	
	Married	23 (19.8)	59.94±20.74	57.07±23.56	76.45±12.48	55.85	62.66±16.98	62.66±16.98	
	P		0.443	0.833	0.670		0.690	0.690	
Father's education	Illiterate	7 (6)	62.24±25.91	67.71±21.44	82.14±16.27	68.21	71.13±20.18	71.13±20.18	
	Elementary school	20 (17.2)	61.07±23.06	56.25±18.70	72.08±25.69	56.13	62.05±18.83	62.05±18.83	
	Secondary school	16 (13.8)	63.84±14.16	54.30±21.74	75.52±22.87	60.28	63.62±13.64	63.62±13.64	
	High school diploma	42 (36.2)	65.24±20.90	51.04±25.15	17.56±19.41	59.63	63.89±17.66	63.89±17.66	
	Academic education	31 (26.7)	60.25±18.13	61.90±18.42	74.73±18.06	55.39	63.82±14.91	63.82±14.91	
	P		0.861	0.188	0.900		0.850	0.850	
Mother's education	Illiterate	17 (14.7)	63.66±23.33	57.42±25.23	78.43±19.11	62.88	18.66±20.26	18.66±20.26	
	Elementary school	40 (34.5)	63.13±18.57	87.03±19.82	75.21±21.97	59.13	63.97±15.67	63.97±15.67	
	Secondary school	20 (17.2)	59.96±18.73	54.69±22.66	73.33±21.90	55.71	61.94±15.22	61.94±15.22	
	High school diploma	28 (24.1)	60.97±19.97	50.00±22.31	75.89±17.62	56.77	61.03±16.58	61.03±16.58	
	Academic education	11 (9.5)	69.81±22.27	69.89±19.53	75.00±23.27	58.95	70.94±16.9	70.94±16.9	
	P		0.736	0.152	0.971		0.501	0.501	

Table 3: Comparison of the mean scores of motivation dimensions based on demographic features (nursing students)

Variable	Frequency (Percentage)	Material motivation		Social motivation		Spiritual motivation		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender									
Male	42 (36.5)	65.05±21.39		61.31±22.77		80.16±19.99		65.50	80.16±19.99
Female	72 (63.5)	61.97±19.01		52.99±21.36		73.03±20.53		52.83	73.03±20.53
P		0.429		0.054		0.046			0.74
Academic semester									
Semester 2	35 (30.2)	66.63±18.88		56.07±23.11		76.67±19.68		58.93	65.77±16.71
Semester 4	30 (25.9)	60.84±21.33		56.46±20.40		73.89±24.44		57.73	62.81±18.11
Semester 6	22 (19)	70.29±16.66		52.98±22.03		78.03±19.84		61.59	68.03±14.77
Semester 8	28 (24.1)	55.10±19.30		58.71±23.34		75.01±16.82		54.30	60.40±15.94
P		0.027		0.85		0.887			0.376
Marital status									
Unmarried	93 (80.2)	63.51±19.70		55.98±21.77		21.96±75.27		59.16	64.21±16.57
Married	23 (19.8)	59.94±20.74		57.07±23.56		76.45±12.48		55.85	62.66±16.98
P		0.443		0.833		0.670			0.690
Father's education									
Illiterate	7 (6)	62.24±25.91		67.71±21.44		82.14±16.27		68.21	71.13±20.18
Elementary school	20 (17.2)	61.07±23.06		56.25±18.70		72.08±25.69		56.13	62.05±18.83
Secondary school	16 (13.8)	63.84±14.16		54.30±21.74		75.52±22.87		60.28	63.62±13.64
High school diploma	42 (36.2)	65.24±20.90		51.04±25.15		17.56±19.41		59.63	63.89±17.66
Academic education	31 (26.7)	60.25±18.13		61.90±18.42		74.73±18.06		55.39	63.82±14.91
P		0.861		0.188		0.900			0.850
Mother's education									
Illiterate	17 (14.7)	63.66±23.33		57.42±25.23		78.43±19.11		62.88	18.66±20.26
Elementary school	40 (34.5)	63.13±18.57		87.03±19.82		75.21±21.97		59.13	63.97±15.67
Secondary school	20 (17.2)	59.96±18.73		54.69±22.66		73.33±21.90		55.71	61.94±15.22
High school diploma	28 (24.1)	60.97±1.97		50.00±22.31		75.89±17.62		56.77	61.03±165.86
Academic education	11 (9.5)	69.81±22.27		69.89±19.53		75.00±23.27		58.95	70.94±16.9
P		0.736		0.152		0.971			0.501

Table 4: Comparison of the mean scores of motivation dimensions and total motivation based on demographic features (midwifery students)

In midwifery students, the mean score of social motivation in married students was reported to be higher than that in unmarried students ($P = 0.031$). In these students, a significant difference was also observed in spiritual motivation between students with different levels of maternal education ($P = 0.036$). The comparison between midwifery students at different academic semesters revealed the existence of a significant difference in the degree of their social motivation ($P = 0.014$) (Table 4).

Based on the results of comparing the mean score of different motivational dimensions between nursing and midwifery students, a significant difference was observed between nursing and midwifery students in terms of social motivation ($P = 0.45$) in such a way that midwifery students enjoyed higher levels of social motivation for the choice of their academic majors than nursing students (62.07 ± 18.38) (Table 5).

Table 5: Comparison of mean scores of different dimensions of motivation and total motivation of students based on academic disciplines

Variable	Material motivation	Social motivation	Spiritual motivation	Total
	Mean SD	Mean SD	Mean SD	Mean SD
Nursing	62.80±19.87	56.20±21.99	75.50±20.539	101.79
Midwifery	65.26±18.27	62.07±18.38	76.52±19.502	103.44
P	0.366	0.045	0.842	0.244

Discussion

Given the role of motivation in the choice of academic majors and the importance of recognizing the factors involved in the choice of academic disciplines, especially in medical sciences, this comparative study was carried out to evaluate the nursing and midwifery students' motivation for choosing nursery and midwifery disciplines at Bushehr University of Medical Sciences. Based on the findings of the current study, out of three types of motivation, namely material, social, and spiritual motivation, spiritual motivation took up the highest mean score in nursing and midwifery students. This finding is consistent with those of the studies carried out by Dalir and Arfaie (8 and 17), but is not consistent with the findings reported by Suarez and Karin (18 and 19). This inconsistency can be attributed to the difference in the attitude and culture of the two populations.

In this study, a significant difference was found in social motivation between midwifery students and nursing students observed. This finding is consistent with the research findings reported by Dalir et al. Alizadeh who argued that the parents and friends opinion about the choice of midwifery and nursing as academic majors had led to a significant difference in social motivation between the choices of these two majors (8 and 13). In contrast, this finding is inconsistent with the studies carried out by Karin and Suarez (18 and 19). This contradiction can be due to the differences in cultural backgrounds of the communities under study since all midwifery students are women and, thereby, women's goal for entering the university may be to experience socialization and social interaction due to the limitations women are faced with. However, the presence of male students in nursing discipline can moderate this effect. On the other hand, negative cultural and social attitudes towards the nursing profession may have caused it to affect people's viewpoint in the lower social status of this profession. In this regard, Law et al. claimed that the

negative attitude toward nursing profession in more than 50 percent of students was due to the low status of this profession in society. In the same way, Karaoz referred to the low status of nursing profession as the main reason for students' negative attitude toward nursing profession (20 and 21). In addition, the possibility of establishing an independent office and, thus, creating less tension compared to teamwork have been referred to as the factors effective in the selection of midwifery as the academic discipline in various studies. This can be due to the influence of parents and the society's perspective of midwifery (22 and 23).

Male nursing students enjoyed higher levels of spiritual motivation than female students, which is inconsistent with the studies conducted in this field because labor market (material motivation), the possibility of employment, and job security in male students have been reported among the main causes of major choices in this field (9, 8, 3.7). According to the above-mentioned studies, the high level of material motivation in male students compared to female students is the main reason for choosing this discipline among boys. It seems that the increased spiritual motivation in male students in this study and its difference with the mentioned studies can be due to the creation of a proper culture in understanding the role of male nurses in the community in accordance with the cultural-religious context of the country, the emphasis of authorities on the implementation of the compliance plan at treatment centers in recent years, and bringing up the male nurses in hospitals with strong motivation. On the other hand, this contradiction can be due to the highlight of the economic role of women in meeting the material needs of families, which has caused men not to choose their jobs with such a strong motivation as that in the past. The fact that people select such professions as nursing with the intention of God's satisfaction and altruistic purposes are regarded as a strong point and success in the education of students since the availability of spiritual motivation is one of the components and the main objectives of the nursing profession.

In the present study, high material motivation in the sixth-semester nursing students and, then, the reduction of this motivation in the eighth-semester students can be due to the attraction of students above semesters 5 to clinical fields as student work. On the other hand, due to the untimely payment of salaries disproportionate with the workload, this motivation is gradually reduced and the reflection of this reduced financial motivation can be observed in motivation for choosing the nursing profession. In this regard, Mahmoudi et al. have referred to low salaries and wages as the least important factors in choosing the nursing profession (23).

Another finding of this study is the presence of high social motivation in married students of midwifery, which is in line with the results of a study conducted by Asadzadeh et al. (3). However, other studies in this area have not reported similar or contradictory results (8, 9, and 15). The advisability of parents and caregivers and proximity to the residential location are among the other dimensions of social motivation in this study while the role of the surrounding individuals and parents in choosing the academic major were the factors that could justify the high social motivation for choosing the academic major among married students in Asadzadeh et al.'s study.

In this study, spiritual motivation in midwifery students with mothers of lower education has witnessed an increase, which is consistent with Asadzade's findings (3). In fact, Asadzadeh found that parents with higher education had higher material attitudes towards the nursing profession. This can be attributed to the higher possibility of employment in this profession from the perspective of these parents. On the other hand, educated parents will have normally higher socio-economic status because of their better and more useful job opportunities and this affects their children's motivation for the choice of future careers.

One of the other findings of this study is the increased level of social motivation in midwifery students with higher academic semesters, which is consistent with the results of some studies in this field (4, 8, and 13). On the other hand, the findings of Arfaie's study on the midwifery students of Azad University of Semnan and Alizadeh's study on the students of Azad University of Rasht are not in line with the results of this study (13 and 17). This difference seems to be due to the type of the research population (Islamic Azad University) since these students have to pay tuition for their education. Therefore, they willingly select their desired academic majors not merely for the sake of proximity to their parents' residential location or due to their friends' opinions.

Conclusion

The promotion of educational consultation at schools and the invitation of successful nurses and midwives in society in order to acquaint students with these professions and their importance can clarify the real position of these jobs in the public domain.

Given that this study was conducted only on nursing and midwifery students at one university, the obtained results cannot be generalized to all nursing and midwifery students. Therefore, the conduct of research at broader levels across multiple nursing and midwifery schools and their comparison with each other can provide more information in this regard.

Another limitation of this study was that the findings are based on the extraction of students' ideas using quantitative instruments and specific preplanned questions. Thus, for the achievement of deeper and richer findings, it is recommended that future studies be conducted using qualitative research methods through individual and group interviews.

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References

- 1- Seif AA. Learning Psychology. 10th Edition. Tehran, Doran Publication; 2010.p. 120-125.
- 2- Mogaddam B. Psychology practice in education. 7th ed. Tehran: Seda and sima, 2007.
- 3- Asadzadeh F, Mostafazadeh F, Sadeghi S. A survey of the Motivation of Nursing Student toward Their Field of Study Selection. *Journal of Health and Care*. 2012; 14 (1 and 2):9-15
- 4- Abbas pour S, Hasan Zedeh M. Motivations For The Choice Of The Nursing Discipline In Faculty Of Nursing In Torbat Heidariyeh *Journal of Nursing and Midwifery Uremia of Medical Sciences*.71-74:(2)6;2008.
- 5- Oshvandi Kh, Zamanzadeh V, Ahmadi F, Fathi-Azar E, Barriers to Nursing Job Motivation, *Research Journal of Biological Sciences* , 2008 ;3(4): 426-434
- 6- Amini A, Valizadeh S, Mohammadi B. Survey of effective factors on learning motivation of clinical students and suggesting the appropriate methods for reinforcement the learning motivation from the viewpoints of nursing and midwifery faculty, *Tabriz University of Medical Sciences. Iranian Journal of Medical Education*. 2002; 2:10-11
- 7- Abedian K, Shahhosseini Z. Factors Affecting Students' Motivations for Choosing Nursing as a Career: A Cross-Sectional Study. *Family Health*; 2013; 1(3); 26-32
- 8- Dalir Z - Shojaeian2 Z, et al. Survey on the Motivation of Nursing and Midwifery Students toward Their Field of Study Selection- *Nursing and Midwifery School 1387-Iranian Journal of Nursing Research*. 2011, (20):44-51
- 9- Zysberg L. Berry D.M. Gender and student's vocational choices in entering the field of nursing. *Nursing Outlook*. 2005; 53(4): 193-198.
- 10- Hashemipour M. Dental students' motivation for entering dentistry in Kerman school of dentistry. *Iranian Journal of Medical Education* 2006; 6(1): 109-15

- 11- Sorori-Zanjani R, Tajkey J. University Entrance Motivations of Pharmacy Students of Zanjan Pharmacy School. *Journal of Medical Education Development* 2009; 1(1): 29-36.
- 12- Ulrich S. Application to a nurse-midwifery education program discloses factors that influence their career choice. *Journal of Midwifery & Women's Health* 2009; 54(2): 127-32.
- 13- Alizadeh SH, Sigarchian M. The Motivation of Choosing Midwifery Field of Study and Related Factors among the Midwifery Students of Islamic Azad University, Rasht Branch, Iran. *Strides in Development of Medical Education*, 2013; 10(1):78-86
- 14- Alizadeh Y, Khoshbakht Pishkhani M, Kazemnezhad Leily E, Khoshrang H, Behboudi H, Mohammadi M, et al . Factors Associated with Medical Students Tendency to Choose a Medical Specialty. 2014; 23 (89):29-36
- 15- Kosgeroglu N, Acat MB, Ayranci U, Ozabaci N, Erkal S. An investigation on nursing, midwifery and health care students learning motivation in Turkey. *Nurse Education in Practice*. 2009; 9(5):331-339
- 16- Pouladi S, Noroozi F. Designing and psychometric properties of nursing and midwifery students' motivation about select the field of study. 3 *JNE*. 2017; 6 (1):61-70
- 17- Arfaie K. Assesin motivational factors in choosing Midwifery as a career in Tehran Medical Sciences Universities. *Iranian J Med Educat*. 2007; 2(18):451-453.
- 18- Suarez V, Shankilin C. Evaluating career values of dietetic student. 2004; *J Allied Health*; 33(1):51-54.
- 19- Karin VR, Pere BLK, Granumm V. How do Nursing students regard their future career? Preferences in postmodern society. *Nurs Educat Today*. 2004; 24(7):493-500
- 20- Law W, Arthur D. what factors influences Hong Kong school students in their choice of a career in nursing. *International Journal of nursing studies*. 2003; 40(1): 23-32.
- 21- Karaoz S. Change in nursing students' perceptions of nursing during their education: the role of the introduction to nursing course in this change. *Nurse Education Today*. 2004; 24(2): 128-135.
- 22- Rognstad M.K, Aasland O. Change in career aspiration and job values from study time to working life. *Journal of Nursing Management*. 2007; 15(4): 424-432.
- 23- Mahmoudi H, Ebrahimian A, Solymani M, Ebadi A, Hafezi S, Fayzi F, et al. The study of job motivation factors in critical in care nurses. *J Behav Sci*. 2008; 1(2):171-8. [Persian]

Barriers to the management of ventilator-associated pneumonia: A qualitative study of critical care nurses' experiences

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Abstract

Background & Aims: Ventilator-associated pneumonia (VAP) is associated with serious complications such as morbidity and mortality, prolonged hospital stay, and great financial burden. The purpose of this study was to explore critical care nurses' experiences of the barriers to VAP management.

Materials & Methods: This descriptive qualitative study was done in 2015 using the conventional content analysis approach. A purposive sample of twelve critical care nurses was selected. Data were collected through unstructured interviews and focus group discussions. Graneheim and Lundman's qualitative content analysis was employed for data analysis. The trustworthiness of the data and the findings was ensured by adopting the criteria proposed by Lincoln and Guba.

Results: The major barriers to VAP management were low quality of working life and poor organizational culture.

Conclusion: Nurses can help manage effective VAP through learning new and standard approaches to care delivery and adhering to standards of care.

Key words:
VAP management,
Quality of working life,
Organizational culture

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Introduction

Nosocomial infections are a major global health problem (1, 2) and the commonest complication of hospital care (3). The most prevalent and fatal nosocomial infection in intensive care units (ICUs) is ventilator-associated pneumonia (VAP) (4). The prevalence of VAP is as high as 9%–27% (5).

Intubated patients rapidly develop VAP within the first five days after intubation (5, 6). The risk factors for VAP are numerous and include accumulation of secretions behind the cuff of the endotracheal tube, impaired cough reflex, reduced ciliary activity, immobility, lying in the supine position (7), aging, underlying conditions, altered consciousness, endotracheal intubation, poor nutrition, healthcare workers' poor hand hygiene (8), hypoxia, naso-gastric tube, acidosis, pulmonary edema, immunosuppression (9), burns, disorders of the central nervous system, severity of the underlying conditions, re-intubation, and surgery (10).

VAP extends the duration of mechanical ventilation, prolongs ICU and hospital stay (11 and 12), and expands hospital staff's workload (11). Besides, it is responsible for half of all antibiotic prescriptions for patients receiving mechanical ventilation (8) and imposes a heavy financial burden on patients and healthcare systems (13). According to Lawrence and Fulbrook (2011), VAP adds to the cost of hospital care by 40,000 US dollars per patient per hospital admission (14).

Given the serious complications of VAP and the priority of prevention over treatment, VAP prevention is the most cost-effective and optimal way for fighting VAP (15). Studies have shown that one third of all nosocomial infections such as VAP are preventable (16). Currently, VAP prevention is considered as one of the key components of patient safety guidelines (4), a main safety goal (17), and a quality improvement indicator in most healthcare systems, and a criterion for evaluating ICUs (18).

Despite many efforts for controlling VAP, its incidence rate is still very high and it is the most fatal nosocomial infection. Consequently, prevention and management of VAP necessitate continuous monitoring (19), effective problem assessment, and all-party support. According to Lambert et al. (2013), all hospital staff need to receive continuing education about VAP management. Moreover, preventive measures should be designed to improve the quality of hospital care (17).

Nurses are the most important component of nosocomial infection prevention programs (20). As healthcare providers who have constant presence in clinical settings, nurses have significant roles in preventing and managing health problems and providing care to patients. In addition, implementing VAP prevention strategies is among the key responsibilities of nurses. Thus, exploring their experiences is of great importance. Nonetheless, most of the previous studies into VAP prevention had been done by using quan-

titative designs, leaving nurses' experiences of VAP prevention poorly explored, if at all. The present study was made to bridge this gap. The purpose of the study was to explore critical care nurses' experiences of the barriers to VAP management.

Methods

Design

This descriptive qualitative study was done by using the conventional content analysis approach (21).

Setting

The study was conducted in 2015 in a teaching hospital located in Lorestan Province, Iran.

Participants

Sampling was done through purposeful sampling and was continued until reaching data saturation (22). Consequently, twelve critical care nurses were selected. Nurses were included if they had at least a bachelor's degree in nursing, minimum work experience in ICUs of three months, desire for sharing their experiences, and stable psychological state for establishing communication. We excluded them if they voluntarily withdrew from the study or avoided sharing their experiences.

Data collection

Semi-structured interviews were carried out with twelve nurses for data collection, each of which lasted 30 minutes, on average. Besides, we held two focus group discussions. The size of each focus group was six nurses and the length of the discussions was 25 minutes, on average. Focus group discussions help collect data from a large sample of participants in a short period of time while semi-structured personal interviews provide a deeper understanding of the intended phenomenon (23). Broad open-ended interview questions were employed to delve into the participants' experiences. Some of the interview questions were: "What care measures do you use to prevent VAP?" "How does the physical structure of your unit affect VAP management?" "How do the facilities and equipment in your unit affect VAP management?" "What are the barriers to VAP management in your unit?" "What are the facilitators to VAP management in your unit?" Besides these main interview questions, follow-up questions were also asked to clarify ambiguities in experiences shared by the participants. The interviews and the focus group discussions were recorded digitally using a MP3 recorder.

Data analysis

Concurrently with data collection, we performed data analysis by pursuing the Graneheim and Lundman's five-step approach to content analysis (21). Immediately after holding each interview, it was transcribed word by word and read for several times. Then, primary codes were extracted, compared and merged with each other, and grouped into categories based on their similarities.

Rigor and data trustworthiness

The credibility of the data was maintained through employing the member checking technique, allocating adequate time to data collection, and arranging the interviews based on the interviewees' preferences. Moreover, confirmability was ensured through sending the interviews, codes, and categories to several external reviewers and asking them to assess the accuracy of data analysis, while dependability was maintained by immediate transcription and analysis of each interview. The maximum variation sampling was also employed to enhance the transferability of the findings (24).

Ethical considerations

Ethical approval for the study was obtained from the Ethics Committee of Lorestan University of Medical Sciences, Khorramabad, Iran. After explaining the aim and the methods of the study to the participants, their informed consent for participation in the study and recording their interviews was secured. They were ensured that their information would be treated as confidential and they would have access to the findings.

Results

Most of the participants were female (10 cases). The means of their age and professional experience were 25.3 and 4.6 years, respectively. Their experiences of the barriers to VAP management came into two main themes of low quality of working life and poor organizational culture which are shown in Table 1 and explained in what follows.

Table 1: Main themes, categories and subcategories of critical care nurses' experiences of the barriers to VAP management

Main themes	Main categories	Subcategories	
Low quality of working life	Difficult nature of critical care delivery	Mandatory extra shifts	
		Manpower's Shortage	
		Heavy workload	
		Defective equipment	
		Poor structural condition	
Lack of opportunities for learning and skill development	Unfair salaries	Traditional care delivery	
		Professional incompetence	
		Complex nature of work	Critical conditions of patients in ICUs
			Low safety for critical care nurses
			Unprofessional practice
Disbelief in standard care delivery			
Poor organizational culture	Strict supervision of nurses		
	Poor professional interactions	Professional distrust	
	Reluctance to perform care measures	Poor interdisciplinary collaboration	
	Routine-based practice		

A. Low quality of working life

Quality of working life (QWL) is the result of workers' satisfaction with their needs and is achieved through attending workplaces. In healthcare organizations, QWL is among the principal factors behind the quality of workers' performance and care. According to our participants, low QWL was among the main barriers to effective VAP management. The five main categories of this main theme were difficult nature of critical care delivery, lack of opportunities for learning and skill development, unfair salaries, complex nature of work, and unprofessional practice.

A1. Difficult nature of critical care delivery

Critical care delivery is complex and difficult because patients who are hospitalized in ICUs usually are critically ill and suffer from life-threatening conditions. The participating nurses referred to low nurse-patient ratio as a major barrier to effective VAP management.

The number of nurses is low and we have to do extra working shifts. Therefore, we are too fatigued to provide quality care. Or, we are very busy at work. There are only two nurses in each shift and hence, we have not adequate time for implementing care measures properly. For instance, instead of letting gavage soup pass through

the nasogastric tube, we push it forcibly by using a gavage syringe. Another instance is that we do not perform suctioning properly in order to be able to carry out our other care-related responsibilities (P. 2).

Nursing staff shortage negatively affected the participants' care quality through increasing their workload and the number of their mandatory extra shifts. Mandatory extra shift was referred to by the participants as another barrier to effective VAP management. Such working schedule tired them, disturbed their personal life, broke their concentration, and reduced the quality of care.

As I have a little baby, I don't want to do extra shifts. However, the hospital nursing office doesn't agree and thus, I have to do extra shifts. When doing extra shifts, I'm greatly preoccupied with my baby and hence, I cannot perform my tasks properly. For instance, I may avoid performing suctioning accurately (P. 1).

Another workforce-related barrier to effective VAP management was lack of professional physiotherapists in hospitals. Therefore, the participants were required to do the extra task of performing physiotherapy for patients. However, they considered physiotherapy neither as their own responsibilities nor as a routine practice and hence, it was usually overlooked.

It is for about two years that there is no physiotherapist in our hospital and thus, physiotherapy is usually performed by us even though it is not among our responsibilities. We perform physiotherapy only for the sake of patients. Of course, our physiotherapies are not standard enough (P. 3).

Critical conditions of patients who are hospitalized in ICUs and their greater need for specialized care services along with serious staff shortage had dramatically expanded our participants' workload. Such a working condition had forced them to pay little attention to the quality of care. On the other hand, during shift handover, the quantity of care was valued much greater than its quality. In other words, if nurses performed smaller number of their tasks with greater quality, they were accused of shirking. Such a practice had resulted in the delivery of low-quality care.

When I'm too busy, I cannot perform suctioning or other care measures accurately because I need to perform each measure quickly in order to have adequate time for my other tasks. Thus, I usually pay little attention to the quality of work because during shift handover, no one values the quality of my care; rather, they only value the amount of undone tasks. Therefore, I need to do all my tasks at any level of quality in order not to be accused of shirking (P. 4).

Despite the necessity to use high-tech equipment in ICUs, our participants noted that they had little access to such equipment. They referred to defective or inadequate equipment as another barrier to effective VAP management. In other words, they had many difficulties in providing

quality patient care due to having limited access to basic critical care equipment. Defective equipment resulted in providing nonstandard care while lack of equipment resulted in failure to perform some care measures such as measuring the pressure of endotracheal tube cuff.

The remote controllers of the beds in our unit are defective. When we are too busy with other care measures, we are unable to change the controllers and thus, patients may be in an inaccurate position during gavage (P. 5). We never measure the pressure of endotracheal tube cuff because we have no access to the necessary equipment (P. 7).

Another barrier to effective VAP management was poor and nonstandard structural conditions of ICUs both for patients and nurses. For instance, the participants' working unit had neither an air conditioning system nor an isolated room for patients with infectious diseases. Besides, the windows to open space were kept open for long hours and inter-bed distances were too small. Therefore, the likelihood of infection transmission was high. In addition, the staff resting room was in poor condition.

The physical space of the unit is too awful. There is a small space between the beds and there is no air conditioning system in the unit. In case of poor air conditioning, both nurses and patients are at risk of bacterial infections (P. 6).

A2. Lack of opportunities for learning and skill development

One of the key characteristics of critical care nurses is to have great knowledge of care. In other words, nurses who are not knowledgeable enough cannot work in these units. Nonetheless, our participants' experiences showed that critical care services were provided based on usual routines. In other words, novice nurses learned the way of care delivery from their experienced colleagues and took professional knowledge-based practice for granted. Such a practice had resulted in nonstandard care delivery.

The most important thing for us is that the endotracheal tube cuff be kept full. Therefore, other things (such as the pressure of the cuff) are not very important. We just inject 5 cc of air into the cuff.

According to the participants, some critical care nurses did not have enough professional competence for working in ICUs due to poor in-service education. For instance, some nurses were not skillful enough for measuring the pressure of endotracheal tube cuff or doing physiotherapy. Moreover, as attending physicians or anesthesiologist refrained from setting ventilators, nurses were obliged to do this task despite having received no in-depth training in this area. Consequently, they set ventilators based on their own personal experience.

I have no adequate knowledge about ventilators. Thus, there may be an opportunity for weaning a patient from the ventilator while I cannot take advantage of such opportunity due to having poor weaning skills. Therefore, the patient

may unnecessarily receive mechanical ventilation for many days (P. 8).

A3. Unfair salaries

Because of their heavier workload and stressful work condition, the participating nurses expected to receive higher salaries compared with nurses in other hospital wards. However, hospital administrators' inattention to fair budget and resource allocation had reduced their motivation for work. Financial issues were so important to the nurses that they referred to them as a significant factor behind care quality.

The salaries of critical care nurses should be different from those of nurses in other hospital wards. However, there is no difference between the salaries of these two groups in our hospital. Sometimes, critical care nurses' salaries are even less than other nurses. Such practice significantly contributes to our poor motivation for work (P. 1).

A4. Complex nature of work

When providing care to critically-ill patients in critical situations, the nurses focused mainly on saving patients' life and paid little attention, if any, to the requirements of each care-related activity. Accordingly, they might insert an intra-tracheal tube or perform suctioning under unsterile conditions, resulting in greater risk for VAP. The likelihood of such an unsterile practice was greater in stressful situations such as in emergencies or once working with an inexperienced colleague.

When a patient is critically-ill and needs intubation, I just focus on intubating him/her irrespective of the quality or the sterility of the procedure. The most important thing in such situations is to prevent patient's death (P. 9; group discussion).

Shortage of personal protective equipment had also caused most of the participants to develop hospital-acquired respiratory infections. They referred to this fact as a negative experience and mentioned that they avoid providing standard care to patients with serious infections in order to protect themselves against infections.

Here, I developed pneumonia several times. In order to prevent another episode of pneumonia, I perform suctioning for patients with pneumonia in a very short period of time. Such practice reduces the quality of my care (P. 6).

A5. Unprofessional practice

Due to the critical conditions of patients who are hospitalized in ICUs, critical care nurses need to have high levels of critical care specialty, knowledge, and experience. They not only need to be highly knowledgeable, but also should properly use their knowledge in their practice. Nonetheless, nursing staff shortage in the study setting had resulted in the recruitment of inexperienced nurses for ICU. Inexperienced nurses avoided providing care services independently in order not to be involved in malpractice lawsuits.

I avoid weaning a patient from ventilator independently and attempt to do it after obtaining my senior or manager's permission. I usually perform what they recommend (P. 8).

Some of the participating nurses had no healthy attitude toward quality care delivery and hence, they used to provide care based on their own beliefs and experience. For instance, some of them did not maintain sterility while doing nursing procedures and believed that such practice is sound.

When I go from one patient to another, I simply change my gloves and believe that it is enough for preventing infections. I have no firm belief in washing hands before doing procedures (P. 9, group discussion).

B. Poor organizational culture

Another major barrier to effective VAP management was poor organizational culture. Organizational culture has a significant effect on organizational and employee performance. Factors such as supervision and control, organizational relations, and managerial support can contribute to the formation of cultural norms.

