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

Review

International Health Affairs

Education and Training

Clinical Research and Methods

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 *TECT*A 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).

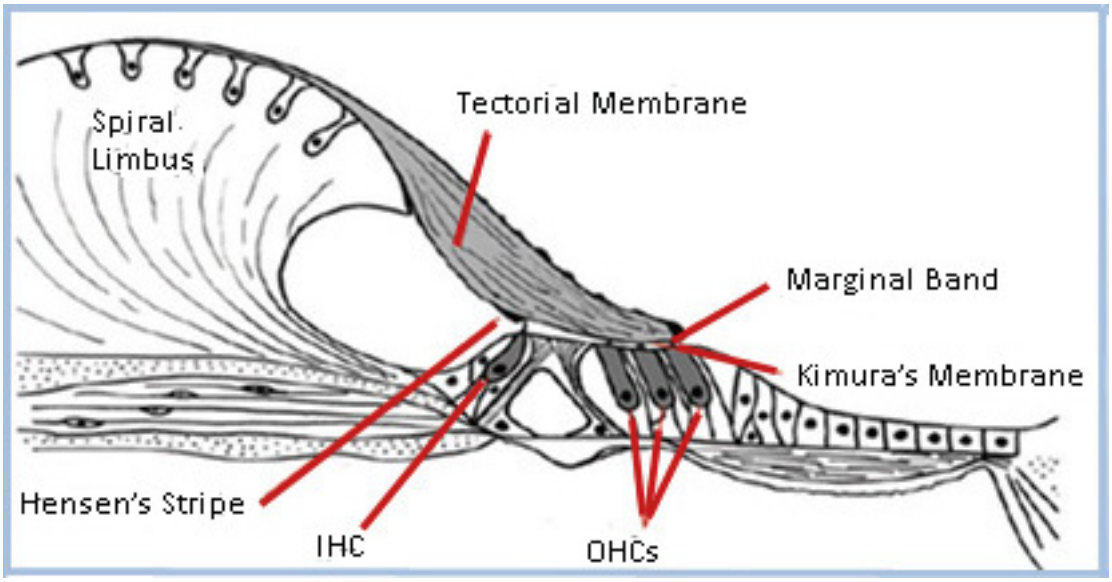

Figure 1: Organ of Corti structure and TECTA. The structure of the organ of corti Schematic picture in the basal area of the cochlea in the human ear. TM is connected to the outer hair-cells Stereocilia via Kimura membrane, hair-cell Stereociliavia Hensen fibers and also spiral limbus (11).