B1. Strict supervision of nurses

Our nurses were continuously monitored by their administrators. However, they believed that evaluation of employee performance is not performed effectively because administrators who did evaluations usually focused more on nursing documentations than the process of care delivery and attempted to pinpoint employees' weaknesses in order to punish them instead of minimizing shortages and weaknesses. Some of the participants also argued that administrators usually evaluate each nurse based on their own previous attitudes towards her/him. Such a poor evaluation had reduced the participants' motivation for quality care delivery.

Previously, they recruited many novice staff to the unit and thus, several errors happened in the unit and all of us were punished consequently. Thereafter, they never pay attention to the ICU and our matron believes that ICU staff never perform their tasks appropriately (P. 10).

B2. Poor professional interactions

The ability to establish effective communications with colleagues is a basic clinical skill and a key component of efficient care delivery in ICUs. Nonetheless, most participants referred to poor inter- and intra-professional interactions as another barrier to effective VAP management. Inter-professional distrust and poor interdisciplinary collaboration were among the participants' main concerns. In the study setting, physicians had no trust in nurses and accused them of shirking, resulting in the reduction of nurses' motivation for quality care delivery.

Every morning, we wash and rinse patients' mouth with chlorhexidine. However, when attending the unit, physicians get angry and complain that why we do not perform mouth washing for patients. They do not trust us

when we say that we have done mouth washing. Such behaviors of physicians make us unmotivated (P. 5).

On the other hand, there were weak intra-professional interactions among nurses due to their heavy workload. In other words, they were unable to help each other in doing care-related activities. Sometimes, the nurses were even unable to perform their activities due to the lack of help and support.

I cannot ask my colleagues to help me because they are heavily involved with their own duties. If they help me, their duties would remain undone. Therefore, I cannot efficiently perform suctioning when I'm alone (P. 11).

B3. Reluctance to perform care measures

Our participants' detailed another problem in managing VAP as their reluctance and lack of motivation for performing care measures. Factors contributing to such reluctance were, but not limited to, inaccurate judgments, administrators' inattention to nurses, poor accommodation for nurses, and similar salaries for critical care nurses and the nurses of other hospital wards. Such situations disappointed the participants and hence, they had no motivation for better care delivery.

Our resting room is of poor condition. No one values our welfare. When we go to the resting room to take some rest, such problems add psychological fatigue to our physical fatigue because we feel that no one values us (P. 10).

B4. Routine-based practice

The other barrier to effective VAP management was nurses' routine-based practice due to lack of efficient incentive systems and poor workforce development policies. According to the participants, their administrators paid little attention, if any, to their career advancement and professional development, did not encourage them, and used punishment instead of encouragement. Therefore, the nurses were reluctant to learn and provide quality care.

If you do your tasks correctly, our administrators never encourage you. However, if you commit an error, they will punish you. The predominant system in our setting is punishment not incentive (P. 1).

Discussion

The purpose of the study was to explore critical care nurses' experiences of the barriers to VAP management. The study findings indicated that there were many barriers to effective VAP management in ICUs.

One of the major barriers to VAP management was nurses' low QWL. Mullen (2015) also noted that in the United States, nurses face many barriers in their working life (25). Long working hours due to mandatory extra shifts was among the factors which contributed to the difficulty of critical care delivery, nurses' fatigue, and reduced quality of nursing care. Olds et al (2010) also reported that increased work

hours raise the likelihood of adverse events and errors in healthcare (26). Renata et al. (2012) also found nurses' heavy workload as a risk factor for nosocomial infections (27).

Duffin (2014) noted that higher nurse-bed ratio prolongs patients' survival in ICUs (28). The results of studies made by Laschinger et al. (2000) also illustrated that putting nurses under pressure leaves them with feelings such as dissatisfaction, frustration, and powerlessness (29) and affects their QWL. Our findings also showed that lack of professional physiotherapists in hospitals results in added responsibilities for nurses. It is noteworthy that as a key component of critical care, physiotherapy is of paramount importance to effective airway clearance and VAP management (30).

We also found that nonstandard physical structure of ICU and defects or shortages of high-tech equipment in this unit reduced care quality and interfered with effective care delivery. This finding is in line with the findings reported by Matakala et al. (2014) who reported that the design of ICU can affect care delivery, outcomes of care, and the incidence of infections (31).

Another finding of the study was that care services were provided based on old routines. Lack of opportunities for learning and skill development requires nurses to deliver care services more based on old routines and personal experiences than clinical standards and guidelines. Studies showed that the nursing care delivery system in Iran is congruent with the attributes of Johnson's Delegated Medical Care model. In this model, the cornerstone of care is routine-based practice and execution of medical orders (32). Evidence shows that one of the key prerequisites to effective VAP prevention, particularly in countries with limited resources, is continuing education of healthcare workers (33, 34). In fact, poor in-service training would result in nonstandard care delivery.

Study findings also revealed unfair salaries as another factor affecting nursing care delivery and VAP management in ICUs. Administrators' indifference toward same salaries for critical care nurses and nurses working in other hospital wards had reduced our participants' motivation for work and the quality of their care. Unfair payment for different groups of hospital staff has been reported as a significant factor behind nurses' poor motivation for work (35 and 36).

Unfulfilled work-related needs of nurses (such as need for personal protective equipment) had faced the study participants with serious complications such as pneumonia and thereby, reduced the quality of their care. According to Stone et al. (2004), nurses' working condition is among the major risk factors for healthcare-related infections and occupational exposure to infections (37). Evidence indicates that healthcare workers are at risk for developing hospital-acquired infections. Moreover, nurses' safety and occupational health have been reported to be correlated with their job satisfaction (38). Alex (2011) also found job

satisfaction as a determining factor behind hospital staff's performance and the quality of their care services (39). According to the findings of the present study, nurses' disbelief in standard care delivery was another main factor contributing to VAP management. Such disbelief can result in arbitrary care delivery. Studies have shown a significant correlation between individuals' attitudes and their behavioral pattern. For instance, Noruzi et al. (2015) found that nurses' personal attitudes and beliefs are correlated with their adherence to infection prevention standards (40).

On the other hand, study findings revealed that nurses' professional experience had a significant role in VAP management and standard care provision. In other words, nurses with limited professional experience provided lower quality care. The results of a study by Jafari et al. (2012) illustrated that novice nurses' professional competence is not proportionate to the requirements of clinical settings and hence, they provide low-quality care (41). Vogus et al. (2014) also reported that in their first year of professional practice, novice nurses' performance is significantly affected by environment, workplace conditions, and work-related factors (42). Generally, workplace culture and atmosphere can dramatically affect ward outcomes such as staff performance (43).

We also found that factors such as strict supervision of nurses and inappropriate evaluation of employee performance reduced the nurses' motivation for work, gave them a negative attitude towards their administrators, and prevented them from correcting their errors. The administrators of the study settings paid little attention to the quality of care and focused mainly on spotting employees' errors and punishing them. According to the Social Contracts Theory, nurses who feel injustice in performance evaluation, experience some kind of negative tension and attempt to reduce their involvement in the organization's affairs in order to relieve their tension. On the other hand, nurses who feel that performance evaluation is performed fairly become motivated to play a more significant role in their organizations (44).

The study findings also indicated that poor professional interactions (such as inter-professional distrust) reduced the quality of VAP-related care services. Moreover, nurses' heavy workload had undermined their ability to closely collaborate with each other. Havens (2010) reported that improving nurses' relationships with other healthcare professionals can lower the rate of nosocomial infections and improve the quality of care (45).

Two other significant factors behind ineffective VAP management in the study setting were routine-based practice and lack of innovation at work due to administrators' inattention to personnel and the dominance of punishment system. These findings are contrary to the findings reported by Sajadi et al. (2011) who found no significant correlation between nurses' creativity and organizational culture (46). This contradiction may be due to differences in the design and the setting of these two studies.

This study was done in a single ICU setting and thus, the findings may have limited generalizability. Therefore, conducting further studies in different settings is recommended in order to identify other barriers to effective VAP management.

Conclusion

Poor structural and process standards as well as poor organizational culture are the major barriers to effective VAP management. The findings of the present study enhanced our understanding of the fact that administrators need to adopt strategies to improve nurses' welfare and motivation, alleviate their problems, boost their salaries, enhance the quality of performance supervision and evaluation, and recruit more nurses into ICUs. On the other hand, nurses need to learn new and standard approaches to care delivery in order to play a more significant role in VAP management. Future studies are recommended to develop and implement strategies to improve organizational cultures and nurses' QWL as well as to change nurses' personal beliefs and attitudes.

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References

1. Ahoyo T, Bankolé H, Adéoti F, Gbohoun A, Assavèdpo S, Guénou M. Prevalence of nosocomial infections and anti-infective therapy in Benin: results of the first nationwide survey in 2012. *ARIC* 2014; 3(17): 1-6. doi: 10.1186/2047-2994-3-17
2. Morgan D, Lomotan L, Agnes K, Grail L, Roghmann M. Characteristics of healthcare-associated infections contributing to unexpected in-hospital deaths. *Infect Control Hosp Epidemiol* 2010; 31(8): 864-866. doi: 10.1086/655018
3. Harris A, Pineles L, Belton B, Johnson K, Shardell M, Loeb M, et al. Universal glove and gown use and acquisition of antibiotic resistant bacteria in the ICU: a randomized trial. *JAMA* 2013; 310(15): 1571-1580. doi: 10.1001
4. Bagheri M, Amiri M. Nurse's knowledge of evidence-based guidelines for preventing ventilator-associated pneumonia in intensive care units. *JNMS* 2014; 1(1): 44-48. URL http://jnms.mazums.ac.ir/browse.php?a_code=A-10-327-1&slc_lang=en&sid=1
5. Kalanuria A, Zai W, Mirski M. Ventilator-associated pneumonia in the ICU. *Crit Care Med* 2014; 18(208): 1-8. doi: 10.1186/cc13775
6. Sharma S, Kaur J. Randomized control trial on efficacy of chlorhexidine mouth care in prevention of ventilator-associated pneumonia. *NMRJ* 2012; 8(2): 169-178.
7. Gadani H, Vyas A, Kar AK. A study of ventilator-associated pneumonia: Incidence, outcome, risk factors and measures to be taken for prevention. *Indian J Anaesth.*

- 2010; 54(6):535-40. doi: 10.4103/0019-5049.72643.
8. Darvishi Khezri H. The role of oral care in prevention of ventilator associated pneumonia: A literature Review. *JSSU* 2014; 21(6): 840-849. http://jssu.ssu.ac.ir/browse.php?a_code=A-10-1499-1&slc_lang=en&sid=1
 9. Behesht Aeen F, Zolfaghari M, Asadi Noghabi AA. Nurses' performance in prevention of ventilator associated pneumonia. *Hayat* 2013; 19(3): 17-27. http://hayat.tums.ac.ir/browse.php?a_code=A-10-26-3&slc_lang=en&sid=1
 10. Bonsal Cooper V, Haut C. Preventing ventilator-associated pneumonia in children: an evidence-based protocol. *Critical Care Nurse* 2013; 33(3): 29-21. doi: 10.4037/ccn2013204
 11. Rello J, Lode H, Cornaglia G, Masterton R. A European care bundle for prevention of ventilator-associated pneumonia. *Intensive care med* 2010; 36(5): 773-780. doi: 10.1007/s00134-010-1841-5
 12. Aminzadeh Z, Hajjehkhan B. Bacterial endotracheal tube colonization in intubated patients in poisoning ICU ward of Loghman Hakim hospital of Tehran in 2005. *Horizon Med Sci.* 2007; 13 (2):12-19. http://hms.gmu.ac.ir/browse.php?a_code=A-10-1-56&slc_lang=en&sid=1
 13. Salehifar E, Abed S, Mirzaei E, Kalhor S, Eslami G, Ala S, et al . Evaluation of profile of Microorganisms involved in hospital-acquired infections and their antimicrobial resistance pattern in intensive care units of Emam Khomeini hospital, Sari, 2011-2012. *J Mazandaran Univ Med Sci.* 2013; 22 (1):151-162. http://jmmums.mazums.ac.ir/browse.php?a_code=A-10-29-90&slc_lang=en&sid=1
 14. Lawrence P, Fulbrook P. The ventilator care bundle and its impact on ventilator- associated pneumonia: a review of the evidence. *BACCN* 2011; 16(5): 222-234. doi: 10.1111/j.1478-5153.2010.00430.x.
 15. Mousavi S, Hasibi M, Mokhtari Z, Shaham G. Evaluation of safety standards in operating rooms of Tehran University of Medical Sciences(TUMS) Hospitals in 2010. *PAYAVARD* 2011; 5(2): 10-17. http://payavard.tums.ac.ir/browse.php?a_code=A-10-25-73&slc_lang=en&sid=1
 16. Marić N, Udilja kN, Karaula NT, Jurina H, Mačković M, Bekić D. The impact of interventions to improve adherence to preventive measures on the incidence of nosocomial infections in ICUs. *SIGNA VITAE* 2014; 9 (1): 34 – 37.
 17. Lambert M, Palomar M, Agodi A, Hiesmyr M, Lepape A, Ingenbleek A. prevention of ventilator-associated pneumonia in intensive care units: an international online survey. *ARIC* 2013; 2(9): 1-8. doi: 10.1186/2047-2994-2-9
 18. Morris A, Everingham K, Culloch C, Nulty J, Brooks O, Swann D. Reducing ventilator- associated pneumonia in intensive care: impact of implementing a care bundle. *Crit Care Med* 2011; 39(10): 2218-2224. doi: 10.1097/CCM.0b013e3182227d52
 19. Salimi s, Anami I, Noroznia SH. Rastad M, Acdemir N. Effect Of Standardization Of Nursing Cares On Incidence Of Nosocomial Infection In Micu. *Urmia Medical Journal* 2009; 19(4): 310-315. http://umj.umsu.ac.ir/browse.php?a_code=A-10-3-40&slc_lang=en&sid=1
 20. Jain M, Miller L, Belt D, King D, Berwick M. Decline in ICU adverse events / nosocomial infections and cost through a quality improvement initiative focusing on teamwork and culture change. *Qual Saf Health Care* 2006; 15(4): 235-239. doi: 10.1136/qshc.2005.016576
 21. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today.* 2004; 24(2):105-12. doi: 10.1016/j.nedt.2003.10.001
 22. Carpenter D, Streubert H, Speziale S. Qualitative research in nursing: Advancing the humanistic imperative. Philadelphia: Lippincott Williams and Wilkins. 2011.
 23. Baraz-Pordanjani S, Memarian R, Vanaki Z. Damaged professional identity as a barrier to Iranian nursing students' clinical learning: a qualitative study. *Journal of Clinical Nursing and Midwifery.* 2014; 3 (3):1-15. http://jcnm.skums.ac.ir/browse.php?a_code=A-10-86-1&slc_lang=fa&sid=1
 24. Nasiripour AA, Radfar R, Najaf Begay R, Rahmani H. Factors affecting the deployment of e-health system in Iran. *jhosp.* 2011; 10 (1):53-62 http://jhosp.tums.ac.ir/browse.php?a_code=A-10-25-70&slc_lang=en&sid=1
 25. Mullen K. Barriers to work-life balance for hospital nurses .*Workplace Health Saf* 2015; 63(3): 96-9. <http://dx.doi:10.1177/2165079914565355>
 26. Olds DM , Clarke SP. The effect of work hours on adverse events and errors in health care. *J Safety Res* 2010; 41(2):153-62. doi: 10.1016/j.jsr.2010.02.002.
 27. Renata M. Daud-Gallotti, Silvia F, Thais G, Katia G. P, Evelize N. I. Nursing Workload as a Risk Factor for Healthcare Associated Infections in ICU: A Prospective Study. *PLoS One.* 2012; 7(12): 1-6. doi: 10.1371/journal.pone.0052342
 28. Duffin C. Increase in nurse numbers linked to better patient survival rates in ICU. *Nurs Stand.* 2014 Apr 16-22; 28(33): 10. doi:10.7748/ns2014.04.28.33.10.s8.
 29. Laschinger HKS, Fingan J, Shamian J, Casier S. Organizational trust and empowerment in registered healthcare setting: effects on staff nurse commitment. *Journal of Nursing Administration* 2000; 30(9): 413-425.
 30. Pattanshetty RB1, Gaude GS. Effect of multimodality chest physiotherapy in prevention of ventilator-associated pneumonia: A randomized clinical trial. *Indian J Crit Care Med.* 2010 14(2):70-6. doi: 10.4103/0972-5229.68218.
 31. Matlakala M C, Bezuidenhout MC, Botha ADH. Challenges encountered by critical care unit managers in the large intensive care units. *Curationis*; 2014, 37(1): 7. doi.org/10.4102/curationis.v37i1.1146
 32. Hajbaghery A. Factors influencing Evidence-based nursing: A Qualitative study. *IJN.* 2006; 19(47): 17-330. http://ijn.iums.ac.ir/browse.php?a_code=A-10-1-125&slc_lang=en&sid=1
 33. Apisarnthanarak A, Pinitchai U, Thongphubeth K, Yuekyen C, David K. Warren DK, Zack JE, Warachan B, Victoria JF. Effectiveness of an Educational Program to Reduce Ventilator-Associated Pneumonia in a Tertiary Care Center in Thailand: A 4-Year Study. *Clinical Infectious Diseases* 2007; 45:704–11. doi: 10.1086/520987
 34. Rosa J, Montserrat S, O´scar H, Esther C, Concepcio´n T, Inmaculada F, Jordi V. Assessment of a training programme for the prevention of ventilator-associated pneumonia. *Nursing in Critical Care* 2012; 17 (6): 285-292. doi: 10.1111/j.1478-5153.2012.00526.x
 35. Songstad N G, Rekdal OB, Massay DA, Blystad A. Perceived unfairness in working conditions: The case of public health services in Tanzania. *BMC Health Serv Res.*

2011; 11(34): 1-15. doi: 10.1186/1472-6963-11-34

36. Valizadeh S, Haririan H. Nurses Work Motivation: A Big Challenge for Health System; a Review article. PCNM 2015-2016; 5(2): 56-64. http://www.zums.ac.ir/nmcjournal/browse.php?a_code=A-10-24-1&slc_lang=en&sid=1

37. Stone PW, Clarke SP, Clarke J, Correa-de-Araujo R. Nurses' Working Conditions: Implications for Infectious Disease. *Emerging Infectious Diseases* 2004; 10(11):1984-9. www.cdc.gov/eid

38. Jafari M, Shafii N, Mahfozpor S. The relationship between job satisfaction and occupational safety and occupational health status of nurses in a hospital. *JHSW*. 2012; 2 (3):41-48. http://jhsw.tums.ac.ir/browse.php?a_code=A-10-25-37&slc_lang=en&sid=1

39. Alex MR. Occupational Hazards for Pregnant Nurses *AJN, American Journal of Nursing* 2011; 111(1): 28-37. doi: 10.1097/01.NAJ.0000393056.01687.40

40. Noruzi T, Rassouli M, Khanali Mojen L, Khodakarim S, Torabi F. Factors associated with nosocomial infection control behavior of nurses working in nursery & NICU based on "Health Belief Model". *JHPM*. 2015; 4 (3):1-11. http://jhpm.ir/browse.php?a_code=A-10-50-2&slc_lang=en&sid=1

41. Jaffari Golestan N, Vanaki Z, Memarian R. Organizing "Nursing Mentors Committee": an Effective Strategy for Improving Novice Nurses' Clinical Competency. *Iranian Journal of Medical Education*. 2008; 7 (2):237-247 http://ijme.mui.ac.ir/browse.php?a_code=A-10-2-288&slc_lang=fa&sid=1

42. Vogus TJ, Cooil B, Sitterding M, Everett LQ. Safety organizing, emotional exhaustion, and turn over in hospital nursing units. *Medical care*. 2014; 52(10):870-6. doi: 10.1097/MLR.000000000000169.

43. Guidet B, González-Romá V: Climate and cultural aspects in intensive care units. *Critical Care* 2011, 15:312. doi: 10.1186/cc10361. <http://ccforum.com/content/15/6/312>

44. Abbasnezhad M H, Mehdad A, Asadpour M. The Relationship between Justice Perception of Performance Appraisal System and Organizational Citizenship Behavior and Organizational Commitment among Nurses. *Iranian Journal of Medical Education* 2015; 15(31): 240-250. http://ijme.mui.ac.ir/browse.php?a_code=A-10-2653-1&slc_lang=fa&sid=1

45. Havens DS. Relational coordination among nurses and other providers: impact on the quality of patient care. *Journal of Nursing Management* 2010; 18(N): 926-937.

46. Sajadi A, Rashidi E, Ebrahim zadeh F. Determine the relationship between the enterprise and creativity of nurses in government hospitals of North Khorasan. *National Conference on organizational behavior in nursing, Shirvan, Islamic Azad University of Shirvan*. 2011. http://www.civilica.com/Paper-NCQBN01-NCQBN01_025.html

Clinical Risk Index for Neonates II score for the prediction of mortality risk in premature neonates with very low birth weight

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Abstract

Introduction: One of the most common methods of identifying neonatal mortality risk is the Clinical Risk Index for Babies scoring system (CRIB- II). The aim of this study is to investigate the value of CRIB II scoring system in prediction of mortality risk in premature neonates with birth weight less than 1500 gr.

Materials and methods: This descriptive-analytical investigation was conducted on premature neonates with very low birth weight (less than 1500 g) and gestational age less than 32 weeks who were hospitalized in NICU of Shahid Madani Hospital of Lorestan province (southwest of Iran) during a two-year period (January 2013 to December 2015). These neonates were hospitalized during the first 12 hours of life and evaluated according to CRIB II scoring system. After collecting and completing information about patients, the data was analyzed using SPSS software.

Findings: Of a total 272 neonates, 160 neonates (58.82%) died in the hospital. Mean scores of CRIB II were 6.1 ± 2.7 and 9.7 ± 3.1 for survivor neonates and non-survivor neonates respectively ($P < 0.001$). In a survey for specificity and sensitivity of CRIB II score in mortality prediction of premature neonates with birth weight lower than 1500 gr, it was observed that almost 83% (CI=74-91) of neonatal mortalities can be predicted.

Discussion and conclusion: This study showed that CRIB II index has higher value in prediction of mortality in premature neonates with very low birth weight.

Key words: Premature neonates, Mortality risk, CRIB II.

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Introduction

Very low birth weight (VLBW) infants, weighing less than 1500 g at birth, represent about 1% of all births but account for 50% of neonatal deaths. Compared with infants weighing 2500 g or more, LBW infants are 40 times more likely to die in the neonatal period; VLBW infants have a 200-fold higher risk of neonatal death [1-3].

Contrary to reduction of neonatal mortality rate in recent years, the mortality rate of low birth weight infants has not reduced dramatically. In general, neonatal mortality is a hygiene index and it has a direct connection with the economic and social states of the countries. A higher percentage of premature neonatal mortalities occur in Neonatal Intensive Care Unit (NICU) and definitely, periodic investigation about the activities of these units can be effective in mortality reduction of this sensitive age range. To investigate and compare the activity of NICU, the adjustment of treatment results with primary state of the patient and disease intensity in hospitalization time is vital. Application of a tool that can identify an unwell patient in early hours of hospitalization, can be helpful for evaluation of the medical team activities. So to this end, numerous scoring systems have been developed in order to identify emergency patients in early hospitalization in NICU and before any kind of medical and curing activities that the Clinical Risk Index for Babies (CRIB), CRIB II, Score for Neonatal Acute Physiology (SNAP), Score for Neonatal Acute Physiology-Perinatal-Extension (SNAP-PE) and Neonatal Therapeutic Interventions Scoring System (NTISS) can be mentioned [4]. These scoring systems are different in terms of the type and the number of evaluated variables, and the type of scoring. CRIB scoring system has application in neonates with birth weight less than 1500 gr but SNAP can be used in all gestational ages and all weights [4].

For more than a decade, a clinical risks scoring system has been applied to evaluate the neonate's state and their mortality rate in NICU of the hospitals. Application of an index which is less affected by other interruptive indexes like steroid prophylaxis and to have more reliable results is essential. CRIB scoring system is comprised of 6 variables: birth weight, gestational age, congenital anomalies, minimum and maximum breathing oxygen percentage and maximum Base deficiency information that are investigated during the first 12 hours after hospitalization. In CRIB II scoring system, only 5 variables (birth weight, gestational age, neonate sex, maximum Base deficiency, baby's temperature at hospitalization time) are used to evaluate the premature neonates. These scoring systems have predicting values in determination of neonate mortality rates but there is no use for them in morbidity prediction of neonates [1, 4].

Neonatal mortality rate is affected by NICU facilities and the numbers of nurses. Most researchers believe that CRIB II scoring system has higher value for prediction of hospital premature neonatal mortality with birth weight lower than 1500 gr in comparison to weight and pregnancy

age or both. Since all related variables are practical in our occasion, CRIB II scoring system was chosen to investigate the premature neonates.

This study is for evaluation of CRIB II scoring system in prediction of neonatal mortality rate at NICU ward of Shahid Madani hospital, Khorramabad, Iran.

Materials and Methods

In this descriptive analytical study that was carried out from January 2013 to December 2015 (two years) in NICU of Shahid Madani hospital (Khorramabad, Lorestan province), after obtaining permission from the ethics committee to do the study in vulnerable groups, informed written consent was taken from the parents. The study population included all live-born neonates with a birth-weight of ≤ 1500 gr and/or gestational age ≤ 32 weeks. Exclusion criteria were:

- 1) less than 23 weeks' gestation;
- 2) admission to NICU more than 12 hours after delivery;
- 3) presence of a lethal congenital malformation; 4) death within the first 12 hours of life.

The general characteristics of infants such as gender, type of birth and Apgar scores of first and fifth minutes, were extracted from the infants' cases and recorded in data collection forms. The parameters of CRIB-II were measured and recorded in data forms as follows: Gestational age was calculated using Ballard table or based on the first day of the last menstrual period (LMP). In cases where LMP was not known, gestational age was assessed using obstetric ultrasonography. The infants were weighed at the moment of admission with digital scale of ± 20 precision based on gram unit. The infants' body temperature was measured axillary at the moment of admission in NICU using digital thermometer with a sensitivity of 0.1° C. Capillary blood gas analysis was performed in all infants. Infants' sex was determined through observing phenotype of genitalia.

After measuring mentioned parameters, CRIB-II score (range 0-27) (5) was calculated for each infant and the prediction rate of it concerning infants' outcome was found based on CRIB-II. The studied infants were followed up at 3 months of age and their outcome (dying or staying alive) was recorded in a data collection form. The data were analyzed using SPSS software and to determine the relationship between measured parameters Spearman correlation was used. A logistic model was used to analyze the prediction of mortality using the CRIB II score on admission. In all tests $P < 0.05$ was considered as significant.

Results

In general, 272 neonates were investigated in this study and 151 neonates (52.9%) and 121 neonates (47.1%) were boys and girls, respectively. In this study, 160 neonates (58.82%) died during hospitalization and 112 neonates (41.18%) survived during hospitalization and left the hospital. Gestational age, mean body temperature and

mean of base deficiency (based on the analysis of arterial blood gases) in survivor neonates were less than non-survivor neonates and these differences were statistically significant (Table 1).

The mean of CRIB II scores for non-survivor neonates and survivors was 9.7 ± 3.1 and 6.1 ± 2.7 respectively. Statistical analysis showed that the mean of CRIB II score in non-survivor neonates was much more than survivor neonates significantly ($P < 0.001$). The mean of hospitalization time for non-survivor neonates (5.1 ± 4.5) was shorter than hospitalization time for survivor neonates (15 ± 9.8); and this difference was statistically significant ($P < 0.001$). In survey for specificity and sensitivity of CRIB II score in mortality prediction of premature neonates with birth weight lower than 1500 gr, it was observed that almost 83% (CI=74-91) of neonatal mortalities can be predicted.

In the present study, we compared risk factors of neonatal mortality according to gestational age less than 30 weeks, body temperature less than 36.5 centigrade, Base deficiency less than -10, birth weight less than 1200 gr, hospitalization time shorter than 9 days and CRIB II score more or equal with 10 in survivor and non-survivor neonates. The results showed that 46% of non-survivor neonates and 9% of survivor neonates have gestational age less than 30 weeks and there was a marked difference between the two groups ($P < 0.001$). Also, other variants were significantly much better in survivor neonates than non-survivor neonates, and these differences were statistically significant ($P < 0.001$).

Discussion

In our investigations, it was observed that CRIB II score has a high value in prediction of premature neonates' mortality with birth weight lower than 1500 g, in a way that, CRIB II score could predict 83% of mortality cases in premature neonates that shows a high value of this index. Measurement of this index is very easy and fast because all applied variables are of routine investigations of low weight neonates; also these variants are not affected by human errors. Since prediction of neonatal mortality with very low birth weight (less than 1500 gr) reveals an outstanding impact on medical interventions, in different studies, and various indexed were studied (5-9).

Felice et al (2005) studied 147 neonates with birth weight less than 1500 gr or gestational age less than 31 weeks. They evaluated CRIB, CRIB II, birth age and birth weight for prediction of neonatal mortality; according to AUC, these indexes could predict mortality between 86% (birth age) to 92% (CRIB). The researchers did not observe any difference between investigated indexes in prediction of neonatal mortality (10). As it was mentioned previously, in our study all indexes were valuable in prediction of neonatal mortality.

Although in previous studies and our investigation, CRIB II declared higher values in comparison with other indexes like birth age and birth weight, there are some studies that have evaluated CRIB II as less predictive, and other indexes though showed there was no significant difference. In Baumer et al's study, between 1991 to 2006, 1485 premature neonates were studied. In this investigation based on AUC, CRIB 82%, birth weight 74%, birth age 71% and CRIB II 69% could predict mortality cases. Although there was no statistically significant difference between the indexes, CRIB II has lower value compared to other indexes. As there is no clear reason for these observations, researchers believe in the need for further studies (11).

Low birth weight and low gestational age are two main causes of numerous disorders in these neonates; also these two are the main reason for mortality in infancy and the first year after birth (12). Disease severity of the neonate at hospitalization time and some laboratory findings like Base deficiency rate are associated with the prognosis of the neonates. Application of CRIB as a simple way for evaluation of illness severity during hospitalization that can estimate the relative risk of neonatal mortality (13, 14).

In a survey to evaluate the CRIB II value for prediction of mortality rate of premature neonates in comparison with birth weight and gestational age, 97 neonates were investigated. The area under the ROC diagram was almost equal for birth weight, gestational age and CRIB II. The result of this research showed that the predictive value of CRIB II score in prediction of mortality rate in premature neonates is not more than birth weight and gestational age (15).

Table 1: Evaluated variables in CRIB II score in survivor and non-survivor neonates

Variable		Survivor neonates (N=112)	Non-Survivor neonates (N=160)	P-value
Sex	Male	54 (35.76%)	97 (64.24%)	<0.001
	Female	58 (47.93%)	63 (52.07%)	
Gestational age (weeks)		31.2 ± 2.2	27.9 ± 2.1	<0.001
Temperature (Celsius)		36.5 ± 0.3	36.3 ± 0.1	<0.001
Base deficiency (meq)		-15.4 ± 5.4	-10.2 ± 5.1	<0.001
Birth weight (gr)		1291 ± 201	1044 ± 223	<0.001

Mortality rate of premature neonates is evaluable by CRIB II. In an investigation to compare the ability of CRIB, CRIB II, birth weight and gestational age in prediction of premature mortality, 1,485 neonates were studied. The area under the AUC graph was 82% for CRIB, 74% for birth weight, 71% for gestational age, and 69% for CRIB II. The results of this investigation showed that CRIB II does not have any priority over birth weight, gestational age and CRIB in determination of mortality rate of premature neonates (16).

In an investigation to assess the ability of CRIB in determination of long-time prognosis of neural development in premature neonates, 455 neonates were studied. 386 neonates (89%) survived until clearance from hospital and 352 neonates (91%) were investigated mentally when they were 1 year old. There were 76 neonates (22%) with a major neural disorder. Higher CRIB score was assigned with major neural disorder (17). In addition, in another investigation, neonates with 13 CRIB II score or more at first hour after birth had major developmental disorders (18).

In another study which was conducted in Gorgan university of medical sciences, in order to evaluate the prognostic power of CRIB score in prediction of the consequence of premature VLBW neonates, 46 neonates with gestational age less than 37 weeks and birth weight lower than 1500 gr were assayed. Mortality rate in this research was 37% and the most prevalent reason of death was respiratory failure. The mean of birth weight, gestational age and the mean of CRIB score in the group of survivor neonates and non-survivor neonates was 1201, 934 gr and 30 and 28 weeks, and 3.76 and 11.47 respectively (19). In our investigation, CRIB II scoring system was used to determine the mortality risk in neonates with birth weight less than 1500 gr. The powerful point of the present study was that all mentioned variables in this study are measured routinely in all neonates with birth weight less than 1500 gr, and we did not need any further interventions. Considering this point, that neonatal state at first hours after birth is related to midwifery and obstetric issues of mother and problems of the neonate, the measurement of these variants at first hours after birth can be valuable in prediction of mortality and also higher score in CRIB II shows higher risk of mortality for neonate. About the birth weight variant in prediction of neonatal mortality, it should be said that, although for a long time it has been used as an index in determination of neonatal mortality, numerous studies have shown that prognosis of neonates with equal weights in NICU of different hospitals are different and that can be related to the applied equipment in these units, proportion of nurses to patients and other factors.

Limitations of the Study

The main limitation of our study was clearance of the neonates with personal satisfaction of the parents before conduction of the study and this issue was solved by substitution of other neonates.

Conclusions

According to our findings in this study, CRIB II has a higher value in mortality prediction of the neonates with birth weight lower than 1500 gr in a way that, it could predict 83% of mortalities in premature neonates with birth weight lower than 1500 gr and this shows the high value of this index. Since the prediction of neonatal mortality in VLBW neonates (less than 1500 gr) has a high value in medical interventions, CRIB II score is a trustable tool in neonatal mortality prediction and their classification is to make priority for medical interventions especially in absence of medical facilities

Results

1. Waldemar A. Prematurity and Intrauterine Growth Restriction. Robert M Kliegman, Stanton. Nelson textbook of pediatrics. 19th ed. Philadelphia: Saunders; 2011; 555-558.
2. Basu S, Rathore P, Bhatia BD. Predictors of mortality in very low birth weight neonates in India. Singapore Med J 2008; 49(7):556-60.
3. Kliegman Stanton RM. Nelson textbook of pediatrics. 19th ed. Philadelphia: Saunders; 2011
4. Horbar JD, Gould JB. Evaluating and improving the quality of neonatal care in neonatal perinatal medicine. Fanaroff AA, Martin RJ. Disease of the fetus and infant .9th ed. Philadelphia: Elsevier Mosby; 2011; 56-75.
5. Brito AS, Matsuo T, Gonzalez MR, de Carvalho AB, Ferrari LS. CRIB score, birth weight and gestational age in neonatal mortality risk evaluation. Rev Saude Publica 2003; 37(5): 597-602.
6. Gagliardi L, Cavazza A, Brunelli A, Battaglioli M, Merazzi D, Tandoi F, et al. Assessing mortality risk in very low birth weight infants: a comparison of CRIB, CRIB-II, and SNAPPE-II. Arch Dis Child Fetal Neonatal Ed 2004; 89(5): F 419-422.
7. Rastogi PK, Sreenivas V, Kumar N. Validation of CRIB-II for prediction of mortality in premature neonates. Indian Pediatr 2010; 47: 145-147.
8. Marete IK, Wasunna AO, Otieno PA. Clinical risk index for neonates (CRIB) II score as a predictor of neonatal mortality among low birth weight neonates at Kenyatta National Hospital. East Afr Med J 2011; 88(1): 18-23.
9. Guzmán Cabañas JM, Párraga Quiles MJ, del Prado N, Ruíz MD, García Del Río M, Benito Zaballos F, et al. Usefulness of Clinical Risk Index for Neonates based on birth weight in predicting hospital death and severe intraventricular hemorrhage in the SEN 1500 Spanish neonatal network. An Pediatr (Barc) 2009; 71(2): 117-127.
10. De Felice C, Del Vecchio A, Latini G. Evaluating illness severity for very low birth weight infants: CRIB or CRIB-II? J Matern Fetal Neonatal Med 2005; 17(4): 257-260.
11. Baumer JH, Wright D, Mill T. Illness severity measured by CRIB score: a product of changes in perinatal care? Arch Dis Child Fetal Neonatal Ed 1997; 77(3): F211- 215.
12. Vakrilova V. Scoring systems for assessing illness severity and predicting outcome in very low birth weight infants. Akush Ginekol (Sofia) 2011; 50(1): 37-41.

13. Vakrilova L, Emilova Z, Sluncheva B. Using the CRIB as an early prognostic index for very low birth weight infants, treated in neonatal intensive care units. *Akush Ginekol (Sofia)* 2007; 46 Suppl 1:66-73.
14. Prieto CL, Colomer BF, Sastre JB. Prognostic factors of mortality in very low birth weight infants with neonatal sepsis of nosocomial origin. *Am J Perinatol* 2013; 30(5): 353-358.
15. Khanna R, Taneja V, Singh S. The clinical risk index of neonates (CRIB) score in India. *Indian J Pediatr.* 2002; 69(11): 957-960.
16. Buhner C, Metze B, Obladen M. CRIB, CRIB-II, birth weight or gestational age to assess mortality risk in very low birth weight infants? *Acta Paediatr.* 2008; 97(7): 899-903.
17. Buhner C, Grimmer I, Metze B. The CRIB (Clinical Risk Index For Babies) score and neurodevelopmental impairment at one year corrected age in very low birth weight infants. *Intensive Care Med* 2000; 26: 325-329.
18. Lodha A1, Sauvé R, Chen S, Tang S, Christianson H. Clinical Risk Index for Babies score for the prediction of neurodevelopmental outcomes at 3 years of age in infants of very low birthweight. *Dev Med Child Neurol.* 2009;51(11):895-900.
19. Fouladinejad M, Behnampour N, Pashaei Zanjani A, Gharib MH, Akbari Kamrani M. The evaluation of predicting mortality risk of premature infants with very low birthweight by CRIB Score. *J Gorgan Uni Med Sci.* 2009;10(4):40-43. (In Persian)

Effect of pre-colporrhaphic physiotherapy on the outcomes of women with pelvic organ prolapse

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Abstract

Background and Aim: Pelvic organ prolapse (POP) is a common gynecological problem with numerous complications. This study was conducted to investigate the effects of pre-colporrhaphic physiotherapy on the outcomes of women candidates for colporrhaphy with moderate to severe POP.

Methods: This randomized clinical trial was conducted on women aged 20-59 years with moderate to severe POP. The subjects were randomized to two groups of 35 each: Controls (no intervention) and cases (undergoing 10 sessions of physiotherapy). Three months later, the two groups were examined for outcomes and the outcomes were recorded in a checklist. Data analysis was conducted by SPSS 16.

Results: There was no significant difference in age, height, disease duration, and parity between the two groups ($p>0.05$), but the difference in weight was statistically significant between the two groups ($p<0.05$). The mean score on quality of life after the intervention was 57.59 ± 5.3 in the control group and 66 ± 5.9 in the case group ($p<0.001$). There was no significant difference in the rates of pressure in pelvic organ, urinary incontinence, and bowel movement disorder between the two groups ($p>0.05$), but sexual satisfaction was significantly higher and dyspareunia was significantly lower in the case group than the control group ($p<0.05$).

Conclusion: Pre-colporrhaphic physiotherapy can improve quality of life and sexual function in candidates for colporrhaphy.

Key words: Physiotherapy, Colporrhaphy, Pelvic organ prolapse

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Introduction

Pelvic organ prolapse (POP) in women refers to descended womb, bladder, small intestine, and large intestine as well as post-hysteroscopy vaginal cuff leading to uterine prolapse, vaginal prolapse, or both. In this condition, the patient may feel pain and pressure or prolapse of a vaginal mass (1). As the elderly population is expected to double by the year 2030, pelvic organ prolapse will become higher prevalent (2). Recently, the treatments that can return the patients to normal life after POP surgery have attracted attention (3). The quality of life index is disrupted in the women with POP (4) and therapeutic interventions such as a surgery can help to improve this index (5). However, colporrhaphy may lead to certain anatomical outcomes. Dyspareunia and sexual dysfunction, gastrointestinal diseases, and urinary incontinence are some of common complications after colporrhaphy (6-8). However, these complications may even occur more or less before colporrhaphy (depending on prolapse grade) and be intensified after this surgery (9, 10). However, other therapeutic methods are also recommend for preventing or treating this complication. For example, Kegel exercise and tension-free vaginal kits are considered preventive and protective approaches before POP surgery, but their therapeutic potential remains controversial (11).

Physiotherapy has been frequently studied as a procedure for strengthening the muscles. However, a study showed that physiotherapy before and after the surgery helped to improve the patients' symptoms and quality of life (12). But, another study reported that presurgical physiotherapy did not cause improvement of bladder function and prolapse symptoms (13). This study was conducted to investigate the effects of pre-colporrhaphic physiotherapy on the outcomes of the women with moderate to severe POP candidates for colporrhaphy.

Materials and Methods

This randomized clinical trial was conducted on the women aged 20-59 years with moderate to severe POP referring to Hamedan Fatemiyeh Hospital between 2011 and 2012. The subjects were selected by census sampling and 70 women with inclusion criteria were enrolled in the study within this period. According to a previous study (2), this sample size is adequate to conduct the current study. The inclusion criteria were POP diagnosed with reference to the indications upon which specialists have agreed; lack of response to conservative treatments in the past, grades 2 and 3 accompanied by progression of the symptoms, willingness to undergo colporrhaphy, candidacy for colporrhaphy, and full consent to participate in the study.

Diabetes, obesity, urinary tract infections, genital tract infections, grades 1 and 4 cystocele, uterine prolapse, forceps delivery and vacuum extraction, and history of birth of macrosomic infant, multiple pregnancy, and pelvic fascia and muscle surgery were considered the exclusion criteria. Then the subjects were randomized to

two groups. To conduct randomization, the patients who referred on the even days of the week were assigned to the case group and those referring on the odd days of the week were assigned to the control group. The case (intervention) group underwent physiotherapy before colporrhaphy and the control group underwent the colporrhaphy without any intervention before conducting the surgery. Physiotherapy of the patients in the case group was conducted by a physiotherapist. The physiotherapy intervention consisted of a pelvic floor muscle (PFM) strength training, accompanied by counseling on bladder and bowel. Vaginal examination was conducted to ensure correct PFM contraction, without any change in respiration or recruitment of accessory muscles; intensified attempt to reach maximum voluntary contraction as correct technique was maintained; performing of a series of 6-8 sec contractions, with an interval between each contraction for rest. This approach was done over 10 sessions, 3 times per day performed in a variety of positions, progressing from lying to upright (13, 14). The physiotherapy with similar technique and assistance of a single physiotherapist who was blind to the research purposes and details.

Then, a single gynecologist who was blind to the study purposes and details conducted colporrhaphy on all subjects in the Hamedan Fatemiyeh Hospital with a similar technique. Afterwards, the subjects of both groups received similar recommendations and care. All subjects were followed up for three months, and then they were re-examined and their descriptions were drawn again. The patients' data on complaints of urinary disorders (incontinence and obstructive symptoms), complaints of fecal excretion symptoms (incontinence and constipation), sexual satisfaction, and the presence or absence of dyspareunia were drawn and recorded in a pre-designed checklist.

In addition, the overall score on quality of life was calculated and recorded for both groups using a standard questionnaire on patient quality of life (SF-36). A study to translate and validate this international standard scale demonstrated that its Persian duplicate has adequate validity and reliability for investigating health-related quality of life (15).

To observe research ethics, the subjects provided informed consent to participate in the study, and the study protocol was approved (approval no.: IRCT201201188772N1) in the Iranian Registry of Clinical Trials. Data analysis was conducted in SPSS (V. 16.0, III Chicago Inc.) by analytical statistics t-test, chi-square test, and Fisher's exact test after qualitative data were encoded and descriptive statistics were drawn.

Results

According to the data analysis, there was no significant difference in age, height, and the disease duration between the two groups ($p < 0.05$) (Table 1).

Table 1: Comparison of mean age, weight, and duration of disease between case and control groups

Variable	Group	Mean±SD	P-value
Age (Year)	Control	42.89±6.47	0.310
	Case	41.09±8.16	
Height (Cm)	Control	161.57±4.9	0.326
	Case	162.09±4	
Weight (Kg)	Control	61.37±10.3	0.04
	Case	67.80±7.49	
Duration of illness (year)	Control	3.51±1.7	0.40
	Case	3.92±2.7	

In the case group, 31 out of 35 (88.6%) patients had history of vaginal delivery and the rest had history of caesarian section; and in the control group, 27 out of 35 (77.1%) patients had history of vaginal delivery and the rest had history of caesarian section, without any significant difference between the two groups ($p = 0.11$). Regarding parity, in the case group, 10 (28.6%) subjects had one child, nine (25.7%) had two children, and two (7.45%) had three or more children; and in the control group, 10 (28.6%) subjects had one child, 20 (57.1%) had two children, and five (14.3%) had three or more children, without any statistically significant difference between the two groups ($p = 0.07$).

The mean score on the quality of life after the intervention was 57.59 ± 5.3 in the control group and 66 ± 5.9 in the case group ($p < 0.001$).

There was no significant difference in the rates of pressure in pelvic organ, urinary incontinence, and bowel movement disorder between the two groups ($p > 0.05$), but sexual satisfaction was significantly higher and dyspareunia was significantly lower in the case group than the control group ($p < 0.05$).

Table 2: Comparison of pressure in pelvic organ, urinary incontinence, and bowel movement disorder between the case and control groups

Variables	Group	Low	Partial	Moderate	High	p-value
		Number (%)	Number (%)	Number (%)	Number (%)	
Feel pressure in pelvic organs	Control	2 (5.7)	3 (8.6)	15 (42.9)	15 (42.9)	0.280
	Case	7 (20)	9 (25.7)	13 (37.1)	6 (17.1)	
Urinary Incontinence	Control	3 (8.6)	9 (25.7)	21 (60)	2 (5.7)	0.130
	Case	9 (25.7)	12 (34.3)	13 (37.1)	1 (2.9)	
Impairment of bowel movements	Control	9 (25.7)	8 (22.9)	12 (34.3)	6 (17.1)	0.872
	Case	10 (28.6)	10 (28.6)	9 (25.7)	6 (17.1)	
Sexual satisfaction	Control	12 (34.3)	12 (34.3)	7 (20)	4 (11.4)	0.037
	Case	5 (14.3)	7 (20)	14 (40)	9 (25.7)	
Dyspareunia	Control	3 (8.6)	19 (54.3)	18 (31.4)	2 (5.7)	0.037
	Case	13 (37.1)	13 (37.1)	7 (20)	2 (5.7)	

Discussion

The present study was conducted with the aim of investigating the effect of pre-colporrhaphic physiotherapy on treatment outcomes in the women with POP candidate for colporrhaphy. Results demonstrated that the mean score on quality of life was significantly higher in the case group than the control group. Consistently, Jarvis et al. reported that undergoing physiotherapy before surgery for prolapse and urinary incontinence could contribute to improving quality of life and decreasing these problems in women (12). In two other studies, pelvic floor physical therapy before and after vaginal repair surgery, caused improvement of the quality of life in case group (16, 17). Surgeries conducted for treating POP can improve the quality of life among women patients because they contribute to decreasing the symptoms or improving the disease complications.

Therefore, undergoing physiotherapy and doing exercise, particularly pelvic floor muscle exercises, exerts synergistic effect in improving the quality of life of patients through reduction of physiological and anatomical disorders (5). In our study, although the number of cases presenting with the symptoms of severe pressure in pelvic organ, urinary incontinence, and bowel movement disorders decreased in the control group, the difference between the two groups was not statistically significant. In contrast, Frawley et al. reported that physiotherapy had no contribution to improving prolapse symptoms and urinary incontinence in women (13). However, other studies have indicated that undergoing physiotherapy and doing pelvic muscle exercises prior and after the surgeries for POP can be effective in decreasing urinary incontinence (12, 18-20), improving bowel function (20, 21), and relieving feeling of pressure and pain (22). To explain this, we can argue that the surgery itself can help to improve the symptoms, which can relatively neutralize the differences between the two groups. Besides that, women's physiological conditions can affect the results.

In the present study, the rate of sexual satisfaction was significantly higher and dyspareunia was significantly lower in the case group than the control group. In a study to compare the effects of physiotherapy accompanied by surgery on the sexual satisfaction in patients with pelvic floor disorders, patients were assigned to two groups of routine treatment and physiotherapy. After an 8-week intervention, consistent with the present study, the symptoms of dyspareunia and orgasm in the case group improved. Therefore, physiotherapy can be considered an effective therapy for pelvic disorders (23). Notably, colporrhaphy itself is an effective treatment for improving sexual desire, orgasm, and sexual satisfaction for the women with POP (24). Hagen et al's study on pelvic floor muscle exercises in the women with pelvic fascia prolapse, showed that doing these exercises for 6 months could improve patients' sexual problems (22). A study reported that the patients who underwent pelvic muscle rehabilitation, exhibited improvement in certain indices such as orgasm and sexual desire, but no change in arousal (25).

Conclusion

This study indicated that presurgical physiotherapy could be used as an appropriate approach to improve the quality of life and sexual function for patients with POP who are candidates for colporrhaphy. It is recommended to investigate individual and specific physiotherapy and match the two groups of the study by physical conditions in future studies as well as to conduct longitudinal studies.

References

- Jelovsek JE, Maher C, Barber MD. Pelvic organ prolapse. *Lancet*. 2007;369(9566):1027-38.
- Chow D, Rodriguez LV. Epidemiology and prevalence of pelvic organ prolapse. *Curr Opin Urol*. 2013;23(4):293-8.
- Choi KH, Hong JY. Management of Pelvic Organ Prolapse. *Korean Journal of Urology*. 2014;55(11):693-702.
- Fritel X, Varnoux N, Zins M, Breart G, Ringa V. Symptomatic pelvic organ prolapse at midlife, quality of life, and risk factors. *Obstet Gynecol*. 2009;113(3):609-16.
- Doaee M, Moradi-Lakeh M, Nourmohammadi A, Razavi-Ratki SK, Nojomi M. Management of pelvic organ prolapse and quality of life: a systematic review and meta-analysis. *Int Urogynecol J*. 2014;25(2):153-63.
- Segal S, Arya LA, Smith AL. Functional Outcomes for Incontinence and Prolapse Surgery. *Current bladder dysfunction reports*. 2012;7(3):179-86.
- Ellington DR, Richter HE. Indications, Contraindications, and Complications of Mesh in Surgical Treatment of Pelvic Organ Prolapse. *Clinical obstetrics and gynecology*. 2013;56(2):276-88.
- Barber MD, Maher C. Epidemiology and outcome assessment of pelvic organ prolapse. *Int Urogynecol J*. 2013;24(11):1783-90.
- Tok EC, Yasa O, Ertunc D, Savas A, Durukan H, Kanik A. The effect of pelvic organ prolapse on sexual function in a general cohort of women. *J Sex Med*. 2010;7(12):3957-62.
- Buchsbaum GM. Urinary incontinence and pelvic organ prolapse. *Minerva Urol Nefrol*. 2006;58(4):311-9.
- Giarenis I, Robinson D. Prevention and management of pelvic organ prolapse. *F1000Prime Reports*. 2014;6:77.
- Jarvis SK, Hallam TK, Lujic S, Abbott JA, Vancaillie TG. Peri-operative physiotherapy improves outcomes for women undergoing incontinence and or prolapse surgery: results of a randomised controlled trial. *Aust N Z J Obstet Gynaecol*. 2005;45(4):300-3.
- Frawley HC, Phillips BA, Bo K, Galea MP. Physiotherapy as an adjunct to prolapse surgery: an assessor-blinded randomized controlled trial. *Neurourol Urodyn*. 2010;29(5):719-25.
- Bø K, Hagen RH, Kvarstein B, Jørgensen J, Larsen S, Burgio KL. Pelvic floor muscle exercise for the treatment of female stress urinary incontinence: III. Effects of two different degrees of pelvic floor muscle exercises. *Neurourology and Urodynamics*. 1990;9(5):489-502.
- Montazeri A, Gashtasebi A, Vahdaninia M. Translate, determine of reliability and validity of Persian questionnaire of SF36. *Payesh*. 2005;5(1):49.

16. Pauls RN, Crisp CC, Novicki K, Fellner AN, Kleeman SD. Impact of physical therapy on quality of life and function after vaginal reconstructive surgery. *Female Pelvic Med Reconstr Surg.* 2013;19(5):271-7.
17. Pauls RN, Crisp CC, Novicki K, Fellner AN, Kleeman SD. Pelvic floor physical therapy: impact on quality of life 6 months after vaginal reconstructive surgery. *Female Pelvic Med Reconstr Surg.* 2014;20(6):334-41.
18. Rajkowska-Labon E, Bakula S, Kucharzewski M, Śliwiński Z. Efficacy of Physiotherapy for Urinary Incontinence following Prostate Cancer Surgery. *BioMed Research International.* 2014;2014:785263.
19. Ghaderi F, Oskouei AE. Physiotherapy for Women with Stress Urinary Incontinence: A Review Article. *Journal of Physical Therapy Science.* 2014;26(9):1493-9.
20. Hagen S, Stark D, Dougall I. A survey of prolapse practice in UK women's health physiotherapists: what has changed in the last decade? *International Urogynecology Journal.* 2016;27:579-85.
21. Brækken IH, Majida M, Engh ME, Bø K. Can pelvic floor muscle training reverse pelvic organ prolapse and reduce prolapse symptoms? An assessor-blinded, randomized, controlled trial. *American Journal of Obstetrics and Gynecology.* 2010;203(2):170.e1-.e7.
22. Hagen S, Stark D, Glazener C, Dickson S, Barry S, Elders A, et al. Individualised pelvic floor muscle training in women with pelvic organ prolapse (POPPY): a multicentre randomised controlled trial. *The Lancet.* 2014;383(9919):796-806.
23. Eftekhar T, Sohrabi M, Haghollahi F, Shariat M, Miri E. Comparison effect of physiotherapy with surgery on sexual function in patients with pelvic floor disorder: A randomized clinical trial. *Iranian Journal of Reproductive Medicine.* 2014;12(1):7-14.
24. Shahghaibi S, Faizi S, Gharibi F. Effect of colporrhaphy on the Sexual Dysfunction of women with pelvic organ prolapsed. *Pakistan Journal of Medical Sciences.* 2013;29(1):157-60.
25. Beji NK, Yalcin O, Erkan HA. The effect of pelvic floor training on sexual function of treated patients. *International Urogynecology Journal.* 2003;14(4):234-8.

The effect of Hypertonic Dextrose injection on the control of pain associated with knee osteoarthritis

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Abstract

Introduction: The purpose of this study was to evaluate the effect of dextrose injection on controlling pain associated with knee osteoarthritis.

Methods: To achieve the research objectives, available sampling was done using 80 patients with knee osteoarthritis referring to Taleghani Hospital in 2017 and samples were divided into two groups: 15% dextrose injection and 25% hypertonic dextrose injection. This injection was performed at the beginning of the study, the first week, the fifth week and the ninth week. During these weeks, participants were asked to complete the WOMAC questionnaire implementing the VAS scale. After data collection, independent t-test and two-way variance analysis with repeated measures were used.

Findings: The findings showed that 15% and 25% dextrose injection had a significant effect on the visual scale of pain and function of patients, so that, during weekly treatment, scales showed improvement in treatment in these patients. Also,

other findings showed that injection of 25% dextrose had a significant visual analog of patient's pain and function compared to 15%.

Conclusion: In general, it can be suggested that the use of dextrose prolotherapy is a simple, safe, inexpensive, accessible and less complicated method than other treatments in these patients.

Key words: Osteoarthritis, Prolotherapy, Treatment, Health.

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Introduction

Osteoarthritis (OA) is the most common joint disease in humans and is characterized by the degradation of the hyaline cartilage and can lead to chronic pain and severe disability in the patient (1). The morning and the decrease in the movement range of the joint are important characteristics of this disease (2). The greatest risk factor for this disease is age (3), but high blood pressure, severe strokes, excessive use of the joint, inoperative anterior cruciate ligament and damage to the meniscus can also result in knee OA (4-5). OA levels in all societies are rising due to increased longevity. Pain, stiffness and knee pain during active knee movements are common symptoms of OA, which not only reduces the ability of patients, but also adversely affects the quality of life of patients (6).

Osteoarthritis is one of the five main causes of physical disability in the elderly (1, 7). It is estimated that 90% of people over 40 in the United States suffer from osteoarthritis (8). Studies show that the prevalence of knee osteoarthritis is 60 to 90% as a cause of musculoskeletal pain among people 65 years of age or older (9). By 2020, it is estimated approximately 4.55 million Americans, i.e. 18.2% of the US population will have osteoarthritis (10). According to the World Health Organization, the prevalence of osteoarthritis in the Iranian urban population is reported to be about 19.3% (5). The findings of a similar study in Iran show that osteoarthritis is higher in the Iranian population than in the other studied populations, and the prevalence in women is more than in men (11). OA costs 60 billion dollars a year for the US economy (12). This disease is one of the main causes of functional impairment and has greatly influenced people's lives, including their mobility, independence, and daily activities, resulting in limited recreational activities, sports, and work (13). The results of a 2004 study in Iran investigating 200 patients with osteoarthritis showed that high BMI, high age, and live in a village were the main factors affecting the inability of these patients (14). Sex also plays a major role in this issue, about 2.3% to 3.4% of the knee OA patients are female (15).

The inflammation process also plays an important role in osteoarthritis, and cytokines such as IL-1 beta, IL-6, tumor necrosis factor, and IL-15 play a role in this disease (16-17). The disease is divided into two primary and secondary forms. In the primary type, the degeneration process and joint destruction occurs without previous anomalies. Its main cause is unknown, usually it is seen in individuals over 40 years of age with slow progressive and multiple arthroplasty, and is seen through normal or abnormal pressure on the weak joint (8, 15). Secondary osteoarthritis is followed by an underlying cause such as fractures, bone and joint injuries, infections, rheumatoid arthritis, and congenital and metabolic diseases (18).

In terms of pathology, this disease is caused by three biological, mechanical and biomechanical causes. Symptoms begin with mild pain in one or more joints and gradually intensify. This pain is improved with exertion and relaxation, with the advancement of pain, it develops and joint stiffness lasts for a few minutes (19).

Failure to use a joint with OA due to pain results in rapid atrophy of the muscles around the joint, and therefore, lead to muscle loss, which is one of the most important factors for joint support. Eventually, in the last stages of the disease or when there is severe pain (20), it disturbs patients' quality of life, and ultimately leads to surgery such as joint replacement (21). Pain is a multidimensional phenomenon that has physical, psychological, social, and spiritual components, and is, in fact, a kind of unpleasant sensory and psychological experience that is associated with actual or potential tissue damage and it is expressed with a series of words from people who experience it (22). The lack of management of chronic pain affects the physical and mental condition of individuals, decreases their quality of life and that of their families, and on the other hand, along with the physical and psychological disabilities, it imposes a significant cost to the economic resources of countries, health systems and insurance (23). In addition to the direct medical costs caused by pain, it imposes the following indirect costs, such as complications of therapeutic measures, the number of days someone cannot handle, movement restrictions, being useless and ineffective, functional disorders, pain-related disabilities, and compensation for these disabilities on the individual and the community (24).

In industrialized countries and developing countries attention to knee osteoarthritis is an important cause of pain and disability, the loss of proper joint performance, and joint instability and deformity are increasing (25). Therefore, several therapeutic approaches have been proposed for the treatment or improvement of this disease. Multiple treatments for this disease include medication, lifestyle changes, weight loss, muscle strengthening, using cane, brace, heel wedge and surgical procedures. All of these methods have a sedative effect and only delay the onset of the disease (26). The standard of care and treatment is multifactorial in osteoarthritis, and often involves physical therapy, prescribing and taking anti-inflammatory drugs, intracranial injection of hyaluronic acid (visco-supplementation) and arthroscopic surgery. New studies also show no therapeutic effect left alone (27).