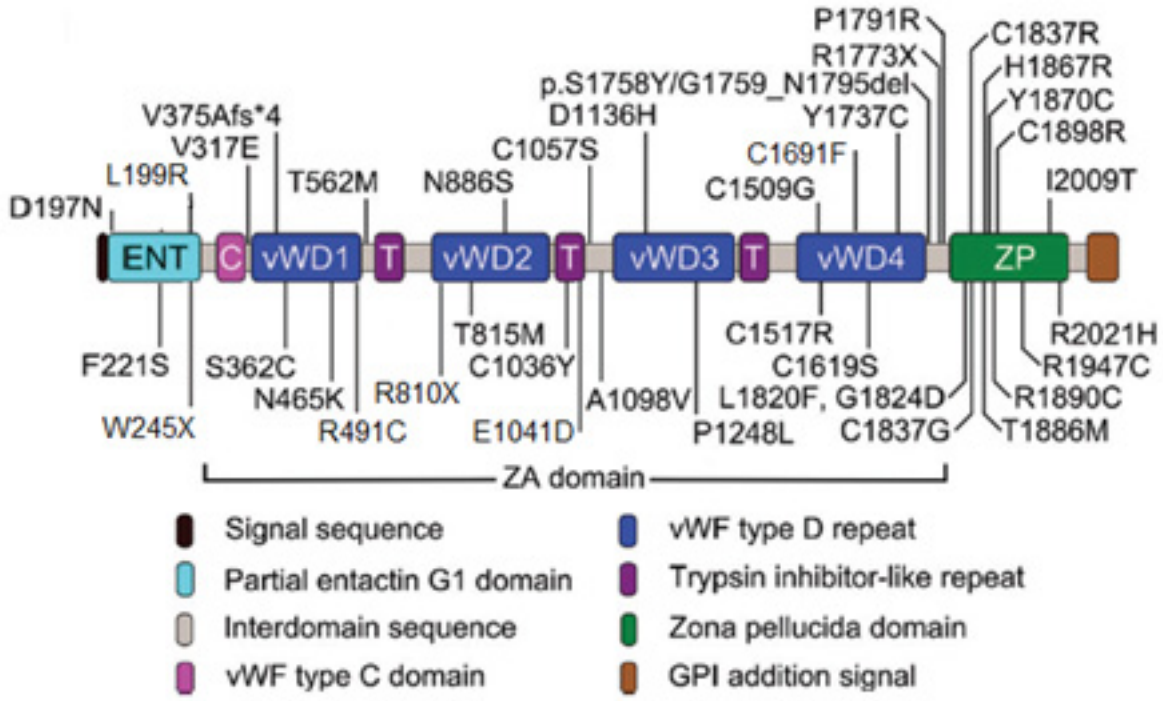

Figure 2: The structures of TECTA domains and the position of missense mutations causing hearing loss. Mutation in Entactin-G1 domain, vWFD, vWFD2 and TIL2 repeats of ZA and ZP cause to mild-frequency hearing loss, while mutation in other parts of ZA domain results in high-frequency hearing impairment.

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 disolphide 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

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.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 2: reported mutations in TECTA gene (DFNA8/12) 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.Tyrl870Cys	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)

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$^{\Delta ENT/\Delta ENT}$ 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*$^{+/DENT}$ 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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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 apexes 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±0.52mm), and second premolar tooth in men over 50 years (9.29±1.94mm) 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±0.94mm), and the minimum lingual distance was located in the distal root of third molars in women over 50 years (0.90±0.32mm). 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±1.15mm) 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±0.37mm), and the highest diameter on average was the distal root of the third molars in men 30-50 years (2.75±0.54mm). 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

Left			Right			Dental area
Total	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

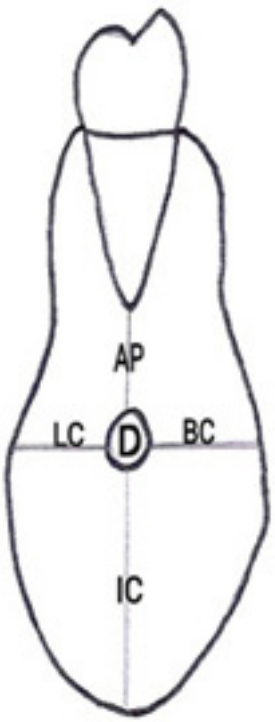

Figure 1: measurements in posterior teeth roots area in Cross-sectional view, D: MC diameter, AP: distance from root apex to superior border of MC, IC: distance from inferior border of MC to mandibular inferior border, BC: distance from MC to buccal cortical border, LC: distance from MC to lingual cortical border