Unfortunately, no definitive treatment for this disease has been found despite the many used therapeutic methods. Therefore, given the long duration, high financial costs, widespread side effects, non-steroidal anti-inflammatory drugs, and finally, the symptoms of the disease lead to limitation of movement and severe disability and loss of muscle performance and muscle weakness; therapeutic goals of the disease should include reducing pain and weakness, improving performance and range of motion, and facilitating day-to-day activities. Treatment of the disease includes medical treatments and non-pharmacological treatments including physiotherapy. Another promising treatment that has recently been used to treat musculoskeletal pain is prolotherapy (28, 29). Prolotherapy is a selective therapeutic and complementary injection for chronic musculoskeletal pain. Prolotherapy techniques and injected intra-articular materials are very different and are related to the patient's condition, severity of symptoms and clinical manifestations of patients. Prolotherapy involves infusion of a very small amount of

an anti-inflammatory or sclerosis agent into the tendon, inflamed or painful joint or ligament (30).

It is assumed that prolotherapy leads to stimulate recovery in chronic soft tissue injuries; typically, dextrose hypertonic is used in prolotherapy for intramuscular injection (30). The study of Reeves et al. (2003) showed that the pain of the patients was significantly decreased after the injection of into the hip (31). Jo et al. also found that intra-joint 15% dextrose injection can reduce knee pain in these individuals (32). A study by Rabago et al showed that in adults with osteoarthritis, using intra-articular dextrose reduces pain, rigidity and increased function of patients without side effects (33).

Knee osteoarthritis can result in severe physical and mental disability, and the therapeutic goals in this disease include reducing weakness, improving performance, reducing pain, increasing the range of motion, reducing the morning stiffness of the joints, and facilitating the daily functioning of life (34) and due to the need to find safe, simple and inexpensive non-surgical treatments to reduce pain and improve the function of patients with knee osteoarthritis and the limited number of studies in this field, this study aimed to investigate the effect of dextrose injection on the control of pain associated with knee osteoarthritis in patients referred to Taleghani Hospital (2017).

Methodology

The study was a single-blind clinical trial. The research population was all patients with knee osteoarthritis, who were selected by available sampling method from 80 knee osteoarthritis patients referred to Taleghani Hospital. They were randomly divided into two groups: 15% dextrose injection and injection of hypertonic dextrose 25% divided. The sample size was 80 individuals based on similar research ($p \leq 0.05$) and a test power of 80%. The criteria for entering the study included: unilateral idiopathic OA of the knee, age range of 45-75 years, walking ability, local knee pain with a score of more than 5 based on VAS criteria and exit criteria including: other knee diseases, hip joint OA, and ankle sprain, radicular pain due to lumbar spine disorders, intraocular effusion, history of physiotherapy and intra-articular injection in the past 6 months, psychomotorial diseases, knee necrotic tissue, infection and tissue in the blood, neurological, sensory and motor disorders, history of knee surgery and obesity. Ethical Criteria of this study was approved by the ethics committee of Shahid Beheshti University of Medical Sciences.

Method of implementation

After diagnosis of the patient as an appropriate case, education about the method of implementation and the benefits and possible complications of participating in the project, written consent was taken from the patient. They were informed about the necessity of regular referral for follow up, but that it was not imposed. The intervention was performed without the cost to the patient. Before the intervention, a questionnaire was filled out including patient's demographic information, such as: gender, age, occupation, involved side (upper leg), history of previous

treatments, and history of underlying illness and the duration of symptoms. In addition to providing an educational brochure on how to inject, the time for referrals to perform tests and the next visit was presented face to face. Regarding moral considerations, the patient was assured that they could be excluded from the study whenever they wished, and that their failure to cooperate with the doctor and the hospital would not affect their treatment and all patient information would be kept confidential. The injection procedure was performed in such a way that the patient was placed in a supine position and marked with a knee flexion of 10-15 degrees on the medial side of the knee, marking the injection area, and then the injection site was disinfected with Povidone iodine and the injected area was anesthetized with 1 ml 1% Lidocaine solution and using needle number 25-27 after aspiration and ensuring proper placement of needle for intra-articular injection (35).

In the 25% dextrose group, solution was made of 5 cc 50% dextrose and 5 cc 1% lidocaine. Then, 6 cc of this 25% dextrose solution was injected into the patient's joint and injection was performed with the inferomedial approach (33). In the 15% dextrose group, solution was made of 6.75 cc 50% dextrose and 4.5 cc of 1% lidocaine and 11.25 cc of normal saline 0.9%. Then, 0.5 cc of this solution was 15% dextrose that was injected as subdermal with peppering technique with needle number 25 in the bone ligament. There were 15 injections for each patient (33). This injection was performed at the beginning of the study, the first week, the fifth week and the ninth week. The completion of the WOMAC questionnaire and the implementation of the VAS scale were performed before the intervention, and in the first week, the fifth week, the ninth week and the thirteenth week. To measure the variables, the Western Ontario and McMaster Universities (WOMAC) index and the VAS Scale (Visual Analogue Scale) were used as follows.

Visual Analogue Scale

The visual analogue scale (VAS) indicates the pain of the patients in general. This scale is plotted as a 10 cm line, and the degree of pain is graded from zero to 10 cm. The zero number does not show any pain, 1 to 3 mild pain, 4 to 6 moderate pain and 7 to 10 severe pain [36]. The internal reliability of this tool has been reported as 0.85 to 0.95 (37).

Functional questionnaire of WOMAC

The WOMAC functional questionnaire consists of 24 questions, 5 questions regarding pain, 2 questions related to stiffness and 16 questions regarding the performance of patients with osteoarthritis. The score for each question varies from zero to four. This criterion is scored from zero to 96. If the patient has no problem, then, the score is zero and if they have a maximum problem, score will be 96. Validity and reliability of this tool have been investigated by Ebrahimzadeh et al. and has been validated in the Persian language. Cronbach's alpha was estimated 0.9 in Persian language (5).

In analyzing data, the mean, standard deviations, frequencies, tables and charts were used to categorize

and summarize the collected data. In the study of statistical pre-requisites, the number of observations per distribution was used to test the natural distribution of the data using the Kolmogorov-Smirnov test. Regarding the existence of

statistical hypotheses, independent t-test and two way-analysis of variance with repeated measures ($p \leq 0.05$) and using the Statistical package of version 22 were used.

Results

The participants in the present study consisted of 48 (60%) women and 32 (40%) men. The age range of patients was (45-75) years and the mean age was 64.3 years.

VAS variable

The results of Kolmogorov-Smirnov test showed that the distribution of data was normal ($P > 0.05$). T-test showed that there was no significant difference in VAS scale between the two groups before intervention ($t = 0.781$, $p > 0.05$). Two-way analysis of variance (week \times group) of 3×2 was used to analyze the data. The results are presented in Table 1.

Table 1: The results of variance analysis of VAS scale in two groups

Variables	df	Sum of squares	F	Sig.
Group	1	7.004	14127.948	0.00
Week	2	859.400	2596.509	0.00
Week \times Group	2	1.117	3.373	0.037
Error	78	16.410		

The findings showed that the main effect of the group ($F_{2,78} = 14127.948$, $p < 0.05$), the main effect of week ($F_{2,78} = 2596.509$, $p < 0.05$) and the interaction between the group and the week was significant. The significance effect of the group means that there is a significant difference between the two groups in the visual analogue scale. According to Chart 1, the group of 25% Dextrose injection experienced more pain relief than the 15% group. Significance of the weeks of treatment meant that during the weeks of injection, the process of pain reduction continued significantly (Figure 1).

WOMAC variable

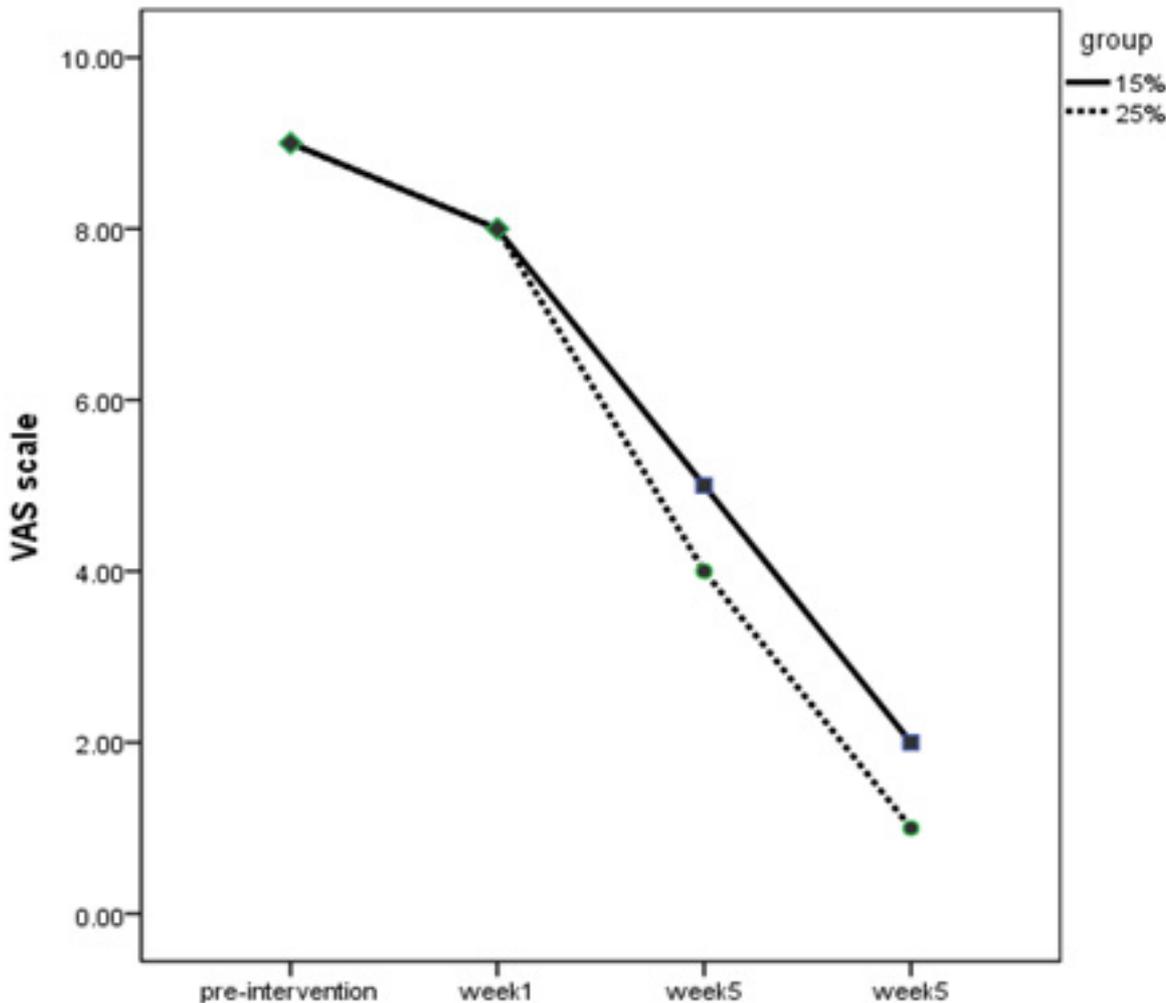
The results of Kolmogorov-Smirnov test showed that the distribution of data was normal ($P > 0.05$). T-test showed that there was no significant difference in the WOMAC scale between the two groups before the intervention ($t = 0.841$, $p > 0.05$). Two-way analysis of variance (week \times group) of 3×2 was used to analyze the data. The results are presented in Table 2.

The findings showed that the main effect of the group ($F_{2,78} = 5671/901$, $p < 0.05$), the main effect of week ($F_{2,78} = 797/595$, $p < 0.05$) and the interaction between the group and the week was significant. The significance of the effect of the group means that there is a significant difference between the two groups on the WOMAC scale. According to Figure 2, it can be said that 25% dextrose injection group had a better experience. Significantly, the weeks of treatment means that during the weeks of injection, the improvement in performance was significantly increased (Figure. 2 - page 197).

Table 2: The results of variance analysis of WOMAC scale in two groups

Variables	df	Sum of squares	F	Sig.
Group	1	2368.817	5671.901	0.000
Week	2	22381.904	797.595	0.000
Week \times Group	2	326.279	12.91	0.000
Error	78	35.558		

Figure 1: VAS scale of the two groups in the weeks of treatment



Discussion

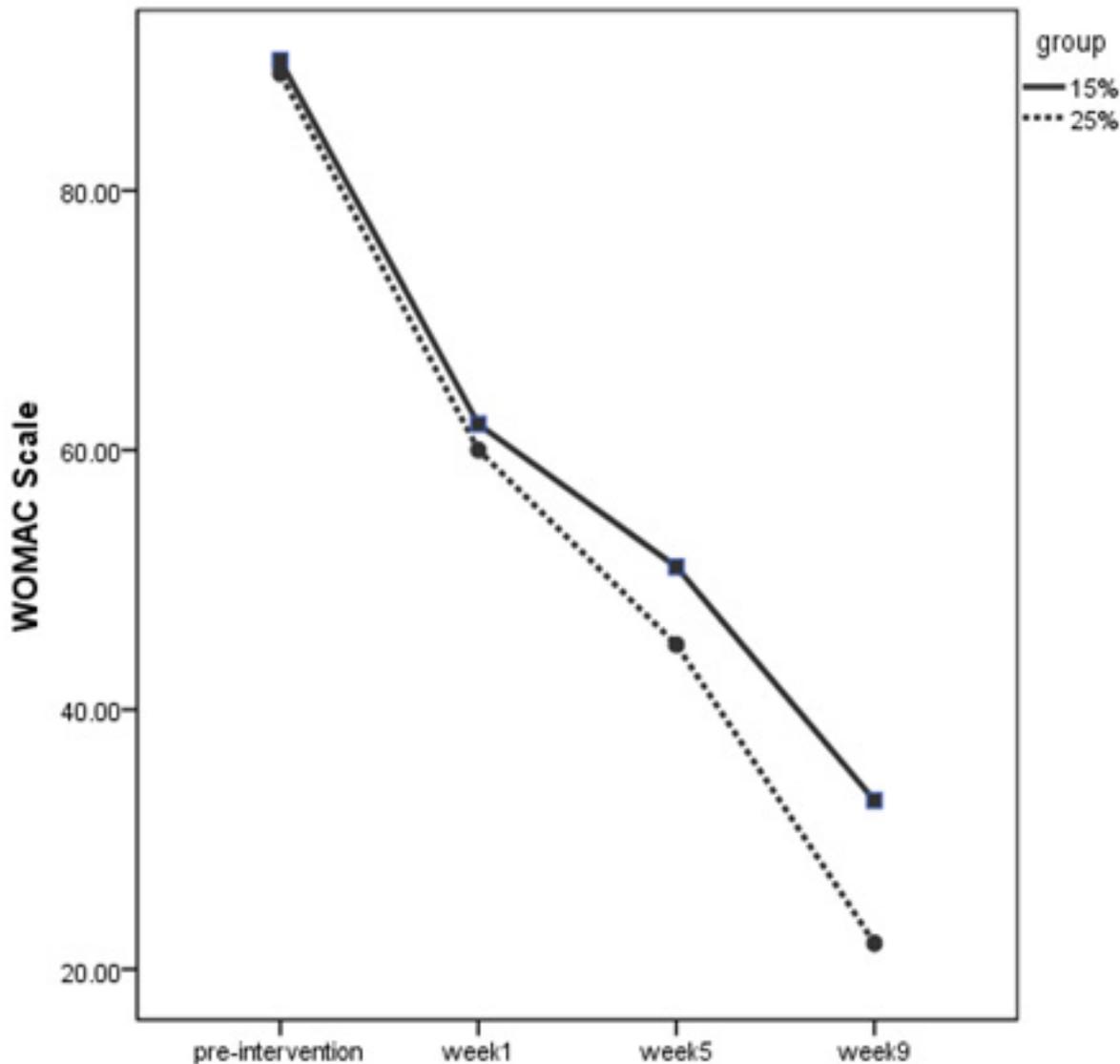
The purpose of this study was to investigate the effect of dextrose injection on pain control associated with knee osteoarthritis. The findings showed that injection of 15% and 25% of dextrose had a significant effect on the visual scale of pain and function of patients so that during treatment, scales showed improvement in treatment in these patients.

Also, other findings showed that injection of 25% dextrose compared to 15% had a significant effect on visual scale of pain and function of patients. These findings are consistent with the results of Reeves and Hassanin (2004), Rabago (2012), Jo (2004), Reeves and Hassanin (2000), Hashemi (2015) and Reeves (2003). For example, the findings of Rabago (2012) showed that in adults with osteoarthritis, using intra-articular dextrose reduces pain, stiffness and increased function of the patients without any side effects (33). Joe et al. (2004) showed that the pain of patients was significantly reduced by 15% dextrose injection. They also concluded that intra-articular injection of 15% dextrose can reduce knee pain in these individuals (32). In another study, Hashemi et al. (2015) attempted to compare the effect of ozone therapy and dextrose injection in patients with osteoarthritis. They evaluated the patients using the WOMAC and VAS scales. The findings showed that in

both groups, pain significantly decreased and function was significantly increased. They concluded that both treatments were effective in reducing pain and increasing the function of patients (38). In subsequent studies, Reeves and Hassanein (2000) evaluated the effect of 10% dextrose on osteoarthritis of fingers. After six months of follow up, they found that in the dextrose group, a significant improvement was observed in the case of xylocaine group during fingers movement and joint flexion, but there was no significant improvement in pain during rest and recovery. Another study on knee osteoarthritis and anterior AC ligation showed significant improvement in pain and knee swelling and flexion, but in the ACL group, there was no significant improvement in instability (40).

Also, Hassanein and Reeves (2002) conducted a study on patients with joint instability associated with ACL rupture. Their findings showed that in patients with a three year follow up, there was a significant decrease in pain during walking, joint swelling and joint flexion (40).

In another study for the treatment of osteoarthritis, finger joints used 10% dextrose over two months, which was associated with beneficial therapeutic effects (41). In another study, it has been reported that in third world countries where knee insertion surgery is not available, in contrast to symptomatic patients, exercise, physiotherapy or NSAIDs

Figure 2: WOMAC scale of the two groups in the weeks of treatment

are prescribed. The researchers found that 10% dextrose could modify ACL ligament laxity, which was not associated with rupture, and also prevented gradual salivation after surgery in joints with a potential displacement (42). The mechanism of dextrose effect is that injection of a stimulant such as dextrose into a damaged joint, possibly with local inflammatory reactions, may lead to an increase in blood flow around the joint and damaged tissue, thereby causing self-repair in that area.

The dextrose effect has another mechanism of effect (43). They showed that in treatment with 10% Dextrose, the response rate, the accumulation and tightening of the uterus, was significantly better than oxytocin treatment (40 units per liter).

These researchers argued that the mechanism of dextrose effect is that since the activity of the sympathetic nervous system and the level of adrenalin of the blood increases at an advanced age, this increase in adrenalin increases the level of cAMP by binding to beta receptors and thus, activates the protein kinase dependent to cAMP, which in turn has a moderating role in kinase adhesion to the myosin-

like chain and calcium-calmodulin molecule, and therefore, result in reduction in the contractile power of the smooth muscle. Hence, at an advanced age, it is necessary to increase the level of dextrose and consequently increase the level of ATP for exposure to high levels of catecholamines to help accumulate and tighten the uterus.

According to the results, it can be concluded that the mechanism of the effect of Dextrose Prolotherapy is direct effects, osmotic and inflammatory growth. Dextrose injection with a concentration of less than 10% directly promotes cell and tissue proliferation without inflammatory reaction and a high concentration of 10% results in an extracellular osmotic gradient at the injection site resulting in loss of intracellular and lyse cellular cells and invasion of growth factors and inflammatory cells that start the wound healing cascade in that particular area. Dextrose is an ideal proliferant because it is water-soluble and is a mixture of blood that can be safely injected into several areas and in large quantities, and the final result is the insertion of new collagen into damaged tissues such as Ligaments and tendons.

When extracellular dextrose concentrations reach 5%, normal cells begin to proliferate and produce a number of growth factors such as platelet growth factor, TGF- β , epidermal growth factor, basal growth factor fibroblast growth factor, insulin-like growth factor, and connective tissue growth factor that repairs the tendon, ligaments and other soft tissues.

Conclusion

Finally, according to human and animal studies, dextrose Prolotherapy has a significant effect on musculoskeletal pain, disability and cost of treatment. Major complications from dextrose have not been reported, and include mostly side effects of injection (pain in injection site, hematoma, infection, and skin pigmentation) (38, 39). According to the findings of this study, the use of Dextrose Prolotherapy is a simple, safe, inexpensive, available and uncomplicated method for other remedies in these patients, which has been confirmed by other studies.

References

- Jordan JM, et al. The impact of arthritis in rural populations. *Arthritis & Rheumatism*. 1995; 8(4): 242-250.
- Gordon, A., P., the Five Pillars of Pain Management: A Systematic Approach to Treating Osteoarthritis. *Osteoarthritis and Cartilage*, 2006. 14: p. S193.
- Kurtaiş, Y., et al., Reliability, construct validity and measurement potential of the ICF comprehensive core set for osteoarthritis. *BMC musculoskeletal disorders*, 2011. 12(1): p. 255.
- Buckwalter, J.A. and N.E. Lane, Athletics and osteoarthritis. *The American Journal of Sports Medicine*, 1997. 25(6): p. 873-881.
- Ebrahimzadeh, M.H., et al., The Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) in Persian Speaking Patients with Knee Osteoarthritis. *Archives of bone and joint surgery*, 2014. 2(1): p. 57.
- Neogi, T., et al., Association between radiographic features of knee osteoarthritis and pain: results from two cohort studies. *Bmj*, 2009. 339.
- Felson, D.T., et al., Osteoarthritis: new insights. Part 1: the disease and its risk factors. *Annals of internal medicine*, 2000. 133(8): p. 635-646.
- Sowers, M., Epidemiology of risk factors for osteoarthritis: systemic factors. *Current opinion in rheumatology*, 2001. 13(5): p. 447-451.
- Williams, F.M. and T.D. Spector, Biomarkers in osteoarthritis. *Arthritis Research and Therapy*, 2008. 10(1): p. 10.
- Issa, S.N. and L. Sharma, Epidemiology of osteoarthritis: an update. *Current rheumatology reports*, 2006. 8(1): p. 7-15.
- Haq, S.A. and F. Davatchi, Osteoarthritis of the knees in the COPCORD world. *International journal of rheumatic diseases*, 2011. 14(2): p. 122-129.
- Buckwalter, J.A., C. Saltzman, and T. Brown, The impact of osteoarthritis: implications for research. *Clinical orthopaedics and related research*, 2004. 427: p. S6-S15.
- Salavati, M., et al., Validation of a Persian-version of Knee injury and Osteoarthritis Outcome Score (KOOS) in Iranians with knee injuries. *Osteoarthritis and Cartilage*, 2008. 16(10): p. 1178-1182.
- Shakibi, M.R., Relationship Between Pain and Disability in Osteoarthritis Patients: Is Pain a Predictor for Disability? *J. Med. Sci*, 2004. 4(2): p. 115-119.
- Moskowitz, R.W., *Osteoarthritis: diagnosis and medical/surgical management*. 2001: WB Saunders Company.
- Waldmann, T.A., Targeting the interleukin-15 system in rheumatoid arthritis. *Arthritis & Rheumatism*, 2005. 52(9): p. 2585-2588.
- Nishimoto, N., et al., Treatment of rheumatoid arthritis with humanized anti-interleukin-6 receptor antibody: A multicenter, double-blind, placebo-controlled trial. *Arthritis & Rheumatism*, 2004. 50(6): p. 1761-1769.
- Cole, B.J. and C.D. Harner, Degenerative arthritis of the knee in active patients: evaluation and management. *Journal of the American Academy of Orthopaedic Surgeons*, 1999. 7(6): p. 389-402.
- Moskowitz, R.W., *Osteoarthritis: diagnosis and medical/surgical management*. 2007: Lippincott Williams & Wilkins.
- Mease, P.J., et al., Pain mechanisms in osteoarthritis: understanding the role of central pain and current approaches to its treatment. *The Journal of rheumatology*, 2011. 38(8): p. 1546-1551.
- Bennell, K., et al., Efficacy of physiotherapy management of knee joint osteoarthritis: a randomised, double blind, placebo controlled trial. *Annals of the Rheumatic Diseases*, 2005. 64(6): p. 906-912.
- Pizzo, P.A. and N.M. Clark, Alleviating suffering 101—pain relief in the United States. *N Engl J Med*, 2012. 366(3): p. 197-199.
- Gran, S.V., L.S. Festvåg, and B.T. Landmark, 'Alone with my pain—it can't be explained, it has to be experienced'. A Norwegian in-depth interview study of pain in nursing home residents. *International journal of older people nursing*, 2010. 5(1): p. 25-33.
- Brennan, F., D.B. Carr, and M. Cousins, Pain management: a fundamental human right. *Anesthesia & Analgesia*, 2007. 105(1): p. 205-221.
- Foley, A., et al., Does hydrotherapy improve strength and physical function in patients with osteoarthritis—a randomised controlled trial comparing a gym based and a hydrotherapy based strengthening programme. *Annals of the Rheumatic Diseases*, 2003. 62(12): p. 1162-1167.
- Andreoli, T.E., et al., *Andreoli and Carpenter's Cecil essentials of medicine*. 2010: Elsevier Health Sciences.
- Samson, D.J., et al., Treatment of primary and secondary osteoarthritis of the knee. *Evid Rep Technol Assess (Full Rep)*, 2007. 157(157): p. 1-157.
- Hassan, F., et al., The effectiveness of prolotherapy in treating knee osteoarthritis in adults: a systematic review. *British Medical Bulletin*, 2017. 122(1): p. 91-108.
- Reeves, K.D. and K. Hassanein, Randomized prospective double-blind placebo-controlled study of dextrose prolotherapy for knee osteoarthritis with or without ACL laxity. *Alternative therapies in health and medicine*, 2000. 6(2): p. 68.

30. Rabago, D., A. Slattengren, and A. Zgierska, Prolotherapy in primary care practice. *Primary Care: Clinics in Office Practice*, 2010. 37(1): p. 65-80.
31. Reeves, K.D. and K.M. Hassanein, Long term effects of dextrose prolotherapy for anterior cruciate ligament laxity. *Alternative therapies in health and medicine*, 2003. 9(3): p. 58.
32. Jo, D. and M. Kim, The effects of Prolotherapy on knee joint pain due to ligament laxity. *Journal of the Korean Pain Society*, 2004. 17(1): p. 47-50.
33. Rabago, D., et al., Hypertonic dextrose injections (prolotherapy) for knee osteoarthritis: results of a single-arm uncontrolled study with 1-year follow-up. *The Journal of Alternative and Complementary Medicine*, 2012. 18(4): p. 408-414.
34. Ross, S.M., Osteoarthritis of the knee: An integrative therapies approach. *Holistic nursing practice*, 2011. 25(6): p. 327-331.
35. Hashemi, S.M., et al., Intra-articular hyaluronic acid injections vs. dextrose prolotherapy in the treatment of osteoarthritic knee pain. *Tehran University of Medical Sciences*, 2012. 70(2).
36. Jensen, M.P., P. Karoly, and S. Braver, The measurement of clinical pain intensity: a comparison of six methods. *Pain*, 1986. 27(1): p. 117-126.
37. Mokkink, L.B., et al., Construct validity of the DynaPort® KneeTest: a comparison with observations of physical therapists. *Osteoarthritis and Cartilage*, 2005. 13(8): p. 738-743.
38. Hashemi, M., et al., The effects of prolotherapy with hypertonic dextrose versus prolozone (intraarticular ozone) in patients with knee osteoarthritis. *Anesthesiology and pain medicine*, 2015. 5(5).
39. Hashemi, SM., et al., Intra-articular hyaluronic acid injections vs. dextrose prolotherapy in the treatment of osteoarthritic knee pain. *Tehran Univ Med J*, 2012. 70(2).119-125
40. Kim SR, Stitik TP, Foye PM: critical review of prolotherapy growth factor-beta and basic fibroblast growth factor. *J Bone for osteoarthritis A physiatric perspective* 2004; 83: 379- *Joint Sur.* 1995; 77: 543-5439.
41. Reeves KD, Hassanein K. Randomized prospective double-blind placebo-controlled study of dextrose prolotherapy for knee osteoarthritis with or without ACL laxity. *Altern Ther Health Med.* 2000; 6(2):68-74, 77-80
42. Reeves KD, Harris AL. Recurrent dislocation of total knee prostheses in a large patient: Case report of dextrose proliferant use. *Arch Phys Med Rehabil* 1997; 78:1039.
43. Rafiee, M.R., Samimi, M., Nouraldini, M., & Mousavi, S.G.H.A. Comparison of the effect of 10% dextrose and oxytocin 40 units per liter on uterine contraction after cesarean section. *Yafte*, 2006, 8(1), 13-18

Evaluation of Psycho-Social Factors Influential on Emotional Divorce among Attendants to Social Emergency Services

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Abstract

The purpose of this research was to evaluate psychological and social factors effective on emotional separation among attendants to welfare social emergency centers in the county of Shirvan Cherdval. A number of 40 women attendants were selected as sample. Research instrument included emotional divorce questionnaire used for measurement of variables. Data was analyzed using the SPSS-18 software and using correlation and regression analysis. Results showed that psychological and social factors have a positive correlation with emotional divorce and regression analysis showed that social factors rank first and psychological problems are next in importance when it comes to emotional divorce. Therefore, the results of this research can be applied in the context of prevention and counseling and guidance of couples.

Key words: Social Factors, Psychological, Emotional Divorce, Social Emergency

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Introduction

Divorce in terminology means separation, letting go, resolution and annulment of marriage between couples. Divorce is a discretionary organized method for ending a tie (Abhari, 2003). Most evaluations performed show correlations between divorce and addiction, crime and delinquency, neuroticism, lack of balance of personality, educational and teaching issues, suicide and/or social combat and the like and consider divorce tied with them (Piran, 1980). Numerous studies show that psychological disorders among singles, widowers, separated and divorcee is higher than married individuals and the risk of depression in divorce is higher than in widowhood (Zahireddin & Khodaiifar, 2003).

A look at the situation of divorce in Iran shows that its trend in the two thousandth decade (2001-2009), namely from 2001, has been completely on the rise such that it has increased from 0.95 for each 1.71 per thousand in the entire country. Additionally, the level of divorce in rural areas has more than doubled (from 0.41 to 0.88 in a thousand) and in municipal areas it has nearly doubled (from 1.01 to 2.09 in a thousand) (Kalantari et al, 2011).

Previous Research

Results of research by Dehghani and Nazari (2013) has shown that the variables of unasked for intrusion by relatives in the life of couples, level of difference of socio-economic status among couples, marital satisfaction and positive perception of results of divorce has direct influence on divorce. Additionally, Barikani and Sarbechlou (2011) have listed incorrect initial selection and too much dependence of one of the couple on the family among the most important causes of divorce.

With the purpose of evaluating factors influential on divorce rate, in this research three theoretical outlooks have been integrated: Homogamy theory, Exchange theory and Network theory. The most fundamental pre-assumptions of the exchange theory is that groups are just collections of individuals where their behavior is predicted and explained by studying their motivations and they are driven by virtue

of personal advantage and are intellectual computers of profit and costs. Whenever this balance is destroyed, the person tends towards aggressive behavior based on this theory and ultimately divorce happens. Thus, the perception of the individual of profit and loss in marital life is of importance and one should note what rewards in case of separation will replace others. The same applies to costs and they should ultimately decide in which stage (before or after divorce) profits were higher (Jalilian, 1996).

In the homogamy theory, marriage is recommended among those who are similar in all regards economic, social and cultural. The sides should be completely equal in education, economic status, ethics and other aspects of life. Otherwise, the marriage will not be successful. The non-homogamous marriage theory has been introduced by Veet. He believes in economic and social equality in socio-economic status but inhomogeneity in ethics and mannerism of individuals. In other words, husband and wife should complement each other ethically. A man who has an angry temper and is hasty should make ties with someone calm and perseverant. Otherwise, ties between a hasty and angry man with a women of the same nature will lead to much tension in the family and ultimately gives rise to divorce (Saroukani, 2008).

Cheney and Yamamura believe that the stronger tribal and cultural attachments between husband and wife, risk of separation is much less among them. Overall, the more homogeneous spouses are, their marriage will hold better and in total, it can be stated that it is a more stable end (Saroukhani, 2006). Spouse selection traditions trend towards homogeneous marriages. This by itself can result in transactions and exchange of spiritual values and material assets. The theory of homogamy considers family unity a result of similar traits between husband and wife.

Network theory stands against normative theory. Therefore, in the opinion of network theoreticians, normative outlooks emphasize culture and socialization processes and internalization of norms and values in individuals. In the normative outlook, what keeps people alongside each other is a series of common ideas. Network theory

negates such outlook and states that causality models that connect people in society with each other should be investigated. If husband and wife both belong to networks of such type and these networks are protected, marriage is only enforced on top of the existing relations such that the couple continues outreach towards out of home activities and people. In this situation, roles are separated in a dry and in-flexible way. The reason is that the couple are both able to acquire support outside of the family domain (Segalen, 1997).

Considering previous research, this study aimed to evaluate social, economic and cultural factors influential on emotional divorce between attendants to welfare social emergency centers in the county of Shirvan Cherdavel.

Methods

This research is correlational. Statistical population of the research includes all women who have attended centers for decreased emergent divorce in the county of Shirvan Cherdavel in the first five months of 2011 and their files are still open. A number of 40 women were selected as sample. Next, questionnaires were completed by participants in Access and it was endeavored this way to evaluate factors influential on emotional divorce.

Research Instrument

For data collection, questionnaire was used. This questionnaire in total included 42 items designed in two parts: socio-demographic traits such as age, gender, education level, occupation, income, number of off- spring and independent and dependent research variables (including income level, interest in emotional divorce, intrusion of relatives and friends, aggression and psychological problems). Each item had 5 responses from completely agree=5, agree=4, no opinion=3, disagree=2, completely disagree=1 which were scored based on a Likert scale (off course, scoring of some items were in reverse). To evaluate questionnaire validity and its scales of external validity and for measuring its reliability, Cronbach's alpha was used which was calculated at 0.85 for the questionnaire.

Results

For evaluation of the relationship between psychological problems and social factors with emotional divorce among couples, Pearson's correlation coefficient was used.

Table 1: Correlation between psychological problems of couples and emotional divorce

Pearson's test	Determination coefficient R	Significance level	Number
Emotional divorce factors			
Psychological problems	0.31**	0.04	40

As shown in Table 1, statistically meaningful correlation exists between psychological problems and emotional divorce and P=0.04 is lower than the set P=0.05 and the coefficient R=0.31. In other words, psychological problems between couples are among causes of emotional divorce and direct correlation also exists between these two.

Table 2: Correlation between causes of psychological problems of couples and emotional divorce

Pearson's test	Determination coefficient R	Significance level	Number
Emotional divorce factors			
Psychological problems	0.69**	0.001	40

**= p<0.001

Based on Table 2 which shows correlation between causes of emotional divorce and social factors, this correlation is meaningful and $P=0.000$ which is less than the set $P=0.05$ and the coefficient $R=0.897$. In other words, social factors are influential on emotional divorce and direct correlation exists between the two.

Table 3: Step by step linear regression modeling of psychological and social factors involved in emotional divorce

Models			Non standard coefficients		Standard coefficients	T	Sig.
	R	R2	B	Std. Error	Beta		
1 Social	.850	.720	1.49	.170	.780	8.77	.0000
2 Psychological	.860	.750	.190	.090	.190	2.12	.040

Results of step by step linear regression analysis of psychological and social factors involved in emotional divorce: the variable of emotional divorce as dependent variable and psychological and social factors as independent variable were entered into the regression analysis. By selection of step by step model, two exemplifications were chosen as follows. Ultimately, example 2 was entered into the formula as the final model where social factors ranked first and psychological factors second with significance level of $P=0.00$.

Conclusion

This research was performed with the objective of evaluating psychological and social factors influential on emotional divorce between attendants to emergency social welfare offices in the county of Shirvan Cherdavel. Results showed that psychological and social factors have positive correlation with emotional divorce. This result agrees with previous research: The research by Sepehrian in 2000 reported the reason for requesting divorce in 83 percent of cases was lack of behavioral and ethical adaptability and in 10 percent of the cases illness or psychiatric disease in at least one of the couple (Davodi, 1977; Ghotbi, 2004). The level of divorce in a society can be considered to be lack of social stability and since it is the reason for disruption of the family unit we are certainly left with its social consequences.

It is suggested that families provide more situations for their off spring to communicate before marriage. Maybe with increased understanding of each other's psychological, personality, social and economic characteristics as well as timely utilization of specialized counseling in spouse selection, disagreement and marital disputes can be decreased to some extent. Education at various levels for society and parents and guardians can play an important role in prevention of this social concern and promote physical, psychological, social and economic well-being of the country. Research is recommended in the context of evaluating psychological well-being of couples attending family courts, comparative evaluation of causes of divorce

in various provinces, evaluation of the relationship between counseling and divorce prevention in couples attending family courts in the future.

References

- Abhari, Majid (2001). Causes and factors leading to social pathology. Pashtoun Publications.
- Barikani, A; Sarbechlou, MI (2011). Evaluation of factors influential on divorce among attendants of marriage and divorce offices and judiciary compounds in the province of Gazvin in 2007. Collection of Articles of the Second National Congress on Social Pathologies in Iran, University of Social Sciences University of Tehran: Iranian Sociology Society.
- Davodi, Parstoo (1977). Causes and factors of divorce. MS Dissertation, University of Tehran, Tehran.
- Kalantari, Abdolhossein; Roshanfekr, Payam; Javaheri, Jelveh (2011). Review of three decades of research on reasons for divorce in Iran. Women and Family Socio-Cultural Council Journal, year 14, no 53.
- Piran, Parviz (1980). In search of sociology of divorce. Ronagh Journal, year 1, no 1, p41.
- Jalilian, Zahra (1996). Social factors influential on request for divorce in the city of Tehran. MS Dissertation, University of Allameh Tabatabaai, University of Social Sciences.
- Saroukhani, Bagher (1997). Divorce: a research on understanding the truth and its factors, 2nd edition. Tehran: University of Tehran Publications.

- Saroukhani, Bagher (2006). A primer on sociology of family, 8th edition. Tehran: Soroush Publications.
- Sgallen, M (1997). Historical sociology of family, 2nd edition. Soroush Publications.
- Gotbi, Marjan et al (2004). The situation of divorce and some factors influential on it in divorcee's residing in the Dolatabad district. *Refah*: 3(12): 271-286.
- Skidmore, V (1993). Theoretical thinking in sociology (Translation: Mohammad Hazer et al). Tehran: Sefid Publications.
- Sotoudeh, Hedayatollah and Seifollah Bahari (2007). Family pathology. Tehran: Nedaye Ariana.
- Zahiredin, Alireza and Khodaiifar, Fatemeh (2003). Evaluation of personality profiles of divorce attendants to the court. *Research and Scientific Journal*, no 25, p 1-7.

Organizational Justice and Trust Perceptions: A Comparison of Nurses in public and private hospitals

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Abstract

Background: Hospital organizational environment influences nurses' behaviors, attitudes and work quality. Organizational justice and trust are important organizational factors which have significant effects on the organizational and individual work outcomes.

Objectives: The aim of this study was to investigate perceived organizational justice and organizational trust and their relationship in nurses of public and private hospitals in north of Iran and to compare these two groups of nurses.

Methods: The study population included 322 nurses working in six public and private hospitals selected through stratified and simple random sampling. Perceived organizational justice was assessed through Niehoff and Moorman questionnaire and Elonen et. al questionnaire was used to assess the perceived institutional trust.

Results: Perceived organizational justice and institutional trust of nurses in private hospitals were better than nurses in public hospitals. There was a significant positive relationship between perceived organizational justice and perceived institutional trust and this relationship was more significant in nurses of private hospitals. Organizational justice explained approximately 60% and 50% of the total variance of trust in respectively private and public hospitals. Among three dimensions of organizational justice, procedural justice had a greater relationship with institutional trust and it was a

better predictor of nurses' trust in comparison to distributive and interactional justice in both types of hospitals. Also nurses' perceptions of organizational justice and trust were not significantly different based on sex, age group, job tenure, employment status, and education level in both types of hospitals.

Conclusion: According to the results, in order to improve organizational trust, it is necessary that hospital managers develop organizational justice. In this way, the resulted positive individual and organizational outcomes can significantly affect the quality of nurses' services and patients' satisfaction.

Key words: Organizational justice, Institutional Trust, Nurses, public hospital, private hospital

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Background

Nurses are the healthcare providers whose main duties are caring, disease prevention and health promotion of patients (1). Beside these clinical activities they have managerial activities for coordinating the unit's tasks and condition (2). Nurses are the most numerous members of medical care teams and as frontline health workers have the closest contact with patients (3). Therefore, the nurses' services have great effect on the quality of care, patients' satisfaction, shaping the image of hospital care in viewpoint of patients and hospital performance and effectiveness (1, 4). Many hospitals' managers have realized that the quality of nursing services is the key to their organization efficiency and effectiveness (5). So hospital managers should pay special attention to these greatest parts of the care team.

Employees' attitude toward their jobs and organization is the most important factor that affects their productivity and performance and managers' behaviors affect employees' attitudes, beliefs and behaviors (6, 7). Managers' fair treatment as one of the important and critical needs of employees in organization is crucial in shaping employees' attitudes because the norms and values of fairness make a critical trait of behavior in organizations (7, 8).

Organizational justice interprets the role of fairness in the workplace and the way employees determine they have been treated fairly and how these determinations influence their work related variables (9). Organizational justice has three distinct dimensions (distributive justice, procedural justice, interactional justice) which are related but differentially affect employees' work-related attitudes and behaviors (10). Distributive justice is based on the employees' perceptions of fairness of outcomes due to their input and in comparison to their peers within an organization (11). Distributive justice includes different organizational factors such as promotions, rewards, work schedules, shift assignments, performance evaluations and punishments (12). Procedural justice relates to employees' perceptions of fairness of the methods and processes which are used to make decisions like payment, reward, promotion, evaluation, disciplinary actions etc. in the organization (13). Having stronger procedural justice perceptions, the procedures are necessary to be consistent across time and persons, bias suppression, accurate, correct, ethical and representative of employees' need (14). Interactional justice as the third dimension of organizational justice refers to employees' fairness perceptions of interpersonal treatment of managers in the organization. Interactional justice reflects the politeness, honesty, respect, dignity and sensitivity of authorities' treatment toward individuals in their interactions, decision making and outcomes allocation (15, 16, 17). Employees' perceptions of justice relate to important individual and organizational consequences like job performance, citizenship behavior, job satisfaction, evaluation of supervisor, commitment and conflict solving (18). Nevertheless some studies showed employees' perceptions of injustice caused negative personal issues like psychiatric disorders, sickness

absence and poor self-rated health status and negative organizational issues like low levels of commitment, satisfaction and productivity, weak cooperation, turn over, anti-normative behaviors, disharmony and tension-stress (18, 19, 20, 21). As organizational justice is essential for impressive management and is a key variable to improve effectiveness in an organization and predict its success (14). managers should be sensitive to the factors that affect their employees' justice perceptions.

Studies showed one of the employees' attitudes that was affected by perceptions of fairness in organization is trust. The history of trust issue refers to the creation of earliest human society. Trust is the basis and requirement of all social relationships like organizational relations (22). Trust is mostly considered as a singular construct but it affects the organizational performance, procedures and structures in social or organizational context which makes it a complicated multidimensional construct. Trust as a part of organizational culture and values reflects in different behaviors of employees (23). So organizational trust is essential for creating an effective organization.

Different scholars have looked differently at trust concept and provide different definitions for it. For example Mayer et al define trust as "the willingness of one party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (24). However, some key words constantly appear in the most of scholars' definitions that are belief, willingness and vulnerability (25). Trust takes shape at different level in organizations and the trust referent can be an individual, group, organization or system. Trust can be established between the employee and both the supervisor and the organization (26). Organizational trust includes both interpersonal and impersonal trust. Interpersonal trust contains horizontal and vertical factors. Horizontal trust refers to trust between co-workers and vertical trust refers to trust between employees and their supervisor or managers. Organizational trust also includes systematic trust, when employees feel confidence toward the organizational system and functions. This impersonal dimension of trust is often named as institutional trust (27). Institutional trust basis is the organization's roles, systems and reputation (28). It defines trust of employees on different aspects of organization, such as strategy, vision, procedures, communication, human resources, practices and technological and commercial ability (27).

Researchers found that trust, as an important component of professional life, has different consequences for both employees and organization. Trust can predict employees' reactions, behaviors and performance. It also has a great role in various organizational processes and outcomes such as organizational commitment, commitment to leaders' decisions, organizational citizenship behaviors, job performance, innovation, problem solving, long term stability, managing organizational dynamics, promote cooperation between employees and organizations, reducing the rate of resignation and turnover, organizational

health and productivity and well-being of their members, (27, 29; 30 31, 32, 33, 34, 35). Organizational factors such as structure, human resource policies, procedures and organizational culture affect employees' trust (36). So organizational factors should be considered by managers because they can use them to enhance trust perceptions. For example, improving the work environment in a way that inspires fair and safe system structures can increase employees' trust in management(37).

Employees constantly monitor the activities of their organization to know if they should trust their organization or not (3). So if the process of payment and resource allocation, decision making, interpersonal interaction and leadership are considered to be fair in their point of view they would know their organization and their manager deserve their trust. Institute of Medicine (IOM) also has emphasized enhancement of working relationships and trust, clear and respectful communication and teamwork to improve quality of care (38). So hospital managers should determine their employees' level of justice perceptions and trust and try to eliminate the factors that cause the perceptions of injustice which can lead to mistrust perceptions in an organization.

Objectives

The work condition can be different in private and public hospitals which can affect the employees' attitudes in various ways. Therefore, in the current study we investigated the phenomenon of organizational justice and institutional trust perceptions among nurses in private and public hospitals; the way organizational justice dimensions affect nurses' trust and the power of organizational justice in predicting institutional trust.

Methods

1. Setting and sample

This cross-sectional study was performed among nurses of 3 private and 3 public hospitals affiliated to Rasht University of Medical Sciences, Iran. Among nurses of these hospitals 322 were captured by the Cochran formula. To determine the sample size in each hospital and select nurses of each unit for answering the questionnaires stratified sampling and simple random sampling were used.

2. Study instruments and data collection

Three dimensions of organizational justice (distributive, interactional, procedural justice) were measured by Moorman and Nihouf on a five grade Likert scoring questionnaire. For assessing institutional trust, Ellonen et al (2008) questionnaire in a five-grade likert scoring system was used (27). This questionnaire, with a few modifications, was adapted from trustee's characteristics, which Mayer et al (1995) and McKnight et al (2002) have mentioned (24, 39). Institutional trust dimensions included situational normality, vision, strategy, communication, and structural assurance. The questionnaire's reliability was confirmed via Cronbach's alpha, 89% for organizational justice and 86% for institutional trust.

3. Ethical Considerations

The participants were assured of the confidentiality of their responses.

4. Data analysis

The data were analyzed using descriptive and inferential statistics (Pearson product-moment correlation coefficient, Chi-Square test and Multiple Linear Regression) through IBM-SPSS 19 and level of significance was set to 0.05.

Results

Most nurses were female, between 20-30 years old and had less than 10 years job tenure. About 98% of them had bachelor degree and 55.28% were contractually employed (Table 1). Mean score of organizational justice perceptions of private hospitals' nurses was 3.27 (out of 5) and mean score of organizational justice perceptions of public hospitals' nurses was 3.08 (out of 5). Among the three dimensions of organizational justice the highest mean score referred to interactional justice in both public and private hospitals. The mean score of organizational justice perceptions showed that nurses slightly agreed with organizational justice. Mean score of institutional trust perceptions of nurses of private and public hospitals were 3.08 and 2.88 (out of 5) (Table 2). The findings showed there was a significant positive relationship between organizational justice and its dimensions with institutional trust ($P < 0.05$). Also procedural justice was more strongly and positively related to institutional trust (Table 3). According to the Multiple Linear regression results organizational justice was significant predictors of institutional trust although its power was different in public and private hospitals. Organizational justice explained approximately 60% of the total variance of institutional trust in private hospitals and about 50% in public hospitals.

In public hospitals three dimension of organizational justice could predict the institutional trust but in private hospitals only distributive and procedural justice had the power of institutional trust prediction so interactional justice was omitted from the model. Procedural justice had stronger predictive power for institutional trust than did distributive and interactional justice in both types of hospitals (Table 4).

Also there were no differences between sex, age, job tenure, educational level and employment status in Nurses' perceptions of organizational justice and trust of nurse in private and public hospitals ($P > 0.05$).

Table 1: Demographic and professional characteristics of nurses

Demographic characteristics (n=322)	Frequency N (%)
Gender	
Female	290 (90.1)
Male	32 (9.9)
Age (year)	
20-30	125 (38.8)
31-40	113 (35.1)
41-50	75 (23.3)
> 51	9 (2.8)
Educational level	
Bachelor	315 (97.83)
Master	7 (2.17)
Length of employment (year)	
< 5	115 (35.7)
6-10	115 (35.7)
11-15	46 (14.3)
16-20	24 (7.5)
21-25	12 (3.7)
> 26	10 (3.1)
Employment Status	
Officially employed	144 (44.72)
Contractual employed	178 (55.28)

Table 2: Descriptive statistics of organizational justice and institutional trust

Hospital type	Variables	Mean	S.D
Public hospitals	Organization justice	3.08	0.77
	Distributive justice	2.43	0.84
	Procedural justice	3.18	0.85
	Interactional justice	3.62	1.07
	Institutional trust	2.88	0.9
Private hospitals	Organization justice	3.27	0.84
	Distributive justice	2.74	0.96
	Procedural justice	3.33	0.92
	Interactional justice	3.74	1
	Institutional trust	3.08	1.03

Table 3: Relationship between organizational justice and its components with institutional trust

Hospital type	variables	Institutional Trust	
		Pearson	
		R	P
Public hospitals	Organization justice	0.687	<0.001
	Distributive justice	0.529	<0.001
	Procedural justice	0.676	<0.001
	Interactional justice	0.537	<0.001
Private hospitals	Organization justice	0.761	<0.001
	Distributive justice	0.665	<0.001
	Procedural justice	0.706	<0.001
	Interactional justice	0.620	<0.001

Table 4: Regression components of organizational justice and institutional trust

Hospital type	variables	B	SE	R	R ²	Adjusted R ²	P
Public hospitals	Distributive justice	0.23	0.07	0.71	0.50	0.49	0.001
	Procedural justice	0.40	0.10				0
	Interactional justice	0.18	0.07				0.028
Private hospitals	Distributive justice	0.41	0.07	0.78	0.61	0.60	0
	Procedural justice	0.33	0.11				0.002
	Interactional justice	0.14	0.09				0.120
Private hospitals	Distributive justice	0.39	0.07	0.77	0.60	0.60	0
	Procedural justice	0.45	0.07				0

Discussion

The results of this study indicated the mean score of organizational justice and institutional trust perceptions of nurses from private hospitals was more than nurses of public hospitals. The mean score comparison of organizational justice components showed the score of interactional justice is more than the score of procedural justice and distributive justice in both types of hospitals. Also consistent with some other studies our results showed organizational justice and all its three dimensions had a significant relationship with institutional trust (16, 40, 41) and organizational justice was a significant predictor of institutional trust in both types of hospitals. Among the three dimensions of organizational justice procedural justice was more strongly and positively related to institutional trust and had stronger predictive power for institutional trust in both types of hospitals.

Trust implies that justice perceptions could improve trust towards subordinates (42). Organizational structure, strategy, procedures and communications with employees influence employees' perceptions of trust (43, 44). So managers can engineer trust perceptions by actions and procedures that inspire a justice pattern of organization (45). If employees

believe in justice of organizational outcomes they will trust in management and their decision making (46). Procedural justice refers to the way that an organization manages the tasks, enacts policies and allocates the resources (18). Fairness of Procedures assures employees that each outcome is the result of a certain action regardless of individual opinions or organizational mistakes. This provides evidence of the leaders' consistency and integrity and helps reduce ambiguity (44). Procedural justice also reflects the respect of an organization for the rights and dignity of its employees (47). So procedural justice shows to employees that fairness is organization rule and they will recognize it is deserving of their trust (18). Researchers have demonstrated that procedural justice helps reduce the effects of unequal outcomes because the processes which are used to determine outcomes may be more important to an individual than the received outcomes. So if employees perceive fair procedures have been used in determining the outcomes they receive, trust in the leader and the organization will be affective (46). In this study procedural justice had the most influence of the three variables of organizational justice on institutional trust.

Interactional justice refers to the way that management behaves toward the employees and the quality of their interpersonal treatment and communication. Interactional

justice also determines the integrity and benevolence of management (15, 16). In this study mean score of interactional justice perceptions of nurses in both types of hospitals was highest among the three components of organizational justice which can describe the quality of management communication.

In the organizational theory and organizational behavior realm, organizational justice and trust are two of the essential concepts and practices in every organization. According to the results, the nurses' organizational justice perceptions could strengthen their institutional trust perceptions. So hospital management should try to improve nurses' organizational justice perceptions to enhance their organizational trust perceptions. They should plan to enhance fair perceptions of nurses by fair payment system, fair procedures and enough information about system procedures and suitable communication and behavior with staff.

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References

1. Khan MH, Hassan R, Anwar S, Babar TS, Babar S. Patient Satisfaction with Nursing Care. *RMJ*. 2007; 32(1): 28-30.
2. Duffield M C, Roche MA, Blay N, Stasa H. Nursing unit managers, staff retention and the work environment. *Journal of Clinical Nursing*. 2010; 20: 23–33 23
3. Chen SY, Wu W, Chang CS, Lin CT, Kung JY, Weng HC, Y-T z Lin YT, Lee SL. Organizational justice, trust, and identification and their effects on organizational commitment in hospital nursing staff. *BMC Health Services Research*. 2015; 15:363.
4. Brown MP, Sturman MC, Simmering MJ. The benefits of staffing and paying more: The effects of staffing levels and wage practices for registered nurses on hospital's average lengths of stay [Electronic version]. 2002. Retrieved [insert date], from Cornell University, School of Hospitality Administration. Available at: <http://scholarship.sha.cornell.edu/articles/296>.
5. Needleman J and Hassmiller S. The role of nurses in improving hospital quality and efficiency: Real-world results. *Health Affairs*. 2009; 28 (4): w625-w633.
6. Lundstrom T, Pugliese G, Bartley J, Cox J, Guither C. Organizational and environmental factors that affect worker health and safety and patient outcomes. *Am J Infect Control*. 2002; 30 (2): 93-106.
7. Greenberg J. Organizational justice: Yesterday, today, and tomorrow. *Journal of Management*. 1990b; 16 (2): 399-435.
8. Cropanzano R and Ambrose R. Procedural Justice and Work Motivation. In R. M. Steers and L.W. Porter (Eds.). 2001. *Motivation and Work Behavior* (5th Ed, PP. , 131-143.), NY: McGraw-Hill.
9. Bos K. 2001. Fundamental research by means of laboratory experiments is essential for a better understanding of organizational justice. *Journal of Vocational Behavior*. 58: 254–259
10. Moorman, R. Citizenship behavior: Do fairness perceptions influence employee citizenship? *Journal of Applied Psychology*. 1991; 76 (6): 845-855.
11. Folger R and Greenberg J. Procedural justice: An interpretive analysis of personnel systems. In K. Rowland & G. Ferris (Eds.), 1985. *Research in personnel and human resources management* (Vol. 3, pp. 141 – 183), Greenwich, CT: JAI Press.
12. Lamber E. The impact of organizational justice on correctional staff. *Journal of Criminal Justice*. 2003; 31:155– 168.
13. Cropanzano R and Greenberg J. Progress in organizational justice: Tunneling through the maze.1997. Chapter in C.L Cooper and I.T. Robertson (Eds.), *International review of industrial and organizational Psychology*, New York, John Wiley & Sons.
14. Colquitt JA, Greenberg J, Zapata-Phelan C. P. What is organisational justice: A Historical Overview. 2005. In J. Greenberg, & J. Colquitt (Eds.), *Handbook of organisational Justice* (pp 3-59). New Jersey: Lawrence Erlbaum Associates Inc. Publishers..
15. Williamson K and Williams K. 2011. Organisational justice, trust and perceptions of fairness in the implementation of agenda for change. *Radiography* 17: 61-66.
16. De Coninck J. The effect of organizational justice, perceived organizational support, and perceived supervisor support on marketing employees' level of trust. *Journal of Business Research*. 2010; 63: 1349–1355.
17. Colquitt JA, Conlon DE, Wesson JM, Porter CH. O.L.H and Yee Ng K. 2001. Justice at the Millennium: A Meta-Analytic review of 25 years of Justice Research. *Journal of Applied Psychology* 85 (3): 425-445.
18. Cohen-Charash Y and Spector P. The Role of Justice in Organizations: A Meta-Analysis. *Organizational Behavior and Human Decision Processes*. 2001; 86 (2): 278–321.
19. McFarlin DB, Sweeney PD. Distributive and procedural justice as predictors of satisfaction with personal and organizational outcomes. *Academy of Management Journal*. 1992; 35(3): 626–637.
20. Alexander S and Ruderman M. The role of procedural and distributive justice in organizational behavior. *Social Justice Research*. 1987; 2: 177-198.
21. Elovainio M, Kivimäki M, Vahtera J. Organizational Justice: Evidence of a New Psychosocial Predictor of Health. *American Journal of Public Health*. 2002; 92 (1): 105-108.
22. Hassan M. and Semerciöz F. Trust in personal and impersonal forms its antecedents and consequences: A conceptual analysis within organizational context. *International Journal of Management & Information Systems – Second Quarter*. 2010; 14(2): 67-84.
23. Phillips C. The trust deficit: it started long before the scandals. 2004. The fielding graduate institute. Leadership 4 Change Consulting Group, LLC.

24. Mayer RC, Davis JH, Schoorman FD. An integrative model of organizational trust, *Academy of Management Review*. 1995; 20 (3): 709-734.
25. Mishra AK. Organizational response to crisis: The centrality of trust. 1996 . In R. M. Kramer and T. R. Tyler (Eds.), *Trust in Organizations: Frontiers of Theory and Research*, (PP, 261-287). Thousand Oaks, CA: Sage.
26. Whitener EM. The impact of human resources on employee trust. *Human Resources Management Review*. 1997; 7 (4): 389-404.
27. Ellonen R, Blomqvist K and Puumalainen K. The role of trust in organizational innovativeness. *European Journal of Innovation Management*. 2008; 11 (2):160-181.
28. Atkinson S and Butcher D. Trust in managerial relationships. *Journal of Managerial Psychology*. 2003; 18(4): 282-304.
29. Colquitt JA, Scott BA, Le Pine JA. 2007. Trust, trustworthiness, and trust propensity: A meta-analytic test of their unique relationships with risk taking and job performance. *Journal of Applied Psychology* 92 (4): 909-927.
30. Callaway P. The relationship between organizational trust and job satisfaction: an analysis in the U.S federal work force. 2007. Boca Raton, Florida.
31. Robbins SP. *The truth About Managing People*, 3th ED. 2013. Pearson education Inc, FT Press, New Jersey.
32. Frenkel S and Orlitzky M. Organizational trustworthiness and workplace labor productivity: Testing a new theory. *Asia Pacific Journal of Human Resources*. 2005; 43 (1): 34-51.
33. Dirks KT and Ferrin DL. Trust in leadership: Meta-analytic findings and implications for research and practice. *Journal of Applied Psychology*. 2002; 87 (4): 611-628.
34. Folger R and Konovsky M. Effects of procedural and distributive justice on reactions to pay raise decisions. *Academy of Management Journal*. 1989; 32 (1): 115-130.
35. Serap A and Ulku B. Relationship between nurses' organizational trust levels and their organizational citizenship behaviors. *Journal of Nursing Scholarship*. 2010; 42(2): 186-94.
36. Whitener EM, Brodt SE, Korsgaard MA, Werner JM. Managers as initiators of trust: An exchange relationship framework for understanding managerial trustworthy behavior. *Academy of Management Review*, 1998; 23 (3): 513-530.
37. McKnight DH and Chervany N. What Builds System Troubleshooter Trust the Best: Experiential or Non-Experiential Factors? *Information Resources Management Journal*. 2005; 18(3), 30-47,
38. Page A. *Keeping Patients Safe: Transforming the Work Environment of nurses*. 2004. Institute of medicine press. 500 Fifth Street, N.W., Lockbox 285, Washington, DC 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area). Available at: <http://nap.edu/10851>. DOI 10.17226/10851.
39. McKnight DH, Choudhury V, Kacmar C. Developing and validating trust measures for e-commerce: An integrative typology. *Information Systems Research*. 2002; 13 (3): 334-359.
40. Wong YT, Ngo HY, Wong CS. Perceived organizational justice, trust, and OCB: A study of Chinese workers in joint ventures and state-owned enterprises. *Journal of World Business*, 2006; 41: 344-355.
41. Aryee S, Budhwar P, Chen ZX. Trust as a mediator of the relationship between organizational justice and work outcomes: test of a social exchange model. *J Organ Behav*, 2002; 23: 267-285.
42. Brockner J and Siegel P. 1996. Understanding the interaction between procedural and distributive justice: the role of trust. In: Kramer R, Tyler T, editors. *Trust in Organizations: Frontiers of Theory and Research*, (pp. 390-413). Thousand Oaks, CA, US: Sage Publications, Inc.
43. Paliszkievicz JO. *Trust Management: Literature Review*. *Management*. 2011; 6(4): 315-331.
44. Burke CS, Sims DE, Lazzara EH and Salas E. 2007. Trust in leadership: A multi-level review and integration. *The Leadership Quarterly* 18: 606-632.
45. Greenberg J and Colquitt JA. *Hand book of organizational justice*. 2005. Lawrence Erlbaum Associates, Inc, U.S.A.
46. Podsakoff PM, MacKenzie SB, Moorman RH, Fetter R (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leader Quarterly*, 1,(2): 107-142.
47. Konovsky MA and Pugh SD (1994). Citizenship behavior and exchange. *Acad Manage J*; 37(3): 656-69.