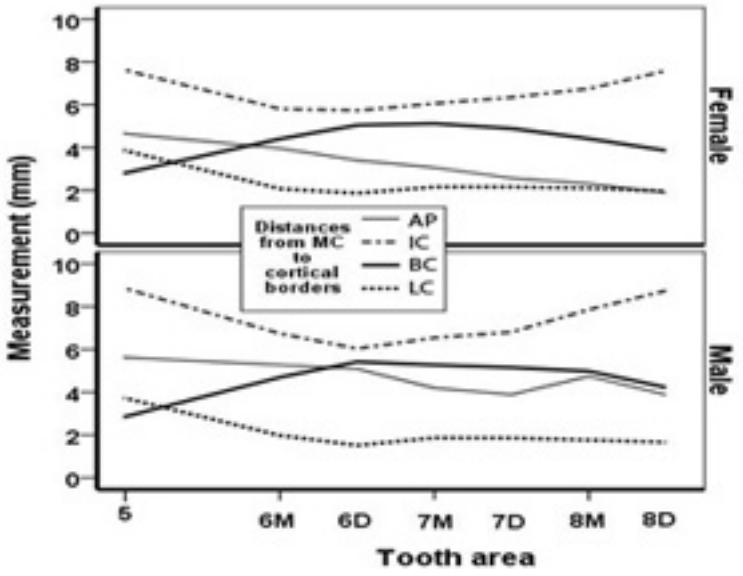

Figure 2: The path of measurements according to gender

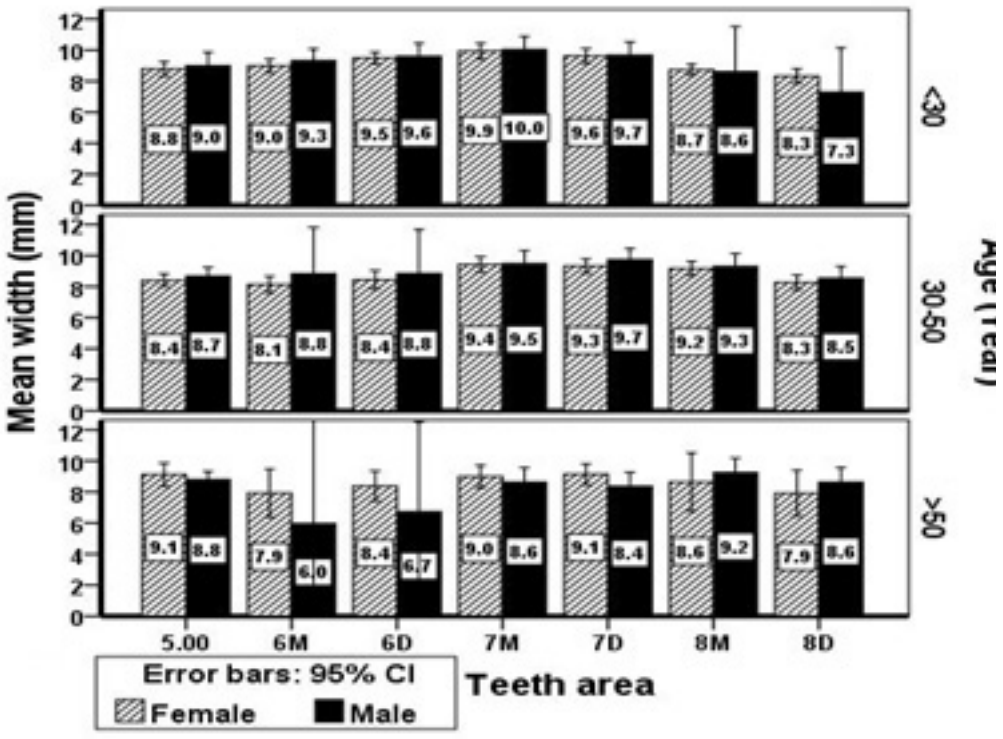

Figure 3: The mandibular width in MC area of posterior teeth according to age and gender