Evaluation of Blood Levels of Leptin Hormone Before and After the Treatment with Metformin

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Abstract

The purpose of this study was to evaluate the blood level of leptin hormone before and after treatment with metformin. This research is a pre-test and post-test type. The statistical population in this study is 50 patients with type 2 diabetes who referred to Ghods specialized polyclinic in 2017. Patients with type 2 diabetes and BMI > 35 were enrolled. Each patient received 1000 mg of metformin twice daily for 2 months in a pill form, and a blood sample was taken before and after taking the drug and frozen at -20 ° C and, at the time of sampling, to room temperature delivered and measured. Glucose, total cholesterol, triglyceride, cholesterol and cholesterol were measured by common laboratory methods. HbA1c was measured by ion exchange chromatography using the Drew-DS5-UK device. Blood insulin concentration in patients was measured by sandwich ELISA method. Leptin was measured using the sandwich ELISA method. The findings of the study also indicated that body weight, BMI, FFM / Kg, FM / Kg before and after treatment were not significantly different. There was no significant difference between the mean of leptin hormone levels in the pre- and post-test, and there was no significant difference with the concentration of insulin hormone either. But the mean glucose concentration before and after treatment was statistically significant ($p < 0.05$). Also, the results indicated that the effect of drug use in pre-test and post-test on the level of cholesterol, triglyceride and LDL cholesterol levels in the patients was significantly different. In this study, the effect of metformin during the treatment period reduced the blood glucose level of individuals, but its effect on weight loss and HbA1c did not significantly increase due to the duration of treatment.

Key words: Leptin, Metformin, Diabetes.

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Introduction

Obesity is a major public health problem in developed countries. Today, the prevalence of obesity is increasing in developing countries, due to changes in lifestyle, modernization and urbanization. Body mass index (BMI) is a numeric measure that measures the rate of obesity by using weight and height data. BMI does not directly measure body fat, but research has shown that BMI is directly related to body fat (Pevester, 2010). According to the hypothesis of lipostat, that is the leading indicator of the relative stability of body weight, there is a mechanism of post-tracing (negative control) to control eating behavior and increase energy consumption when the body weight gain is of a certain degree (adjustment point); such inhibitory effect will stop when the body weight falls below this regulatory point (Lindel, 2008). This hypothesis predicts the existence of a post-traumatic message that originates from fat tissue and acts on the brain's control of eating habits and activity. Such an agent was discovered in 1994, and leptin was named. Leptin, a hormone suppressor of eating behaviors when sufficient sources of triacylglycerol were stored, was found to be a factor in the blood of natural mice that, with the elimination of leptin deficiencies, reversed the behavior of the bulky mutated rats (Montsours, 2011). These mutated rats were obese due to overeating, but their body weight was reduced by injection of leptin (Graham, 2012). There are also many causes for obesity, among them physiological causes play a more important role in this regard, with the Kennedy theory of liposuction in 1953 (Brenin, 2008). Based on this theory, fat tissue builds up a substance to regulate body composition, a theory that led to the discovery of a gene that later became known as the "Obesity Gene". This gene is called leptin, and was discovered in 1994 by Zang et al. Leptin comes from a Greek word Leptos, meaning "lean", but it's a bit more complicated than trying to interpret it as leptin is less than fat. Leptin is a hormone that controls appetite and body weight. This hormone is made up of fat cells and sends messages to the brain about how much energy is available to a person. The more fat cells a person has, the more leptin they will have. It seems that when the leptin is not secreted, the brain thinks that there is no fat in the body and it stimulates

the person to eat more and accumulate fat (Enfonds, 2014). The coordination of metabolism in various tissues of a mammal is done by the neuroendocrine system. Adjustment of this system is performed in such a way that separate cells in a tissue sense a change in the current condition and respond by secreting an extracellular chemical message and this message, after attaching to the receptor molecule in another cell, that causes a change in that cell. The hypothalamus of the brain is the center of the neuroendocrine system. Some regulatory mechanisms operate on a very long-term basis and control nutrition and energy consumption in a manner that maintains the body of mammals in a state of equilibrium. A partial imbalance in weight gain can put life at risk. When fat tissue forms a large part of the total body mass, life expectancy decreases. As a result, there is a lot of interest today in researching how to adjust body size and fat content. Leptin was identified as a product of a gene that was shown in laboratory mice with OB (abbreviated to obese, meaning obese). Mice with two defective versions of the gene (*ob / ob* genotype) indicate the behavior and physiology of animals is in a steady state of hunger: The levels of corticosterone hormones increase. They are not able to withstand heat, they grow naturally and their appetite is maintained. Due to the latter case, these mice are highly obese and their weight is 3 times higher than normal mice. These mice also have metabolic disorders such as diabetic animals and cannot use insulin (Robbins, 2010). By leptin injection into mutated mice (*ob / ob*), their weight decreased and locomotor activity increased and their heat production increased. The second gene of the mouse, also labeled DB (for diabetes), has been found in the regulation of appetite. Mice with two defective versions of the gene (*db / db*) are obese and diabetic. It is known that the DB gene is responsible for coding the receptor for leptin. Leptin activity does not appear when the leptin receptor fails. Leptin is produced only in fat cells and less in the intestinal epithelium and in pairs (Chen, 2013). Leptin receptors are expressed principally in the regions of the brain, including the arcuate nucleus neurons, and the hypothalamic ventromedial, that play a role in regulating eating behavior. This receptor is also expressed in the corpuscular cells of the adrenal glands and the beta pancreas cells, albeit at a low level. Leptin carries a message that fat deposits are sufficient and fuel consumption is reduced and energy consumption is rising. Leptin reciprocating with its receptor in the hypothalamus changes the release of an effect on appetite. Leptin also stimulates the sympathetic nervous system and thereby increases blood pressure, heart rate and heat production (producing heat at the expense of metabolic energy) by separating electron transport from ATP synthesis in mitochondria of fat tissue (Yang, 2009). The common model of leptin is a cascade of regulatory events that interact with the interaction of leptin and its receptor and affects the amount of hormones that stimulate or inhibit eating and energy consumption. The amount of leptin released from fat tissue depends on the number and size of fat cells. The leptin that connects to the receptor is as following: The receptor of leptin has a single piece of protein that is circulating in the membrane that is dipped to the outer side by binding leptin. Both monomers of this

dimer receptor are phosphorylated by a kinase enzyme. These phosphorous portions act as binding sites for three proteins that are message transducers and transcription activators. Then these three proteins are phosphorylated by the same kinase. Message transducers and transcriptional activators go to the cell nucleus after phosphorylation by kinase and, by binding specific DNA sequences, stimulate the expression of specific target genes. Eventually, the products of these genes affect the nutritional behavior of energy. One of the products of these genes is the α -melanocyte stimulating hormone that acts as an appetite suppressor. The increase in catabolism and the production of heat by leptin is due in part to the increase of the ucp-1 mitochondrial protein in fat cells. Leptin stimulates the synthesis of ucp-1 by altering synaptic transmission of neurons in the arcuate core and hybridization of some hypothalamic neurons. With the creation of a channel, the ucp-1 protein increases the entry of protons into the mitochondrial matrix without passing through the synthase ATP complex. This prevents the oxidation of fuels (fatty acids inside a fat cell) without the synthesis of ATP and releases energy in the form of heat, thus consuming calories or stored fats in large amounts (Freelit, 2010). Metformin is a type 2 diabetes regulator. Metformin has a cell-mediated sensitivity to insulin and anti-hyperglycemia, and is used to treat insulin in Non-Insulin-dependent diabetes mellitus (NIDDM). The precise mechanism of metformin has not been identified, but one of the proposed actions is the clearance of peripheral glucose in low insulin concentrations. Studies indicate that obesity in adults with metformin with type 2 diabetes leads to weight loss, and glucose tolerance and fat stores are corrected. Metformin mainly effects its anti-hyperglycemic effect by reducing glucose output through inhibition of gluconeogenesis. Additionally, the use of metformin in non-diabetic obese adults leads to reduced intake of food and weight loss along with a decrease in glucose, lipids, and insulin in fasting conditions. There are reports that metformin, in addition to the above effects, also reduces plasma leptin levels and fat stores (Jinjirik, 2012).

Methodology

The current study, based on the purpose of the applied type and based on its nature, is a type of pre-test and post-test. The statistical population in this study is type II diabetic patients (including adolescent and youth) referring to Ghods specialized polyclinic in 2012, that is 50 people. In this research, using a simple random sampling method, due to the wide extent of the statistical society and the impossibility of conducting research on the whole society, has been used. Patients with type 2 diabetes and BMI > 35 were enrolled. Each patient received 1000 mg of metformin twice daily for 2 months in a pill form, and a blood sample was taken before and after taking the drug and frozen at -20°C and, at the time of sampling, to room temperature, delivered and measured. Glucose, total cholesterol, triglyceride, cholesterol and cholesterol were measured by common laboratory methods. HbA1c was measured using a Drew-DS5-UK device using ion exchange chromatography. Blood insulin concentration

in patients was measured using Sandwich Elise method. Leptin was measured using the sandwich ELISA method. The results of the measured factors were expressed as mean and standard deviation. For statistical analysis, the results of glucose, blood lipids and HbA1c, and leptin and insulin, as well as body weight, BMI, body fat mass, and FFM body mass index from T was used.

Findings and Outcomes

Blood leptin hormone levels were measured in the two experimental groups. The results indicated that the mean of this hormone was $6.5 \mu\text{g} / \text{ml} \pm 3.3 \mu\text{g} / \text{ml}$. Also, the amount of insulin was $27.1 \pm 28.11 \text{ IU} / \text{mL}$. And the mean glucose was $159 \text{ mg} / \text{dl}$. Finally, glycosylated hemoglobin was 7.5%. The results indicate an inverse relationship between leptin and insulin showing this difference and the correlation between leptin and insulin, glucose, HbA1c, cholesterol and triglyceride, and BMI in the current study. Table 1 indicates the correlation between leptin and insulin, glucose, HbA1c, cholesterol, triglyceride and BMI.

Also, to evaluate the effect of metformin on weight factors, scores were compared before and after treatment. The results are shown in Table 2.

As shown in Table 2, body weight, BMI, FFM / Kg, FM / Kg before and after treatment were not significantly different. Also, to evaluate the effect of metformin on biochemical and metabolic factors in pre and post test (Table 3).

The results indicated that the mean of leptin hormone levels in pre- and post-test, as well as the concentration of insulin hormone was not significantly different. However, the mean of glucose concentration before and after treatment indicated a statistically significant difference ($p < 0.05$). Also, the effect of drug use in pre-test and post-test on the level of cholesterol, triglyceride and LDL cholesterol in patients was significantly different. Correlation analysis was also used to assess the relationship between leptin and biochemical parameters. The results are shown in Table 4.

The results of Table 4 indicated that there was no significant relationship between leptin of blood and any of the biocompatibility parameters.

Discussion and Conclusion

Obesity is a complex complication characterized by excessive accumulation of fat tissue. Obesity is associated with many health problems, including vascular diseases. The discovery of leptin hormone has led to further research on obesity. The main reason for this progress was that it indicated that the fat tissue of the signals is transmitted to the central nervous system. The Leptin produced by the obesity gene is a protein hormone with a molecular weight of 16 kDa, which is mainly secreted from fat tissue, and has a key role in regulating body weight. It is better to say that leptin acts as a warning mechanism for regulating body fat. This hormone increases energy consumption by

increasing the activity of the sympathetic nervous system and lipolysis. Leptin also inhibits appetite by influencing hypothalamic receptors. Therefore, the net effect of leptin is to reduce weight, but deficiency of the hormones or resistance to its effects can both lead to weight gain. Leptin resistance, that is associated with its increase in blood, is much more common in human obesity than the deficiency of this hormone. In recent years, numerous studies have been conducted on the association of leptin with arterial hypertension and heart rate. Leptin independent of CRP, that is an inflammatory marker, is associated with vascular disease, and this finding points to the importance of body fat in cardiovascular problems (Astling, 2011). Leptin receptors are on the endothelium wall and smooth vascular muscle cells. For this reason, leptin imposes intermediate is effective on ability and vascular growth. At the cellular level, leptin stimulates smooth muscle for proliferation. Vascular calcification is accelerated by leptin in empirical models. This hormone increases the oxidative pressure in the vascular wall, which can damage them. Therefore, as a general conclusion, it can be concluded that leptin levels in blood are related to cardiovascular health (Thomas, 2014). The findings also indicated that body weight, BMI, FFM / Kg, FM / Kg before and after treatment were not significantly different. The results of the study indicated that the mean of leptin hormone levels in pre- and post-test patients, as well as in the concentration of hormone insulin no significant difference was found. But the mean glucose concentration before and after treatment was statistically significant ($p < 0.05$). Also, the results indicated that the effect of drug use in pre-test and post-test on the level of cholesterol, triglyceride and LDL cholesterol levels in the patients was significantly different. In this study, the effect of metformin during the treatment period reduced the blood glucose level of individuals, but its effect on weight loss and HbA1c did not significantly increase due to the duration of treatment. Various studies have shown that the effect of metformin has significantly reduced blood lipids, which is consistent with the recent study that indicated that cholesterol and triglyceride and LDL cholesterol decreased after treatment. These findings suggest that the drug has an effect on metabolic pathways in addition to glucose lowering the lipids in these patients. Most studies have shown that a balanced, low-fat diet and physical activity reduce levels of leptin in the blood, even if no significant weight loss occurs. Reduced leptin levels through exercise, changes in energy balance, improved insulin sensitivity and changes in blood lipids are appropriate. The study of changes in leptin with physical activity is one of the issues that is especially important in adolescent and youth obesity. At the same time, there are still no other risk factors for vascular diseases, while many studies point to the onset of dryness and vascular trauma in adolescents.

Table 1: Correlation between research variables

Significance Level	Correlation	Leptin
0/692	0/768	Insulin
0/563	0/326	Fasting Blood Sugar
0/619	0/102	HbA1c
0/594	0/131	Cholesterol
0/804	0/259	Triglyceride
0/561	0/429	BMI

Table 2: Scores of individuals' weight factors in pre and post tests

Significance level	Post- Test		Pre- Test		Weight factors
	SD	M	SD	M	
0/372	17/5	61/6	18/4	64/2	Weight (Kg)
0/242	2/1	29/4	2/5	33/4	BMI
0/827	5/6	44/1	7/3	47/6	FFM/Kg
0/189	4/1	18/9	6/8	21/3	FM/Kg

Table 3: Scores of biochemical parameters in pre and post tests

Significance level	Post- Test		Pre-Test		Biochemical parameters
	SD	M	SD	M	
0/731	1/63	3/2	7/3	1/3	Leptin
0/637	15/5	16/2	4/19	2/15	Insulin
0/002	1/27	173/1	5/61	7/219	Glucose
0/104	1/40	9/9	2/4	4/10	HbA1c
0/009	0/08	214/5	52/4	2/238	Cholesterol (mg/dl)
0/293	0/14	208/4	92/1	1/238	Triglyceride (mg/dl)
0/802	1/06	47/3	25/7	9/51	HDL Cholesterol
0/004	1/93	137/9	62/3	2/163	LDL Cholesterol

Table 4: Correlation between leptin with biochemical parameters

Post-Test		Pre-Test		Biochemical parameters
R	P	R	P	
089/0	867/0	647/0	01/0	Insulin
186/-0	514/0	175/-0	545/0	Glucose
095/-0	762/0	532/-0	02/0	HbA1c
069/-0	731/0	021/0	846/0	Total Cholesterol
217/-0	513/0	034/-0	762/0	Tri Glyceride
199/0	513/0	046/-0	784/0	HDL
/086-0	690/0	-0.051	786/0	LDL
031/0	892/0	198/0	645/0	Body Weight
271/0	539/0	384/0	324/0	BMI
357/0	138/0	512/0	219/0	FFM
305/0	019/0	51/0	029/0	FM

References

- Pellestor F., Andreo B., Arnal F., Humeau C., Demaille J. Maternal aging and chromosomal abnormalities: new data drawn from in vitro unfertilized human oocytes. *Hum Genet.* 2010;112(2): 195-203.
- Lindell K., Svensson E., Bergh C., Lind P., et al. Expression of functional leptin receptors in the human ovary. *J Clin Endocrinol Metab.* 2008;82(12): 4144-8.
- Mantzoros C.S., Cramer D.W., Liberman R.F., Barbieri R.L. Predictive value of serum and follicular fluid leptin concentrations during assisted reproductive cycles in normal women and in women with the polycystic ovarian syndrome. *Hum Reprod.* 2011;15(3):539-44.
- Graham L., Danforth D., et al. Vascular endothelial growth factor, nitric oxide, and leptin follicular fluid levels correlate negatively with embryo quality in IVF patients. *Fertil Steril.* 2012;72(6):1024-6.
- Brannian J.D., Schmidt S.M., Kreger D.O., Hansen K.A. Baseline non-fasting serum leptin concentration to body mass index ratio is predictive of IVF outcomes. *Hum Reprod.* 2001; 16(9):1819-26.
- Anifandis G., Koutselini E., Louridas K., Liakopoulos V., Leivaditis K., et al. Estradiol and leptin as conditional prognostic IVF markers. *Reproduction.* 2014; 129(4):531-4.
- Robins J.C., Srivastava R., Mershon J.L., Thomas M.A. Association of leptin with poor ovarian stimulation during in vitro fertilization. *J Reprod Med.* 2005; 50(5):356-60.
- Chen R., Fisch B., Ben-Haroush A., Kaplan B., Hod M., Orvieto R. Serum and follicular fluid leptin levels in patients undergoing controlled ovarian hyperstimulation for in vitro fertilization cycle. *Clin Exp Obstet Gynecol.* 2013; 31(2):103-6.
- Yang X.F., Huang H.F. Impact of leptin levels on outcome of in vitro fertilization- embryo transfer. *Zhejiang Da Xue Xue Bao Yi Xue Ban.* 2009;31(3): 155-158.Chinese.
- Frelut, M.L, Childhood obesity: from clinics to leptin, *Int. J. Obes. Relat. Metab. Disord.* 2010, 21 (Suppl.2): 5137.
- Ma Z, Gingerich RL, Santiago JV, Klein S, Smith CH, and Landt M, Radioimmunoassay of leptin in human plasma, *Clin. Chern.* 2012; 42: 942.
- Stehling O, Doring H, Ertl J, Preibisch G, and Schmidt I, Leptin reduces juvenile fat stores by altering the circadian cycle of energy expenditure, *Am. J. Physiol* 2011; 271, R1170.
- Tumas MEA, Duncan JS, and Rayner DV. Effect of fasting and refeeding on Ob gene expression in white adipose tissue of lean and obese mice, *FFBS Let,* 2014; 365:488-90.

Etiology, Epidemiologic Characteristics and Clinical Pattern of Children with Febrile Convulsion Admitted to Hospitals of Germe and Parsabad towns in 2016

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Abstract

Background and Purpose: Febrile convulsion is the most common neurological disorder in children. Despite the studies, there are always controversies about the clinical and epidemiological patterns regarding the effect of genetic factors and climatic conditions on its incidence. The present study was carried out to investigate the etiologic, epidemiologic and clinical features of febrile seizure in children admitted to the Children's Hospital of Germe and Parsabad in Ardebil province.

Methodology: This retrospective descriptive cross-sectional study was conducted on 148 cases of admitted children due to febrile convulsion from April to March 2016 in Parsabad and Germe hospitals. The used instrument was a researcher-made questionnaire including demographic data and characteristics of the child's seizure attack. Validity of questionnaire was determined using the content validity method and its reliability was also measured by the observational method. Data were analyzed using SPSS version 22 and descriptive statistics of mean and standard deviation, Chi-square and T-test.

Findings: The prevalence of febrile convulsion in Germe and Parsabad during a year was 6.25%. Among 148 children, 87 children were male and 61

of them were females. The average age of patients was 24.6 ± 15.15 months and the peak of febrile seizure prevalence was between the ages of 1 to 2 years, and the majority of the cases had (81.8%) simple febrile seizure. The most common cause of fever in patients was upper respiratory infection (39.2%) and diarrhea (18.2%), respectively. There was a significant relationship between previous history of seizure, duration of seizure, age of child, duration of fever onset to seizure occurrence and seizure type ($p < 0.05$).

Conclusion: This study showed that the prevalence of febrile convulsion in children younger than 2 years old is more common in males and prevalence of simple seizure is more common compared to complex seizure. Also, the history of seizure, seizure duration, child's age, and duration of fever onset to seizure occurrence are effective in seizure incidence.

Key words: Febrile seizure, children, etiology, clinical pattern, epidemiologic characteristics

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Introduction

Febrile seizure is the most common neurological disorder in children (1), and it happens in 3-5% of American and European children and over 14% in Asian children under the age of 6 (2). Febrile seizure refers to those cases where seizure occurs at temperatures higher than 38 ° C in children from one month to seven years, who are neurologically healthy and have no sign of CNS infection or acute electrolyte imbalance and previous history febrile seizure (3). Febrile seizures mostly occur in children between the ages of six months and six years (2). The most prevalent age for affected children is 10 to 18 months and in 75%, it occurs in children younger than 3 years old (4,5). Febrile seizure occurs at temperatures above 38 ° C and it requires acute, emergency, chronic and long-term control (6). The cause of febrile seizure remains unknown, and so far 3 categories of dominant autosomal genes have been identified that justify the occurrence of familial fever and seizure (7). Positive family history has been confirmed as one of the predisposing factors for febrile convulsion (8,9,10). There is some seasonal differences in febrile convulsion occurrence and maximum prevalence can be observed in November and January (probably due to infection of the upper respiratory tract), June and July (possibly due to intestinal infection) in children (11). Viral infections of the upper respiratory system, Acute Otitis Media, gastroenteritis and roseola infantum are among the most common causes of fever in these patients. Fever and convulsion based on clinical symptoms are divided into two groups of simple and complex seizure (12, 13). Despite the existing studies in children's neurology, the discussion of febrile seizure is one of the topics which is always a lot of controversy about clinical and epidemiological patterns regarding the effect of genetic factors and climatic conditions on its incidence (14,15,16). Therefore, regional and global studies are needed to investigate the characteristics of febrile seizure and in identifying the patients who are at risk, and investigating demographic characteristics such as age, sex, family history, type of seizure, and the interval between febrile onset and seizure so that extra measures can be taken to prevent the recurrence of attacks. For example in Iran, various studies reveal different statistics. A study in Tabriz in 2004 showed that, 40% of children were admitted in hospital because of febrile convulsion (17), and in Birjand in 2007, 70.4% of children admissions was due to febrile convulsion (16). Due to the lack of studies regarding demographic and etiological characteristics and clinical patterns of fever and seizure in Germe and Parsabad, the aim of this study was to assess the etiology, epidemiology and clinical characteristics of children with febrile seizure in hospital in 2016. So, the medical and nursing staff take them into account to take the needed action in the treatment of febrile seizures.

Methodology

This study was a retrospective descriptive cross-sectional study. In this study, all files of children admitted to the Parsabad and Germe Hospitals from April to March 2016 due to febrile seizure were studied. Cases with incomplete information, or patients who were discharged in less than 24 hours, or patients with signs of central nervous system infection or electrolyte and metabolic disorders, and feverless seizures, were excluded and finally, 148 cases were included in the study. In this study, after obtaining permission from competent authorities, data were collected using a researcher-made questionnaire. The questionnaire consisted of two parts. The first part included demographic information, and the second part contained 20 questions about the characteristics of seizure including the age of the first seizure attack, the type and duration of seizure, the frequency of convulsion, temperature during the seizure, family history and cause of fever and pre-seizure measures to reduce fever. Validity of questionnaire was evaluated using content validity method and was evaluated by faculty members of Ardabil University of Medical Sciences. The reliability of questionnaire was also obtained by using the observational method ($r = 0.89$). Data were analyzed using SPSS version 22 and statistical descriptive (mean and standard deviation) and analytical (Chi-square and T-test) methods.

Findings

The analysis showed that during one year, 148 children with febrile seizure were admitted to the two hospitals and compared to the total number of children admitted in the same year, the incidence of seizure was 6.25%. In this regard, 121 children (81.8%) had simple seizure and 27 children (18.2%) had partial seizure. Among these children, 87 (58.8%) cases were males and 61 (41.2%) cases were female. Chi-square test showed that, there is no significant relationship between sex of child and type of seizure ($p = 0/27$).

Investigating the duration of seizure showed that, in the majority of children, or in 65 cases (43.9%), seizure duration was less than or equal to 5 minutes. Previous history of seizure was negative in 116 children (78.4%) and was positive in 32 children (21.6%). Family history of seizure was positive in only 14 children (9.5%) and family history of epilepsy was positive in 8 children (5.4%) in the immediate family. Chi-square test showed a significant relationship between seizure type and previous history of seizure as well as seizure duration with seizure type ($p = 0.000$). However, there was no significant relationship between the duration of seizure with previous history of seizure.

In both types of simple and partial seizure, natural delivery was the most common type of delivery, however, the Chi-square test showed that there is no significant relationship between type of delivery and type of seizure ($p = 0.09$). In this study, 73 children (49.3%) had the first birth rank, 57

children (38.5%) had a second birth rank and 14 children (9.5%) had a third birth rank and four children (2.8%) had fourth or more birth rank. According to Chi-square test, there was no significant relationship between birth rank, type of delivery with seizure type, previous history of seizure in childhood and cause of febrile convulsion.

The average age of patients was 24.6 ± 15.15 months; the minimum age was three months and the maximum age was 66 months. Most of the cases, or about 50 children (33.7%) were in the age range of 1 to 2 years old and the lowest rate, or 3 children (2.1%) were in the age range of 5 to 6 years. The results of t-test showed that, there is a significant relationship between age of child and type of seizure ($p = 0.023$). So, complex seizure mostly occurred in older children. However, no significant relationship was found between the cause of febrile seizure and the age of child. Investigating the duration between fever onset and seizure occurrence showed that, in 126 children seizures occurred (85.1%) in less than 24 hours after the onset of fever. Chi-square test showed a significant relationship between duration of febrile seizure and seizure type ($p = 0.009$). However, no significant relationship was found between previous history of seizure and the cause of febrile convulsion. The average temperature of children with fever and seizure was 38.86 ± 0.85 °C after first hospitalization; in children with simple seizure it was 38.969 ± 0.88 and in children with complex seizure it was 64.40 ± 91.9 °C. T-test showed that, there is no significant relationship between average temperature and seizure type, previous history of seizure and cause of febrile convulsion.

Among the causes of fever in children with seizure, 58 cases of upper respiratory tract infection (39.2%), 27 cases of dysentery (18.2%), 24 cases of idiopathic factors, (16.2%), 16 cases of pneumonia (10.8%), 14 cases of urinary tract infection (9.5%), 5 cases of otitis media (3.4%) and 4 cases after vaccination (2.7%) were the most common causes of fever in children with febrile seizure. Chi-square test showed no significant relationship between the cause of fever in children with seizure type and previous history of seizure in children. In this study, Spring with 45 cases was the season with the most incidence of seizure (30.4%), after that winter with 37 cases (25%), autumn with 35 cases (23.6%) and summer with 31 cases (21%) were in the next rankings, respectively. Chi-square test showed that, there is no significant relationship between season of febrile convulsion, seizure type and previous history of seizure, but there is a significant relationship between the cause of fever and the season of febrile convulsion ($p = 0.0337$). In spring and winter, the most common cause of febrile seizure was upper respiratory tract infections and dysentery was the most common cause in Summer (Table 1 - next page).

The findings of mothers' demographic data showed that, the average age of mothers of children with convulsion was 28.54 ± 5.48 years old. 67 (45.3%) mothers had under diploma, 58 (39.2%) of mothers had diploma and 23 (15.5%) had university education. T-test showed that, there is no significant relationship between mothers' age

with seizure type, previous history of seizure and cause of febrile seizure in children. Also, Chi-square test did not show a significant relationship between mothers' education and type of seizure, history of seizure and the cause of febrile seizure in children. 138 (93.2%) mothers mentioned the absence of perinatal problems, and only 10 (6.8%) mothers mentioned perinatal problems. 139 (93.9%) mothers mentioned the absence of a history of disease, and only 9 (6.6%) of mothers referred to diseases such as neurological problems, depression, diabetes, and previous history of seizure. 143 (96.6%) mothers mentioned non-smoking during pregnancy, and only 5 (3.4%) mothers mentioned the history of smoking during pregnancy. According to Chi-square test, no significant relationship was found between prenatal problems, history of disease in mothers, and smoking during pregnancy with seizure type, history of seizure and febrile convulsion.

126 (85.1%) mothers did some fever reduction measures before their children's seizure, and only 22 (14.9%) of them did not take any measures to reduce fever. 48 (32.4%) mothers tried to reduce the fever, using foot-bath and acetaminophen, 33 (22.3%) mothers only used acetaminophen, 8 (4.5%) mothers only used ibuprofen and 8 mothers (4.3%) used foot-bath and other medicines. There was no significant relationship between pre-seizure measures and seizure type, previous history of seizure and the cause of febrile convulsion (Table 2 - next page).

Discussion

In this study, 148 children with febrile convulsion with an average age of 24.6 ± 15.15 months were studied and the minimum and maximum ages were 3 and 66 months, respectively. 65.7% of children had febrile seizure in the first 2 years of life. Most studies confirm this case. In a study by Ghasemi et al most of the hospitalized children were between 9 months to 2 years (18). In a study by Fallah and colleagues, 66% of febrile convulsion cases were under 2 years (15). In a study by Khoda Panahandeh and colleagues, the average age of children with febrile seizure was 20.5 ± 9.8 months and the minimum and maximum age of children was 6 and 45 months, respectively (19). In a study by Bazegar and colleagues, the average age of children was 29.9 ± 21.2 months (14). In a study by Abbas khaniyan and his colleagues, the average age of children with febrile seizure was 5.1 ± 0.88 , and the highest incidence was in the range of 1 to 2 years old (20). In a study by Namakin and colleagues, the average age of children was 25.5 ± 18.6 months and 61.8% of children with febrile convulsion were under 2 years old (16). The current study, similar to other studies, showed the higher prevalence of seizure following fever in children under the age of 2. Given that the child is at a very vulnerable stage in terms of physical and mental development, therefore, preventing seizure as much as possible and raising the awareness of parents are important measures in controlling seizures and preventing serious physical and mental harm. In the present study, there was a significant relationship between age and type of seizure, so that seizures occurred more often in older children. This finding contradicted the findings of Barzegar and his colleagues, and in their study

Table 1: Comparison of Variables with Febrile Seizure Type

Variables		Simple Seizure	Complex Seizure	P-value
Seizure Type				
Average age (in month)		23/2±15/39	30/88±17/37	0/023
Sex	Male	(49.3 %)73	(%9/4)14	0/275
	Female	(%32/4)48	(%8/7)13	
Type of delivery	Natural delivery	(%42/5)63	(%13/5)20	0/094
	Cesarean section	(%39/2)58	(%4/7)7	
The most common cause of Febrile Seizure	Infection of respiratory system	(%33/1)49	(%6)9	0/265
	Dysentery	(%16/2)24	(%2)3	
Previous history of Seizure	Yes	(%12/8)19	(%8/7)13	0/000
	No	(%68/9)102	(%9/4)14	
Family history of febrile convulsion	Yes	(%7/4)11	(%2)3	0/746
	No	(%74/3)110	(%16/2)24	
Seizure duration	Less than 5 minutes	(%42/5)63	(%1/3)2	0/000
	Between 6 to 10 minutes	(%36/4)54	(%5/4)8	
	More than 10 minutes	(%2/67)4	(%11/4)17	
Duration of fever onset to seizure occurrence	Less than 24 hours	(%70/3)104	(%14/8)22	0/009
	More than 24 hours	(%11/5)17	(%3/4)5	
Average temperature		38/69±0/84	38/64±0/91	0/811
Previous history of hospitalization	Yes	(%19)28	(%8/7)13	0/009
	No	(%62/8)93	(%9/4)14	
Seizure fever season	Spring	(%24/3)36	(%6)9	0/802
	Summer	(%18/2)27	(%2/7)4	
	Autumn	(%19/6)29	(%4)6	
	Winter	(%19/6)29	(%5/4)8	

Table 2: Comparison of mother variables with febrile seizure type

Variables		Simple Seizure	Complex Seizure	P-value
Seizure Type				
Mothers' age		28/52±5/35	28/37±6/26	0/859
Fever reduction measures	Without any measure	(%10/8)16	(%3/4)5	0/704
	Foot-bath	(%18/2)27	(%4)6	
	Acetaminophen	(%15/5)23	(%5/4)8	
	Ibuprofen	(%4/7)7	(%0/6)1	
	Foot-bath and Acetaminophen	(%27/7)41	(%4/7)7	
	Foot-bath and other medicines	(%4)6	(%0)0	
	Other medicines	(%0/6)1	(%0)0	
Mothers' level of education	Under diploma	(%34/4)51	(%10/8)16	0/133
	Diploma	(%35/1)52	(%4)6	
	University education	(%12/1)18	(%3/4)5	
Drug abuse during pregnancy	Yes	(%3/4)5	(%0)0	0/283
	No	(%78/3)116	(%18/2)27	

complex seizures mostly occurred in children with lower age (14). In some other studies, no significant relationship was found between age and type of seizure (21, 16). These differences in results can be due to the difference in the number of samples in different studies. In this study, the incidence of febrile convulsion in males was more than females, which is similar to the results of other studies. They showed that the febrile convulsion prevalence was higher in boys than in girls (1,20,21,22). Therefore, male sex can be considered a risk factor for fever and seizure occurrence.

In the present study, 21.6% of children had a history of febrile convulsion. In the study of Fallah and colleagues, 29%, and in the study of Mohammadi and colleagues, 34% of children had previous history of seizure (15 and 1). In this study, 9.5% of children had a family history of seizure and only 4.5% of children had a family history of epilepsy in their immediate family, while in other studies it was reported at about 20-30%. This difference can be due to the lack of memory of parents regarding childhood seizures or the refusal to express their own history of seizure due to cultural and personal issues (23 and 24). There was no meaningful relationship between febrile seizure and family history of seizure in the present study. However, there is a significant relationship between the previous history of seizure in children with current type of seizures, so that complex seizures are more common in these children. This finding was consistent with the results of studies by Sanaei Dashti and his colleagues (25). According to studies, one third of children with febrile seizure will experience its recurrence and 10% of children will have three or more seizure attacks. Age is the most important risk factor in recurrence of febrile convulsion and in the first seizure the lower the age, the risk of recurrence is more (26). Considering that in this study, the age of most children is between the ages of 1-2, serious measures should be taken to prevent the occurrence of serious complications in the child. In the present study, most children had simple febrile seizures. In other studies, this finding is also confirmed (14,15,20,21). It can be concluded that epidemiologically, the prevalence of simple seizure is more than complex seizure in children with febrile seizure. In the majority of children in this study, the duration of seizure was less than 15 minutes. In the study of Khoda Panahande, 85% of cases of seizures were less than 15 minutes, and in the study of Bazgar and colleagues, 94.1% had seizures less than 15 minutes, which is consistent with the results of this study (7,14). Since the prevalence of fever attacks and simple seizures was higher in this study, one of the main attributes of this kind of attack is the duration of attack, which should be between 10-15 minutes.

In the present study, 85.1% of children had seizure during the first 24 hours after the onset of fever. This finding is also confirmed by other studies, and over 80% of seizures occurred in the first 24 hours after onset of fever (27, 20, 16, 14). The results show that, in the case of fever in a child, the first 24 hours is the most probable time for the occurrence of seizure and this should be taught to parents to try to reduce fever in different ways or transfer the baby to the nearest health center.

In this study, seizure prevalence mostly occurred in Spring, then Winter, Autumn and Summer, respectively. In the study of Abbaskhaniyan et al., the highest prevalence of febrile convulsion was in Winter (68.4%) then Autumn, Summer and Spring, respectively (20). In the study of Amini et al., the highest prevalence of febrile convulsion was in Summer (43.9%), Spring (43.6%), Winter (42.7%) and Autumn (35.7%), respectively (11). This could be due to climatic differences in the studied areas.

In the present study, the most common cause of fever in patients was upper respiratory tract infections and diarrhea. In the study of Imani et al., the most common cause of febrile seizure was unknown fever and then upper respiratory tract infections (21). But in the study of Abbaskhaniyan, Falah and colleagues, the results were exactly the same as the results of the present study (20 and 15). Different results may be due to different climatic conditions and common diseases of each region in different seasons.

Conclusion

This study showed that, the prevalence of febrile convulsion in Germi and Parsabad towns was 6.25% during a year. It was more common in children less than 2 years old and in males, and simple seizure type was more common. There was a significant relationship between previous history of seizure, duration of seizure, age of child, duration of fever onset to seizure occurrence and type of seizure.

Febrile convulsion is a common neurological disorder in children and is one of the reasons for child hospitalization. Hence, providing accurate evidence of attacks over time can help to identify potential triggers and factors accelerating attacks. So, in this way we can control the recurrence of attacks and reduce the incidence of seizure events in children. Based on the results, febrile convulsion occurrence can be prevented in children by identifying risk factors and those who had a previous history of disease and by providing training to parents.

References

- 1- Mohammadi R, Rostamnejad M, Seyedjavadi M, Allahyari I, Mazaheri E. Knowledge and Practice of Mothers of Children with Febrile Seizure in Bou Ali Medical Education Hospital in Ardabil. *Journal of Health and Care*. 2010.12(2):15-21.
- 2- Farrell K. The Management of Febrile Seizures. *BC Medical Journal*. 2011; 53(9): 268-273.
- 3- Commission on Epidemiology and Prognosis, International League against Epilepsy. Guidelines for epidemiologic studies on epilepsy. *Epilepsia*. 1993; 34:592-8
- 4- Mohammadi M. Evidence Based Approach to Children with Fever and Seizure. *Iran J Pediatr*. 2002; 3(12): 3-8.
- 5- Waruiru C, Appleton R. Febrile Seizures: an Update. *Arch Dis Child*. 2004; 89(8): 751-6.
- 6- Moayedi A, Nazemi Gheshmi A, safdariyan F. Etiology and Epidemiology of Febrile Convulsion in Children Admitted to Pediatric Hospital in Bandar-Abbas. *Medical*

- Journal of Hormozgan University. 2005; 9(3):159-156.
- 7- Khoda Panahandeh F, VahidHarandi N, Esma'ili Jazanabadi F. Evaluation of Seasonal Variation and Circadian Rhythm of Febrile Seizures in Children Admitted to the Pediatric Ward of Rasoul -e-Akram Hospital. Journal of Iran University of medical science. 2008.15(59):59-65.
- 8- Bron JK, Minns RA. Chapter of Neurology Campbell A.G.M Mcintosh Neil Forfar Textbook of paediatrics. 15 th Edition Churchill Livingston Company. 1998: 682-684.
- 9- Johnson EW, Dubovsky J, Rich SS, et al. Evidence for a Novel Gene for Familial Febrile Convulsions. Hum mol Gene. 1998. 7(1): 63-7.
- 10- Offringa M, Bossuyt PM, Lubsen J, Ellenberg JH, Nelson KB, Knudsen FU and et al. Risk Factors for Seizure Recurrence in Children with Febrile Seizures: A pooled analysis of individual patient data from five studies. Journal of pediatrics. 1994; 124(4): 574-84.
- 11- Amini AG, Kazemi A, Ghorbani A. Causes of Seizure in 1 Month to 15 Years Old Children in Isfahan. Iranian J Neurol. 2009; 24(7): 355-60.
- 12- Menkes HJ, Sankar R. Paroxysmal disorders. In: Menkes JH, Sarnat HB. Child Neurology, 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2000: 919-1026.
- 13- Aicardi J. Diseases of the Nervous System in Childhood: epilepsy. New York: Raven press; 2009: 253-753
- 14- Barzegar M, Kargar MH, Keivancher N. Epidemiologic and Clinical Features of First Febrile Convulsion in Children. Med J Tabriz Univ Med Sci. 2006; 28(4): 17-21.
- 15- Fallah R, Akavan-Karbasi S, MirNaseri FAS. Evaluation of Demographic and Clinical Characteristics of First Febrile Seizures in Children. J Shahid Sadough Univ Med Sci .2009; 16(5): 61-65.
- 16- NamakinGh, Sharifzadeh R, Rezaee S. Demographic and clinical characteristic of febrile convulsion in children admitted in Valiasr hospital of Birjand. J BirjandUniv Med Sci .2010; 17(4): 281-287.
- 17- SajadiHazaveh M, Shamsi M. Knowledge, Attitude and Practice of Mother Trying to Prevent Febrile Convulsion in Children in Arak. Journal of Urimia Nursing and Midwifery Faculty. 2011; 9(2): 76-83
- 18- Gasemi F, Valizadeh F, Mohsenzadeh A. Educational needs of mothers of children with febrile seizure. Journal of Khorramabad Nursing and Midwifery Faculty.2005; 1(1): 43-48.
- 19- Khodapanahandeh F. A Survey on 107 Children with Febrile Convulsion in Firooz-Abadi Hospital. RJMS. 2001; 8 (25): 269-272.
- 20- Abbaskhanian A, Rezai M S, Ghafarri J, Abbaskhani Davanloo A. Epidemiology and Clinical Pattern of First Attack of Febrile Seizure in Children. J Mazand Univ Med Sci. 2012; 22(94): 36-42.
- 21- Imani E, Khademi Z, Naghizadeh F, Askarnia M. Etiology and Characteristics of Febrile Convulsion in Children Admitted to Pediatric Hospital. Journal of health & care. 2012; 12(1&2): 61-68.
- 22- Imani E, Khademi Z, Naghizadeh F, Askarnia M, Imani A. Epidemiology of Seizure in Children of Bandar Abbas in 2008 Year. Iranian Journal of Epidemiology. 2012; 8(2): 48-53.
- 23- Bessisso MS, Elsaid MF, Almula NA, Kadomi NK, Zeidan SH, Azzam SB, et al. Recurrence Risk After a First Febrile Convulsion. Saudi Med J. 2001; 22(3): 254-258.
- 24- Ashrafzadeh F, Hashemzadeh A, Malek A. Acute Otitis Media in Children with Febrile Convulsion. The Iranian Journal of Otorhinolaryngology 2004; 16(1): 33-39.
- 25- SanaeiDashty A, Akhlaghi A K, Pazoki R. Clinical Risk Factors of Febrile Seizure in Children in a University Hospital in Bushehr port. Iran South Med J. 2007; 9 (2): 168-174.
- 26- Behrman RE, Kliegman RM. Paroxysmal disorders. Nelson Essential of Pediatric. Philadelphia, Saunders; 2013.
- 27- Ehsanipour F, Khodapanahandeh F, Aslani Z. The Prevalence of Meningitis in Children with Febrile Seizure Hospitalized at Hazrat Rasoul Hospital (1997-2002). RJMS. 2005; 11 (44): 907-911.

The comparison of the effect of two different teaching methods of role-playing and video feedback on learning Cardiopulmonary Resuscitation (CPR)

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Abstract

Purpose: This study was conducted with the aim to compare the effects of two educational methods of role play and video feedback on learning CPR.

Background: Cardiopulmonary resuscitation (CPR) is a vital basic life support and the first step in response to cardiopulmonary arrest. Studies have shown that succeeding in cardiopulmonary recovery is strongly linked to education (9) and proper educational methods must be applied in order to improve the quality of educating CPR (12).

Method: This study is a quasi-experimental intervention study.

The research society were sixth semester students of nursing bachelor course in Abadan Faculty of Medical Sciences, among which, 44 students were selected via census sampling was the research sample. The students were familiarized with basics of CPR during 45 minute theoretical and half an hour practical training sessions then they were divided into two groups of role play and video self-feedback, and after a month of training via check lists, they were evaluated with OSCE method. In the video of the self-feedback-group, the participants were filmed while practicing and they scored their performance in a check list based on the video playback. A questionnaire of 24 questions was used in order to assess cognitive

learning and a practical checklist of 15 parts was used to assess the psychomotor learning as pre-test and post-test in both groups, prior to the initiation and one month after holding the educational workshop. Data was studied via T-test and Mann Whitney test.

Findings: The results showed that the average difference between the scores of psychomotor learning before and after training in video self-feedback group ($27/98 \pm 615/5$) was significantly higher than the role play group ($17/02 \pm 374/5$) ($p=0/005$). Also, the average difference of the cognitive learning scores before and after the training in video self-feedback group ($6/50 \pm 2/92$) was significantly higher compared to the role play group ($4/04 \pm 3/27$) ($p=0/12$).

Conclusion: The video self-feedback method in comparison to the role play method is more effective in improving cognitive and psychomotor learning of nursing students in basic cardiopulmonary resuscitation.

Key words: Cardiopulmonary resuscitation, role play method, video self-feedback method.

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Introduction

Today, the potential value of cardiopulmonary resuscitation (CPR) is at a level that can decrease death by half if applied properly (1). The faster the CPR starts, the more successful it will be and it can be enhanced to 90 % (2, 3). For each second of delay in initiating the appropriate treatment, the patient would be one step closer to death and disability; with the passing of every minute, 7 to 10% of the subject's survival decreases so that after 10 minutes, the subject's chance of survival is reduced to nil (4). Faced with such serious problems, CPR should be based on scientific principles, legal standards and human forces who possess the appropriate scientific and practical mandates (5). Nurses are the first people who attend the hospitalized patients' bed when there is cardiopulmonary arrest. They should be skilled enough in order to perform CPR (6). The ability to respond quickly and effectively in clinical situations of cardiopulmonary arrest, to maintain and save patients is considered as a substantial and important qualification in the treatment and care group. The competence of cardiopulmonary resuscitation, is the indicator of cognitive domain and psychomotor skills that are implemented when cardiac arrest occurs requiring cardiopulmonary resuscitation (7). The results of a study indicate that, even the presence of a person with higher skills can have a significant impact on the outcome of resuscitation.

Nowadays, most of the students of the world are following the educational methods that can serve in the development and improvement of clinical decision making capacities and continuous and self-centered learning in students (8). According to the studies, practical education methods are more effective than the other educational methods (9). In learning skills, it is only skill-based practical teaching methods that can allow trainees to have the practical use of these skills. (10) The students also, preferred using experimental methods in a clinical environment over theoretical methods such as lecturing (9). As feedback and repetition is a skills learning necessity, video clip overview is one of the most valuable educational methods for teaching skills (11). Nowadays, in teaching skills there is special attention given to video recording and overviewing it by interns (12, 13). When learning any skills, viewing the person by themselves and watching what exactly they have done and where they should improve, may be very helpful (14). Recording allows reviewing all fields several times and it enables the learner to watch the video again in following days to learn more. This method encourages a learner-focused approach and also enables learners to assess themselves in a precise, detailed and documented manner. In this method, the wrong impression and opposite of what has really happened are avoided. The accuracy and validity of feedbacks in this method is very high and is dedicated (15). In relevant professions to the medical sciences, the students' ability in recognizing their strengths and weaknesses is crucial and the right self-assessment can be effective in the growth of a person's abilities. Self-assessment is proved to be a useful and dynamic method in various studies and in Canada and the United

States, self-assessment improvement is considered as an important factor in the professional evolution of medical graduates (16). Self-assessment allows nurses to monitor their clinical performance in work environment and to revise and improve it. This approach encourages nurses to take a more active role in the learning process and to facilitate it continuously (17).

Role play is another educational method that is widely used for skills training. In this method, individuals put themselves in the desired condition and behave as required. This way, they learn how to deal with situations and problems in this specific condition. Using this educational method, skills are enhanced and the learners are put in real conditions. In playing the roles, there are four elements of thinking, feelings, insight and performance involved and these factors cause the increase in effectiveness of role play in skills training. Reviewing the played role, people think deeply about what happens in every role play, based on its circumstances. Students who have learned communication skills through role play, found it to be a useful method for repeating, observing, discussing and pretending the roles to be actual through educational programs (18). Students who were not experienced in role-play learning method, found it to be an enjoyable and useful method and they strongly, emphasized playing roles in a real manner and with honest feedback (19). The implementation of role play educational method, provides active learning, attitude changing, fostering a sense of confidence, and creating the ability of offering solutions (8).

The literature of previous research also studied the success and effectiveness of both these educational methods. Powell et al (2010) in a study aimed to "identify the thoughts and experiences of nursing students from video self-feedback on cardiopulmonary resuscitation on the mannequin", found that reviewing one's practice by students allows them to know their weaknesses better and to discover the healing fields. The researcher believes that another benefit of the project is to involve the students in the process of assessment (20). In another study, Zadmehr et al (2015) aimed to "evaluate the effect of cardiopulmonary resuscitation training via video self-feedback on the nurses' awareness and performance" showed that video self-feedback training, is effective on the nurses' performance in CPR (21).

In recent decades, the need to revise the traditional teaching methods and the use of modern, active and student-centered learning methods in educational systems, is understood and these methods have been widely used in various fields including medical sciences. It seems that student-centered methods can lead to increased student' satisfaction, enhanced learning speed, creating problem solving skills and continuum of learning and critical thinking. Role play and video feedback methods are among the new and student-centered methods. Various studies have shown positive impacts of various educational methods on learning CPR but, few studies have been conducted on comparison of video feedback method and other methods and their effects on the students' learning. Thus, the author

decided to conduct a study with the aim of “Comparing the effects of role play and video self-feedback on learning CPR in bachelor course nursing students of the Abadan Faculty of Medical Sciences”. It is hoped that the results of this research can be a step towards more efficient and sustainable methods in CPR education and training skilled personnel and ultimately, helping to increasingly successful CPR.

Method

This study is a quasi-experimental intervention research that studies the effects of role play and video self-feedback educational methods on learning in nursing students. In this study, independent variables include training methods (role-play and video self-feedback) and dependent variables include cognitive learning and psychomotor learning. The study society consisted of all sixth semester bachelor course students of Abadan Nursing Faculty of which, 44 people were selected via census sampling as the research sample and were studied during the research. Inclusion criteria were: having a desire to participate in the study, participating in hospital basic CPR workshop for the first time, having no clinical experience in ICU and emergency and urgent sections, selecting the nursing in crisis, emergency and unpredictable events unit during the first semester of 2016-17. The study samples were placed into two groups of role-play (22 people) and video self-feedback (22 people). To conduct the research, the students were requested to fill in the conscious satisfaction form then, they were assured about the confidentiality of the information. Then, all students took the theoretical pre-test (hospital basic CPR, based on the questionnaire of cognitive learning assessment) practical pre-test (basic CPR in OSCE method) (all the students had 3 minutes to perform the operation of cardiopulmonary resuscitation on a specialized mannequin afterwards, their performance was assessed in accordance with the practical evaluation check list). Later, all the students took part in a theoretical training session (1 hour) and a practical training session (2 hours) and they were familiarized with the principles of hospital basic cardiopulmonary rehabilitation. Then in the form of two groups of 1 and 2, group 1 played roles, while group 2 were exposed to video self-feedback. Each group entered a separate training session and were familiarized with the corresponding training methods to perform their CPR training accordingly. In Group 1 and during the training session, the trainer played the role of cardiopulmonary resuscitator on a specialized type D mannequin for 3 minutes based on a pre-designed scenario (QCPR) for the students, then the students practiced in this way so that they had 3 minutes to play the role of cardiopulmonary resuscitator on a specialized type D mannequin (QCPR) and after the practice, they were given the assessment check list and they scored themselves and also, the mannequin display showed the CPR quality percentage of each student after they entered it into the assessment checklist later after each training session. In the second group (video feedback), 2 trainers trained the students using this method, one as the resuscitator that has 3 minutes to perform cardiopulmonary resuscitation on the

specialized Type D mannequin (QCPR), and the other as the cameraman (he filmed his colleague's training using his mobile phone), respectively. Then the resuscitation trainer reviewed his film and analyzed his performance and rated himself in accord to the performance assessment checklist. And they watched their percentage of CPR quality on the mannequin's display. Then they changed places with each other. After that, the students did the training in pairs similarly, one in the role of resuscitator and the other as the cameraman. Both groups did their training in the clinical skills center for a month.

Assessment instruments:

The data collection instruments in this study included: 1) information form containing the characteristics of research units. 2) The questionnaire of 24 questions in the field of cognitive learning for the students' cognitive learning assessment 3) check list, containing 15 correct consecutive CPR measures to assess the students' psychomotor learning. The questionnaire of cognitive learning assessment, is a researcher made questionnaire that contains 24 multiple-choice (4 choices) questions and is designed in accordance with the latest resuscitation guidelines (American Heart Association 2015) and its validity and reliability is verified as well. The amount of Cognitive learning in nursing students would be determined with a maximum of 24 and a minimum of zero score. To determine the amount of students' cognitive learning in basic CPR, before the training workshop and a month after that, each of two groups of students (role-play and video feedback) were given three minutes to perform the CPR on special Type D mannequins then, with using a performance assessment checklist containing 15 practical skills (regarding correct sequential measures of basic CPR) and Mr. Naderi's thesis (Master of Nursing) and in accord to the protocol 2015 of America Heart Association, the necessary modifications were performed and its validity and reliability was obtained and their psychomotor learning was measured accordingly. The CPR quality percentage that is evaluated within the checklist of psychomotor learning assessment, is measured based on the percentage that is screened on the mannequin's display after the CPR operation. The scoring is done as giving no scores to the correct performance and a negative score to a wrong or failing performance in accord to record measures that are determined in the checklist. Finally, if everything is done correctly and completely, there is a zero score and if all the items are wrong, the (-215) score is assigned respectively. The categorization of practical skills would be as follows: 49 percent less (weak) (negative score 107 to 215), 75-50 percent (needs more education) (negative score of 106 to 53), and higher than 76 percent is the acceptable level (negative score of 52 and higher). Comparing the mean scores of the students' assessment checklist for 2 groups finally indicates the method that is more effective in learning CPR.

The visual and content validity of the cognitive domain questionnaire and checklist of psychomotor domain were obtained using scientific resources and texts and by asking the opinions of eight instructors of the nursing school, and

the reliability of the cognitive learning questionnaire was calculated through the test-retest method as 77%. To determine the reliability of the psychomotor field checklist, via assigning two simultaneous observers, the clinical skills were assessed for fourteen students in a reconstructed scene of a given situation at Clinical Skills Center of the faculty. In order to determine the reliability of the clinical skills checklist, Pearson's correlation coefficient was used and a Pearson correlation coefficient of 88% was obtained.

Methods of data analysis:

The data was analyzed using the statistical SPSS Version.16, Mann-Whitney statistical test and independent T-test. The Mann-Whitney test was used to check the amounts of cognitive learning and psychomotor learning in the nursing students, regarding the basic cardiopulmonary resuscitation prior to role-play and video self-assessment training sessions.

To compare the mean of the nursing students' theoretical scores in cardiopulmonary resuscitation skill, after the training with both methods of role-play and video self-feedback, the non-parametric Mann-Whitney test was used. As in Table 1, a significant difference was observed between the average rankings of two groups ($p=0/001$). To compare the mean of the nursing students' theoretical scores in cardiopulmonary resuscitation skill, before the training with both methods of role-play and video self-feedback, the independent T-test was used. As shown in Table 1, no significant difference was observed between the mean of the nursing students' theoretical scores in cardiopulmonary resuscitation skill, before training with both methods of role-play and video self-feedback ($p=0/560$). In this regard, the study of the mean of two groups shows that the average score of role-play was 3.09 ± 14.32 and video self-feedback was 2.52 ± 13.82 .

To compare the mean of the nursing students' practical scores in cardiopulmonary resuscitation skill, after the training with both methods of role-play and video self-feedback, the Mann-Whitney test was used. As in Table 2, a significant difference was observed between the average rankings of two groups ($p=0/001$). To compare the mean of the nursing students' practical scores in cardiopulmonary resuscitation skill, before the training with both methods of role-play and video self-feedback, the Mann-Whitney test was used. As in Table 2, no significant difference was observed between the average ranking of two groups ($p=0/112$). In order to compare the average difference between the nursing students' theoretical and practical scores in cardiopulmonary resuscitation skill, before and after the training with both methods of role-play and video self-feedback, the independent T-test was used (Table 3).

In order to compare the average difference of the nursing students' theoretical scores in cardiopulmonary resuscitation skill, before and after the training with both methods of role-play and video self-feedback, the independent T-test was used. As in Table 3, the average difference of the nursing students' theoretical scores in

cardiopulmonary resuscitation skill, before and after the training in the video self-feedback group, is significantly higher than the role-play group ($p=0/012$). The study of the average difference of theoretical scores in both groups shows the average difference of the nursing students' theoretical scores in cardiopulmonary resuscitation skill, before and after the role-play equals 3.27 ± 4.04 and in the video self-feedback it equals 2.92 ± 6.50 respectively. To compare the average difference of the nursing students' practical scores in cardiopulmonary resuscitation skill, before and after the training with both methods of role-play and video self-feedback, the Mann-Whitney test was used. As in Table 3, a significant statistical difference was observed between the average ranking of two groups ($p=0.005$).

Conclusion

The results of current research showed an increase in the amount of the nursing students' cognitive learning after training through both role-play and video self-feedback methods. In the Zahedmeh and colleagues' study (21) aiming at the study of effect of video self-feedback training on the nurses' awareness and performance in performing cardiopulmonary resuscitation, it was shown that the mean of awareness scores of each group, was increased in the pre-test and post-test. In the Akho and colleagues' study (22) for simulating the effect of cardiopulmonary resuscitation on the nursing students' acquisition and retention of knowledge and self-efficiency in Jordan, increased awareness scores were reported.

In most studies, the average scores of awareness in each group in the post-test, was significantly increased in comparison to the pre-test, therefore, these results confirm that regardless of type of training and the applied method for teaching, education can be considerably effective on increasing the nurses' awareness. That is compatible with the study results in the field of the effects of different educational methods on nursing staff's awareness and knowledge about cardiovascular resuscitation, such as Zahedmeh (21), Mohsenpoor (23), Mokhtari (6), Bakhsha (24), and Adine (11).