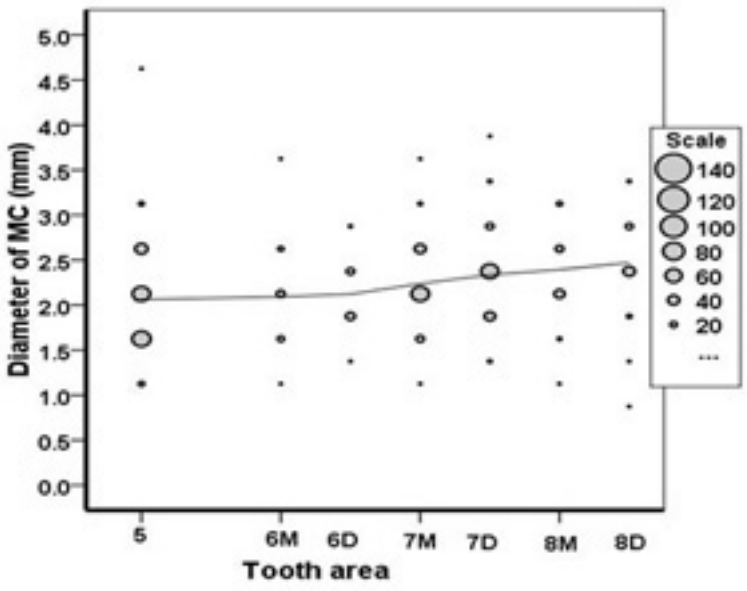

Figure 4: The mandibular canal diameter in posterior teeth

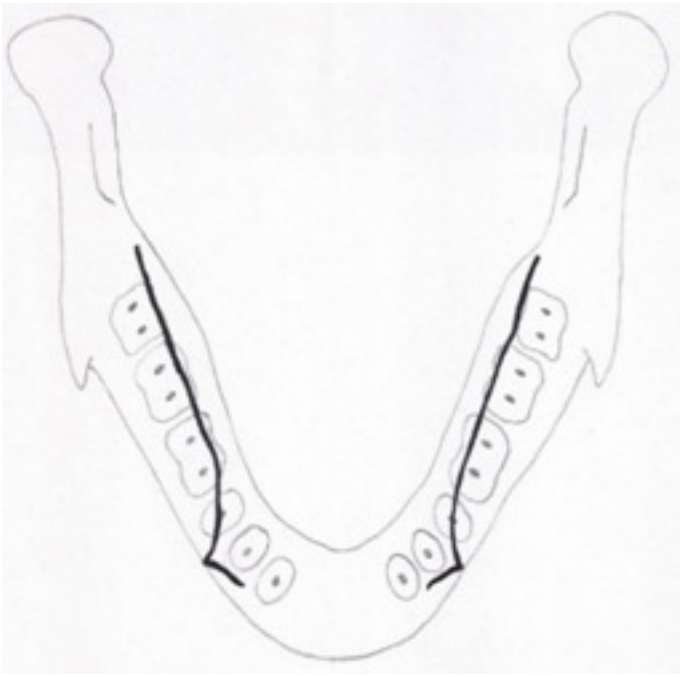

Figure 5: The course of MC in horizontal schematic view

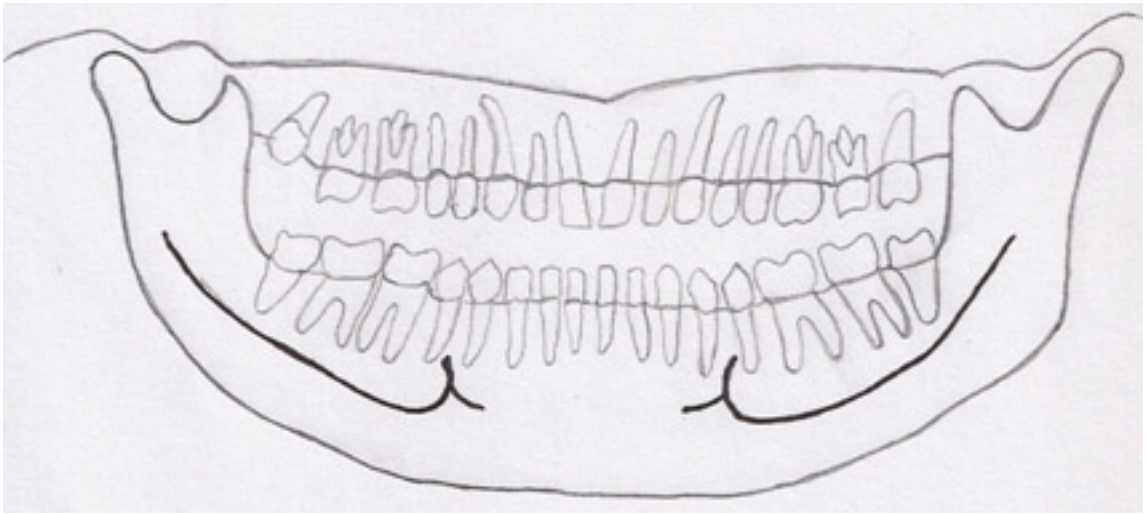

Figure 6: The course of MC in schematic panoramic view

W		LC		BC		IC		AP		
Male	Female	Male	Female	Male	Female	Male	Female	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
9/08±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±2/6 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. Rajechel 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±0.31mm on the right and 1.06±0.28mm 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±3.8mm (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.

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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 anther 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 curriculation 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 evolutional 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 looks 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 he school courtyard and by doing collective and individual activities learn how to place the "Qiblah" direction.

The validation of the curriculation 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 ina 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.

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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

$$Y_{(Nq*1)} = X_{(Nq*q)}\,\beta_{(q*1)} + \epsilon_{(Nq*1)} + \Psi_{(Nq*1)} \quad (1)$$

Where the Y=(r_11,…,r_q1,r_12,…,r_q2,…,r_1N,…,r_qN) is the vector of sample correlation coefficients stacked vertically across the sessions. The ϵ and Ψ are vectors with dimension Nq*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 FMRIB 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 Broodman 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.

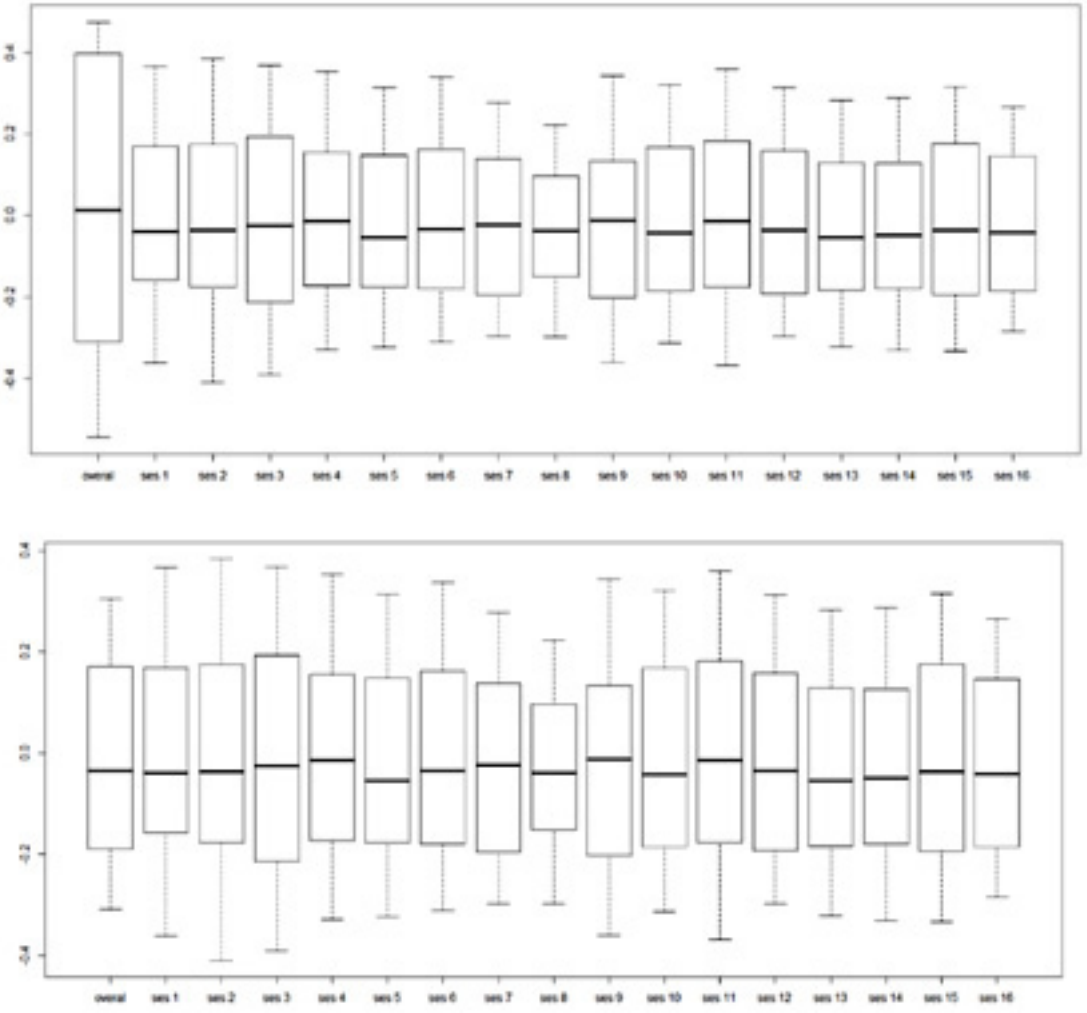
Num	Region of interest	Num	Region of interest	Num	Region of interest	Num	Region of interest
1	Brodmann area 1	11	Brodmann area 13	21	Brodmann area 27	31	Brodmann area 39
2	Brodmann area 2	12	Brodmann area 17	22	Brodmann area 28	32	Brodmann area 40
3	Brodmann area 3	13	Brodmann area 18	23	Brodmann area 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