However, in the Managheb and colleagues's study (25) the results showed, the mean of scores in the intervention group had a significant statistical difference in comparison to the scores before training ($0.000 > p$), while there was no statistically significant difference in the control group ($0.98/0 > p$); therefore, the results of Managheb's study shares similarities with the intervention group of the current study. However, it is different in the control group in terms of the results of this study, perhaps due to the reason that the control group in the Managheb's study, no new methods were used for teaching to enhance the students' cognition after the educational workshop that was held for both groups; while in this study, both groups took advantage of a new educational method (methods of role-play and video self-feedback). Comparison of the nursing students' cognitive learning, before and after training in the two groups of role-play and video self-feedback showed that the students' cognitive learning after implementation of the

Table 1: Comparison of theoretical scores of cognitive learning in nursing students in cardiopulmonary resuscitation skill, before and after the training with both methods of role-play and video self-feedback

P value	Total Rankings	Average Ranking	Number	Group	Intervention Period
0/001	351	15/95	22	Role Play	Post Intervention
	639	29/05	22	Video Self Feedback	
0/560	3/09	14/32	22	Role Play	Pre Intervention
	2/52	13/82	22	Video Self Feedback	

Table 2: Comparison of the mean of practical scores in the nursing students' psychomotor learning in CPR skill, after training with two methods of role-play and video self-feedback

P value	Total Rankings	Average Ranking	Number	Group	Intervention Period
0/001	354	16.09	22	Role Play	Post Intervention
	636	28.91	22	Video Self Feedback	
0/112	562.5	25.57	22	Role Play	Pre Intervention
	427.5	19.43	22	Video Self Feedback	

Table 3: Comparison of the average difference between the nursing students' theoretical and practical scores in cardiopulmonary resuscitation skill, before and after the training with both methods of role-play and video self-feedback

P value	Standard Deviation	Average Difference of Theoretical Scores	Number	Group	Score
0.012	3.27	4.04	22	Role-play	Theoretical Score
	2.92	6.50	22	Video Self-feedback	
0.005	374.5	17.02	22	Role-play	Practical Score
	615.5	27.98	22	Video Self-feedback	

video self-feedback method increased more in comparison to the role-play method. In a similar study that Zahdmehr et al (21) conducted, the results showed that the comparison of mean of awareness post-test scores did not show a significant difference between the experimental and control groups, which is inconsistent with the results of this study. The reason behind it can be the one month practicing opportunity in video self-feedback method before having the test, which was given to the students in this study, as well as assessing the students' awareness based on the practical concepts of resuscitation. Comparing the average scores of the nursing students' psychomotor learning in basic cardiopulmonary resuscitation before and after training through methods of role-play and video self-feedback, showed significant statistical differences. In the study that Lee and colleagues (26) conducted in China in order to study the effect of evaluation prior to training and feedback on improving and maintaining the nursing students acquired skills on the cardiopulmonary resuscitation, it was shown that the students' skills in the test group was higher after retraining classes. Results of the Paul and colleagues' (20) and Zahdmhr and colleagues' study (21) showed that the video feedback boosts the students and nurses' performance level in cardiopulmonary resuscitation skill, which is similar to the results of the current study. The results of the Hazavei et al (27) and Managheb and colleagues' study (28) showed that an increase was observed in the people's average performance in skills after training with educational method of role-play, which is consistent with our study. The results of most studies have revealed similar results to our study indicating that the educational intervention has improved the nurses' performance in cardiopulmonary resuscitation. In this regard, the study results from the Adine (11), Nouri et al (29), Hosseini et al (1), Mokhtari et al (6), Bakhsha's et al (24) studies are compatible with our study. Comparing the average difference of the nursing students' psychomotor learning scores in cardiopulmonary resuscitation before and after the training showed that the video self-feedback group ($5/615 \pm 98/27$) was significantly higher than role-play group ($5/374 \pm 2.17$) ($005/0 = p$). In a study by Paul et al (20), the results showed that all the students believed that their review of their practical performance, enables them to know their weaknesses better and to discover improvement fields. In another study by Yu M S (30), the results showed that the test group students had better results in competence, communication skills and motivation compared to the control group in post-test that was held 8 weeks after the pre-test. It seems that the self-awareness of one's performance via reviewing the videotape, increases the competence in performing clinical skills. The results of Managheb's et al study (25) showed that the difference of average scores in learning clinical skills in the group that were provided with the video feedback, was considerably significant in comparison to the group that did not receive any kind of feedback about its performance ($000 / 0 > p$) and also it showed that not only the video feedback improves the interns' abilities in taking descriptions and physical examination, but also it increases the accuracy of diagnosis and treatment as well. In a study that was conducted by Nicholas Potos (31), the

test group had significantly higher test results therefore, Potosi and colleagues advised using the mannequins together with audio and visual feedback in training basic CPR. Practicing and feedback are the most important principles of learning skills and the video feedback method is the simplest practicing method and the most complete feedback method. Additionally, students in this method can assess themselves and perform the self-learning via reviewing the recordings. Studies also have shown that the best way to improve performance, is to have the individuals assess themselves (Namadi Vosoughi). This self-assessment, through increased awareness and commitment to change, allows nurses to consider their clinical practice in the workplace and to take action in order to improve it. The study also confirms the fact that the video self-feedback training is an effective method in clinical skills training. It is hoped that this research is a step toward improving clinical skills.

References

1. Hosseini-Irani, S.J., Z. Ayazi, et al. (2012) . "The effect of CPR training on performance of nurses in selected hospitals of Shahrekord University of medical Sciences. "Journal of Clinical Nursing and Midwifery (J Clin Nurs Midwifery) 2012 Summer; 1 (1): 73-80. [In Persian]
2. Omid Far N., (1384) " A new method for teaching CPR: " What is The efficiency of this method for promoting the ability and knowledge of medical students in CPR " Attachment of a special 14 th National Conference on Medical Education. [In Persian]
3. Mahdavi S.J. Rezaie, et al. (2009). "Knowledge of nursing staff about principles of Cardiopulmonary Resuscitation in selected hospitals of Kermanshah University of Medical Sciences" Journal of Clinical Research in Paramedical Sciences. 1(4). [In Persian]
4. Alijanpour E, Amri-maleh P, Khafri S, Razzaghi F. (2014), " Assessment of different cardio-pulmonary resuscitation teaching approach on quality of education in medical student, Babol 2011". Medical Journal of Mashhad University of Medical Sciences. 2014; 56(6): 376-382. [In Persian].
5. Fallahnia
6. Mokhtari Nouri J, Khademolhosseini SM, Karimi Zarch AA, Naeem Abadi T, Saghafi Nia M. (2006); "Effect of basic CPR training course on the knowledge and skills of nurses". Med J Kousar 12 (3): 263-271. [In Persian]
7. Nasiripour A. A, Masoudi Asl I. (2012) "The relationship of CPR success and time of patients' referring to emergency department" Iranian Journal of Military Medicine., 14(1): 21-25 [In Persian].
8. Magnusen L, Ishida D, Itano J. The impact of the use of inquiry based learning as a teaching methodology on the development of critic thinking. J Nurs Educ. 2000; 8 (39): 160 – 17.
9. Naderi, D., (1390) A Comparison of Cardiopulmonary Resuscitation Education Using Two Methods: Workshop and Problem-Based Learning among Abadan Nursing Faculty Students, 1390. Nursing MS.C. Degree . Faculty of Arvand International Division Ahvaz Jundishapur University of medical Sciences. [In Persian].

10. AdibHajbagheri, M., M. R. Afazel, et al. (2001). "Evaluation of knowledge and skills of medical personnel of Kashan hospitals regarding cardiopulmonary resuscitation." *KAUMS Journal (FEYZ)* 5(3): 96-103. [In Persian]
11. Adineh M., Zareh K, (2013)"Considering the Effect of Re-training Course of Cardio pulmonary Resuscitation on Nurses' Awareness and Skill Levels of the Most Recent Changes in CPR Protocol" *Scientific Journal of Ilam University of Medical Sciences*.6(22):75- 82.[In Persian]
12. Sabeti1 F, Akbari-Nassaji N, HaghhighyZadeh M H. Nursing Students' Self-Assessment Regarding Clinical Skills Achievement in Ahvaz Jundishapur University of Medical Sciences. *Iranian Journal of education in medical Sciences*(2009);5(11):506-515. [In Persian].
13. Bonnetain E, Boucheix JM, Hamet M, Freysz M. Benefits of computer screen-based simulation in learning cardiac procedures. *Laboratory for the Study of Learning and Development, National Centre for Scientific Research, UMR 5022, University of Burgundy, and Department of Anaesthesia Resuscitation, Dijon National University Hospital, Dijon, France.* Elodie.bonnetain@u-bourgogne.fr
14. ZahedMehr A, Daram Z, ZiaeTotonchi M. The effect of education by video self-assessment on nurses' knowledge and performance in cardiopulmonary resuscitation. *Cardiovascular Nursing Journal* Winter 2016;4(4):32-39.
15. Mohsen Pour M, Imani Z, Abdol KarimM. (2009)"Effect of CPR training on the knowledge of nursing staff and team members CPR one of the hospitals in Kerman province". *J Nurs Mid Kerman* 18(1,2):1-7.[In Persian]
16. Ghana,S., AkramSanagu (2011), "How would the students evaluate themselves in clinical settings: Results of a Study" *Scientific Journal jentashapir*:1(3)227-236 .[In Persian]
17. Bahreini, M., M. Moattari, et al. (2010). "A comparison of nurses' clinical competences in two hospitals affiliated to Shiraz and Boushehr Universities of Medical Sciences: a self-assessment." *Iranian Journal of Medical Education* 10(2): 101-110. [In Persian]
18. Huikuri HV, Castellanos A, Myerburg RJ. Sudden death due to cardiac arrhythmias. *N Engl J Med* 2001 Nov 15; 345 (20): 1473-82.
19. Creedy D, Horsfall J, Hand B. *Problem based learning in nursing education: an Australian view.* Sydney: Benedigo Company; 1999. P. 234 – 67.
20. Paul, F. (2010). "An exploration of student nurses' thoughts and experiences of using a video-recording to assess their performance of cardiopulmonary resuscitation (CPR) during a mock objective structured clinical examination (OSCE)." *Nurse education in practice* 10(5): 285-290.
21. ZahedMehr A, Daram Z, ZiaeTotonchi M. The effect of education by video self-assessment on nurses' knowledge and performance in cardiopulmonary resuscitation. *Cardiovascular Nursing Journal* Winter 2016;4(4):32-39.
22. Akhu-Zaheya, L. M., M. K. Gharaibeh, et al. (2013)," Effectiveness of simulation on knowledge acquisition, knowledge retention, and self-efficacy of nursing students in Jordan." *Clinical Simulation in Nursing* 9(9): e335-e342
23. Mohsen Pour M, Imani Z, Abdol KarimM. (2009)"Effect of CPR training on the knowledge of nursing staff and team members CPR one of the hospitals in Kerman province". *J Nurs Mid Kerman* 18(1,2):1-7.[In Persian]
24. Bakhsha, F. and N. Behnampour (2007). "The effect of CPR training on knowledge of nurses working in the hospitals affiliated to Golestan University of Medical Sciences." *Journal of Gorgan University of Medical Sciences* 8(4): 46-49. [In Persian].
25. Managheb E, ZamaniA R, Shams B, Farajzadegan Z. The Effect of Communication Skills Training through Video Feedback Method on Interns' Clinical Competency. *Iranian Journal of education in medical Sciences*(2010);10(2):164-170. [In Persian].
26. Li, Q., R.-h. Zhou, et al. (2013). "Pre-training evaluation and feedback improved skills retention of basic life support in medical students." *Resuscitation* 84(9): 1274-1278
27. Hazavehei MM, Taghdisi MH, MohaddesHakak HR, Hasanzadeh A. [Tasire 3 ravesheamoozeshye sokhanrani, bazivaifayenaghsh bar

Effectiveness of Group Counseling With Acceptance and Commitment Therapy Approach on Couples' Marital Adjustment

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Abstract

Introduction: The family is the bedrock of the child's physical and psychosocial well-being and is the factor of realization of the physical, psychological and social balance of human beings. The purpose of this study was to investigate the effectiveness of group counseling based on acceptance and commitment approach on couple's marital adjustment in Kermanshah city.

Methods: This research is a type of experimental research (pre-test-post-test). The statistical population consisted of all couples in Kermanshah City who referred to counseling centers in 2016. Available sampling method was used to select the sample. Then, referring to these centers, 40 people (20 couples) were selected and randomly divided into two groups: experimental and control. To conduct the research, all subjects before and after the acceptance and commitment therapy for the experiment group, answered marital adjustment questionnaires (Spanier, 1976) and questions related to demographic characteristics.

Findings: The mean indices and standard deviation in inferiority analysis, analysis of multivariate variance (MANOVA) and analysis of multivariate covariance (MANCOVA) were used to analyze according to the results of single-variable covariance analysis. There was a significant difference between the scores of post-test of marital satisfaction and marital adjustment with pre-test scores. The effect of group on expression of affection is not statistically significant (partial $\eta^2=0.01$, $P>0.05$, $F(1 \ \& \ 244) = 3.76$).

Conclusion: The results of this study indicated that acceptance and commitment approach could increase marital adjustment of couples. At the theoretical level, the results of this research can confirm the results of previous research. At the practical level, the findings of this study can be used to develop educational and therapeutic programs.

Key words: Acceptance and Commitment Approach, Marital Adjustment, Couples

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Introduction

The concept of family and the value of this institution are considered as the basis of works for every state and society, and each society, firstly relies on the family to develop its future citizens. That is why the family is one of the first institutions that need to be changed in society; change will not be achieved except through the understanding of the scientific recognition of its functions and its degradation. The family, with a healthy functioning environment, helps to stabilize the community and provides growth and prosperity for their members. The family is the bedrock of the child's physical and psychosocial well-being and is the factor of realization of the physical, psychological and social balance of human beings (1).

The issue of marriage is one of the most important issues of human interest and is the first emotional and legal commitment that people accept in adulthood. In addition, marriage contracting is considered as a turning point in personal growth and development. Marriage requires cooperation, empathy, unity, interest, kindness, patience and responsibility. Marital satisfaction becomes a significant variable in relation to the quality of marriage. What is important in marriage and unity between men and women is marital satisfaction. The most important factor in the mental health of married people is relationship with the spouse. A spouse is the main element of a person's emotional and social life and the lack of marital adjustment affects the ability of couples to establish relationships with satisfaction with their children and other family members. Favorable relationships with satisfaction within the family will help the effective adjustment of people in different situations and on the other hand, marital conflicts provide the basis for mental illness (2, 3).

Conflicts and marital differences, whether leading to divorce or tensions, are experienced as depression, feeling of emptiness and despair and bring down deadly blows on the body of society. It has psychosocial effects for both husband and wife and for their children. For this reason, the recognition and treatment of marital differences has the primary importance for any society with any ideology and paradigm (4). Therefore, it is obvious that the quality of marital relationship as one of the most important and stable relationships that individuals experience throughout their lives, plays a vital role in their mental health and a successful marriage can increase the individuals' psychological well-being (5). Marital adjustment is always considered as one of the essential components of a successful marital relationship.

On the other hand, in the relationship between marriage and family life, the existence of challenges and interpersonal problems is a natural subject, but if the spouses cannot solve these issues effectively, a lot of unresolved issues are left and seriously damage their relationship. Researchers confirm the effective role of forgiveness in individuals' mental health and psychological well-being (6). Honarparvaran (2014), tested the effectiveness of this therapy on forgiveness and marital adjustment, but his

subjects were women injured by their husband's betrayal and his approach was considered kind of therapeutic than preventive. However, in the present study, consideration should be given to a sample of married men and women who do not have special marital problems. However, the research done by Saedeheh et al, (2017) Honarparvaran (2014) showed that acceptance and commitment therapy is effective on both forgiveness and marital adjustment of these women. He believes this acceptance and commitment therapy, instead of focusing on conflicts and solving them, adopts a positive approach and takes into account the couples' personal values and their priorities in the life and attempts to discover more effective ways of life by emphasizing the experiences of couples' living (7, 8). Baruch, Kanker & Busch (2012) compared two methods of system couple therapy and acceptance and commitment therapy on marital disturbance of couples aged 20-30 years old. In this study, 30 couples were randomly selected and placed into two experiment and one control groups (9). In acceptance and commitment approach, mental concentration and cognitive rupture (which leads to psychological flexibility) are used. The results of this study showed that the acceptance and commitment approach has improved all communication variables over the couple therapy. The purpose of this study was to investigate the effectiveness of group counseling based on acceptance and commitment approach on couple marital Adaptation in Kermanshah City.

Participants and Research Design

The statistical population consisted of all couples in Kermanshah City who referred to counseling centers in 2016. According to the nature of the community, the available sampling method was used to select the sample. 40 people (20 couples) were selected and randomly assigned into two experiment and control groups (each containing 20). Couples should have at least a bachelor's degree and be prepared to continue the sessions. The couples who volunteered to participate in the study were asked to complete the research questionnaires.

Tools

Marital Adaptation Scale (DAS): This scale is a 32-items tool for assessing marital quality in both husband and wife' viewpoints or two people living together. This tool is made for various purposes and can be used to measure overall satisfaction in a sincere relationship by obtaining total scores. Factor analysis shows that this scale measures four aspects of relationship: husband and wife satisfaction, husband and wife correlation, husband and wife agreement and expression of affection. Scoring the questions is from 0 to 151. Higher scores indicate a better relationship (10). The reliability of the whole scale with Cronbach's alpha 0.96 has significant internal consistency. The inner consistency of the subscales is good to excellent: dual satisfaction = 0.94, dual correlation = 0.81, dual agreement = 0.90 and expression of affection = 0.73. Its validity has been tested with content validity logical methods. The husband and wife compatibility scale with the power to identify married and

divorced couples in each question has shown its validity and correlates with Locke-Wallace's Marital Satisfaction Scale to well-known groups. This scale has a concurrent validity

Description of Sessions Based On Acceptance and Commitment

Table : The content of sessions based on acceptance and commitment (11)

Session	Strategy	Interventions
Session 1: Assessment and orientation of treatment	Getting Details About Couples Introducing ACT	Introducing exercises focus
Session 2: Individual assessments	Individual interview, assessment of marital forgiveness adaption	Paired designing sessions, integration of individual and paired assessment
Session 3: Assessing ineffective relationships Costs	Investigating the costs of couples' conflict and avoidance, the development of creative disappointment	Using the Chinese finger trap metaphor and practice fighting and scramble with a spouse
Session 4: Focusing on Sensation and Acceptance	Introducing the focus of attention and acceptance	Exercising the acceptance of thoughts and feelings
Session 5: Cognitive Co-operation	Describing and explaining the negative relationship of thoughts for couples	Bus Driver Exercise, Thoughts on Practicing Papers
Session 6: View the thoughts	Developing an observer's perspective and comparing own reactions and in relationship with the spouse	Thoughts on practice sheets, practice of accepting relationship reactions
Session 7: Choosing the Value's directions	Helping customers to clarify and identify the values of relationship and life	Practicing What's in Life? Do I want a relationship now?
Session 8: Identify the barriers to the value of life through acceptance and observation	Review the worksheet of values, discuss about obstacles of life values and help clients to move with them rather than overcome them	Worksheet of committed action, review of bus driver training
Session 9: Creating flexible patterns of behavior in relationships	Introduction of desire	Worksheet of committed action
Session 10: Self as a context in this relationship	The nature of choice and the ability to respond, the experience of having couples in themselves as the context of the relationship	Commitment Action Worksheet, Metaphor of Chessboard
Session 11: Acceptance and committed action	Review emotional desire in a committed context of action	Committed action Worksheet
Session 12: Work in order to End	Reviewing the values of the relationship and preparation for the committed action at the future and the end of the treatment	CD of exercises the focus of the senses to practice at home

Findings

Among 20 couples participating in the present study, 10 couples in the acceptance and commitment group and 10 couples in the control group were evaluated before and after education using the research tools. The mean age of the subjects was 36.7 with a standard deviation of 6.3; the age range was from 26 to 53 years old categorized by groups. 3 (7.5%) had diploma degree, 20 (50%) had bachelor degree and 17 (42.5%) had master degree. In Tables 1, 2 and 3, details of each age and education and duration of marriage variables are presented in the two groups.

One of the other hypotheses of the covariance analysis test is the normal distribution of data. Kolmogorov-Smirnov test was used to test this hypothesis. The results of this test to observe the hypothesis of normalization of data distribution indicate that all marital adjustment subscales follow the normalization hypothesis ($p > 0.05$).

Bartlett's Test of Sphericity was performed to study the correlation between dependent variables. Since this test was statistically significant ($\chi^2 = 263.21$, $p < 0.001$); this indicates an adequate correlation between the dependent variables for the continuation of the analysis. (Table 2)

Another pre-hypothesis for covariance analysis is studying the homogeneity regression. Considering that none of the marital adjustment scales is not significant in the homogeneity of regression ($P > 0.05$), it can be concluded that the hypothesis of regression coordination is established. (Table 3)

The evaluation of the data attributes showed that the statistical hypothesis of equivalence of variance-covariance matrices for quality of life components (Box's M = 84.81, $P < 0.001$) is not established. Therefore, Pillai's index was used for the purpose of evaluating the significance of multivariate effects. Pillai's index showed that the effect of the group on the linear combination of dependent variables was significant (Partial $\eta^2 = 0.92$, $P < 0.0001$, $F = 83.07$). In other words, there is a significant difference between two experiment and control groups in at least one of the marital adjustment components. (Table 4)

Single-variable ANOVA statistics was individually run for each dependent variable to determine the meaningful source of multi-variable effects. Tables 4-9 show that the group significantly affects marital satisfaction (Partial $\eta^2 = 0.04$, $P < 0.001$, $F = (1&38) = 1$), couple agreement (Partial $\eta^2 = 0.03$, $P < 0.001$, $F = (1&38) = 8.70$), couple correlation (Partial $\eta^2 = 0.03$, $P < 0.001$, $F = (1&38) = 10.00$) and couple adjustment (Partial $\eta^2 = 0.03$, $P < 0.001$, $F = (1&38) = 3.76$). The effect of group on expression of affection is not statistically significant (Partial $\eta^2 = 0.01$, $P < 0.005$, $F = (1&244) = 3.76$). (Table 5)

Table 1: Description of research variables

Group	Research variables	Pre-test of mean (standard deviation)	Post-test of mean (standard deviation)
Acceptance and commitment	Marital Satisfaction	12.65 (4.17)	32.20 (4.96)
	Couple agreement	16.01 (3.14)	32.00 (4.11)
	Couple Correlation	6.60 (2.30)	16.10 (2.40)
	Expression of affection	4.75 (1.86)	4.80 (1.80)
	Total Marital Adjustment Score	43.60 (10.87)	53.12 (11.36)
Control	Marital Satisfaction	10.65 (1.98)	10.75 (1.25)
	Couple agreement	11.65 (1.81)	11.75 (1.33)
	Couple Correlation	5.20(0.52)	5.75 (1.06)
	Expression of affection	4.50 (0.60)	4.60 (0.60)
	Total Marital Adjustment Score	34.25 (7.47)	35.68 (8.30)

Table 2: Study of marital adjustment subscale using variances homogeneity test (Lone)

Subscales	Lone statistics	fd1	df2	Sig.
Marital Satisfaction	0.41	1	38	0.52
Couple agreement	0.45	1	38	0.50
Couple Correlation	2.11	1	38	0.16
Expression of affection	1.75	1	38	0.19
Total Marital Adjustment Score	0.14	1	38	0.70

Table 3: The studying the normalization of data distribution using Kolmogrov-Smirnov test

Kolmogrov-Smirnov test			
Subscales	Statistics	df	Sig.
Marital Satisfaction	0.12	40	0.20
Couple agreement	0.17	40	0.05
Couple Correlation	0.12	40	0.20
Expression of affection	0.17	40	0.06
Total Marital Adjustment Score	0.14	40	0.19

Table 4: Studying the Pre-hypothesis of Regression Homogeneity

subscale	Sum of squares	df	F	Sig.
Marital Satisfaction	6.92	1	0.21	0.64
Couple agreement	31.03	1	1.68	0.20
Couple Correlation	13.24	1	0.44	0.51
Expression of affection	7.18	1	0.20	0.65
Total Marital Adjustment Score	12.83	1	0.40	0.53

Table 5: Variance analysis test of marital adjustment scores in experimenter and control groups

Variable	SS	df	MS	F	P
Marital Satisfaction	160.98	1	160.98	10.86	0.00
Couple agreement	87.84	1	87.84	8.70	0.00
Couple Correlation	40.65	1	40.65	10.00	0.00
Expression of affection	83.12	1	83.12	3.76	0.05
Total Marital Adjustment Score	91.93	1	91.93	11.56	0.00

Conclusion

The research indicated that acceptance and commitment intervention significantly has increased marital adjustment of couples in the experiment group compared with the control group. These results were in line with the findings of the research done by Honarparvaran (2014), Baruch, Kanker & Busch (2012)(7, 9).

In explaining the results of this research we can say that according to the acceptance and commitment therapy, development and conflict and emotional distance in couples is due to the combination of useless controls of each one and empirical avoidance strategies in the relationship between husband and wife. Acceptance and commitment therapy seeks to undermine these processes and thus reduce the unnecessary suffering of couples, which is caused by empirical avoidance of each one. The main purpose of this kind of couple therapy is to help each husband and wife to be aware of their cognitive processes and their emotional reactions, either alone or in a two-person relationship; realize the values that keep them intact, and commit in practices that are consistent with these goals, even in the presence of unwanted thoughts and feelings. Couples usually avoid situations related with injury, rejection or conflict. Acceptance and commitment therapy teaches couples to get close to the unwanted intrinsic thoughts and feelings

and physical states associated with these dynamics and patterns of communication. It is clearly shown that when one of the couples emotionally feels harmed or weakened, he/she goes into emotional distance. However the emotional distance protects individuals and reduces emotional distress in the future, the conscious acceptance of such thoughts is practiced in ways that target couples' emotional communication and intimacy. As couples begin to use these skills and strategies, they become able to approach previous avoidance situations. Approaching the thoughts and feelings associated with previous avoidance and practice in line with the value of bilateral relationships provides an opportunity for couples to provide a stronger relationship (12). According to Hoffman Hofmann & Asmundson (2008), ACT encourages couples to connect and engage with true values of their lives. From the perspective of ACT, avoidance of experiences creates a harmful process that engages in the development and expansion of marital and family conflicts(13). Greco and Eifert (2004) also write about the effectiveness of focusing exercises; they believe these exercises help a person directly contact with stressful events, especially at the treatment sessions and experience the unpleasant thoughts and emotions instead of controlling or struggling with them(14). The person not only has the full experience of thoughts and emotions, but also allows the spouse to have such an experience(15).

In explaining the results, the acceptance and commitment therapy allows couples to focus on changing relationships with their inner experiences, minimizing empirical avoidance and increasing flexibility and increasing action in valuable ways. Changing relationships with internal experiences involves expanding and clarifying inner consciousness. In addition, it emphasizes the strengthening of an experienced non-judgmental relationship. Correction and strengthening self-compassion (a concept that is opposed by judgment and critique) is an important aspect of this therapy; so that reaction, fear and unjustified judgments are reduced immediately. Ultimately, the purpose of this therapy is to experience the thoughts, feelings and senses as naturally occurring (16, 17). In general, interventions based on this approach have helped couples to resolve conflicts with their spouse, initiating a new and positive relationship trying to reduce their marital problems and ultimately increase their marital adjustment.

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References

1. Yousefi Najafabadi Z. The effect of acceptance and commitment therapy on marital conflicts in married women in Isfahan City. Master's thesis. Tehran: Al-Zahra University; 2015.
2. Goodarzi F. the Effectiveness of Acceptance and Commitment Therapy on Marital Satisfaction of Mothers with Mental Disabilities. Tehran: Tarbiat Moalem University; 2015.
3. Nazari B, Bakhshi S, Kaboudi M, Dehghan F, Ziapour A, Montazeri N. A Comparison of Quality of Life, Anxiety and Depression in Children with Cancer and Healthy Children, Kermanshah-Iran. *International Journal of Pediatrics*. 2017;5(7):5305-14 DOI: 10.22038/ijp.2017.3540.1978.
4. Shakeri Z. Effectiveness of acceptance and commitment therapy method on decreasing marital disturbance of married women in Tehran. Tehran: Allameh Tabataba'i University; 2014.
5. Waite L J, Luo Y, AC L. Marital happiness and marital stability: Consequences for psychological well-being. *Social Science Research*. 2009;38(1):201-12.
6. Imani M. Studying the Effectiveness of Behavioral Therapy Based on Acceptance and Behavioral Couple Therapy in Reducing Marital Disturbance and Symptoms of General Anxiety Disorder in Mahshahr City. Ahvaz: Shahid Chamran University of Ahvaz; 2012.
7. Honarparvaran N. Effect of Acceptance and Commitment Approach (ACT) on Divorce and Marital Adjustment of Women Affected by Spouse's betrayal. *Journal of Women and Society*. 2014;5(2):135-50.
8. Saeedeh B, Nafiseh M, Babak N, Arash Z, Hashem B, Fatemeh D. Comparing the Self-Esteem and Resiliency between Blind and Sighted Children and Adolescents in Kermanshah City. *WORLD FAMILY MEDICINE/MIDDLE EAST JOURNAL OF FAMILY MEDICINE*. 2017;15(7):46-51.
9. Baruch D, Kanker J, A B. Acceptance and commitment therapy: enhancing the relationships. *Journal of Clinical Case Studies*. 2012;8(3):241-57.
10. Sanaie B, Alaghehmand S, A. H. *Family and Marriage Measurement Scales*. Tehran: Besat publishing house; 2000.
11. Hayes SC. Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy*. 2004;35(4):639-65.
12. Peterson BD, Eifert GH, Feingold T, S D. Using acceptance and commitment therapy to treat distressed couples: a case study with two couples. *Cognitive and Behavioral Practice*,. 2009;16(4):430-42.
13. Hofmann SG, GJ. A. Acceptance and mindfulness-based therapy: New wave or old hat? *Clinical psychology review*. 2008;28(1):1-16.
14. Greco LA, H EG. Treating parent-adolescent conflict: Is acceptance the missing link for an integrative family therapy?. *Cognitive and Behavioral Practice*. 2004;11(3):305-14.
15. ME M. Forgiveness as human strength: Theory, measurement, and links to well-being. *Journal of Social and Clinical Psychology*. 2000;19(1):43-55.
16. Hayes-Skelton SA, Orsillo SM, L. R. An acceptance-based behavioral therapy for individuals with generalized anxiety disorder. *Cognitive and Behavioral Practice*. 2013;20(3):264-81.
17. Roemer L, Orsillo SM, K S-P. Efficacy of an acceptance-based behavior therapy for generalized anxiety disorder: evaluation in a randomized controlled trial. *Journal of consulting and clinical psychology*. 2008;76(6):1083.