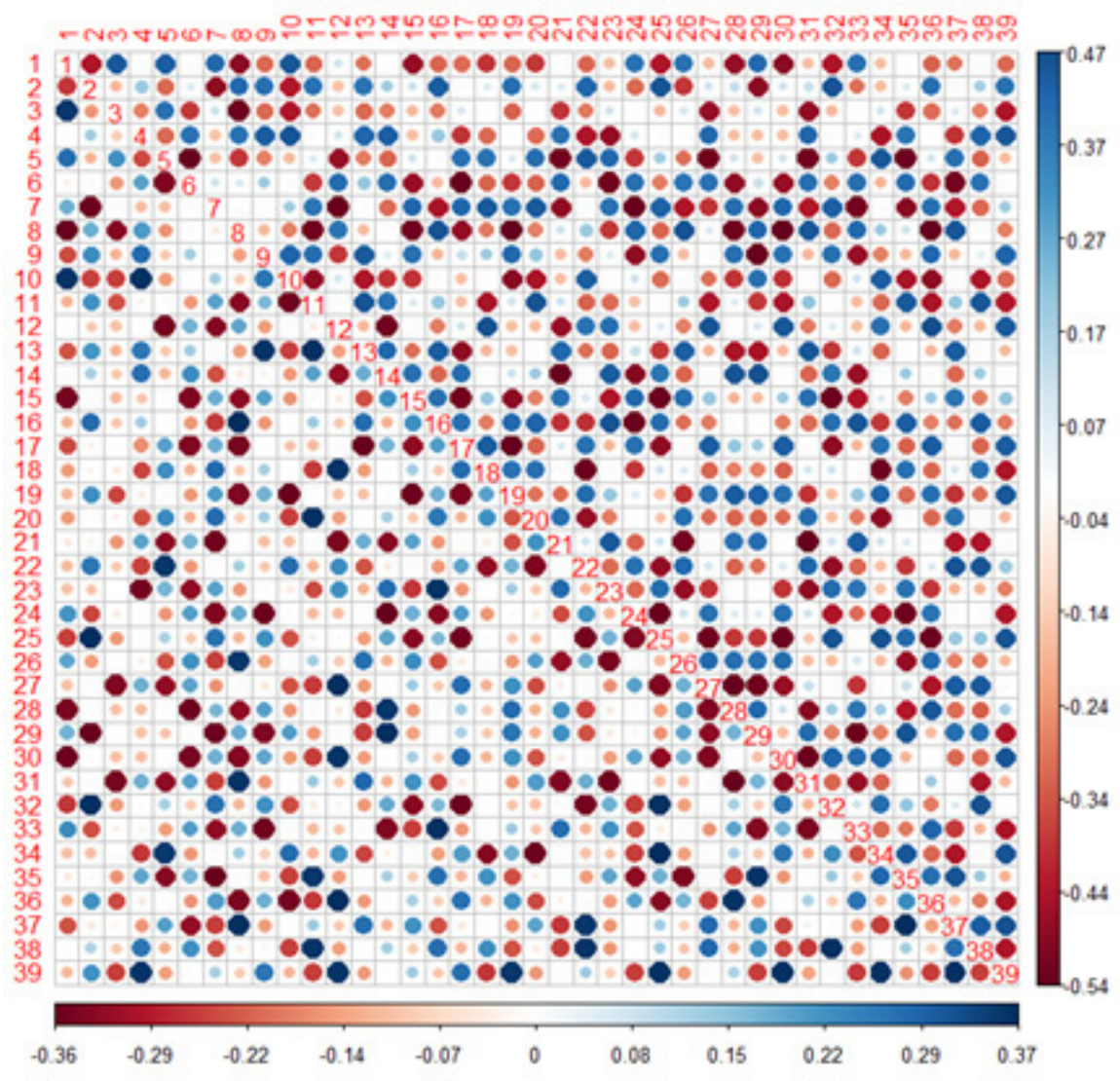
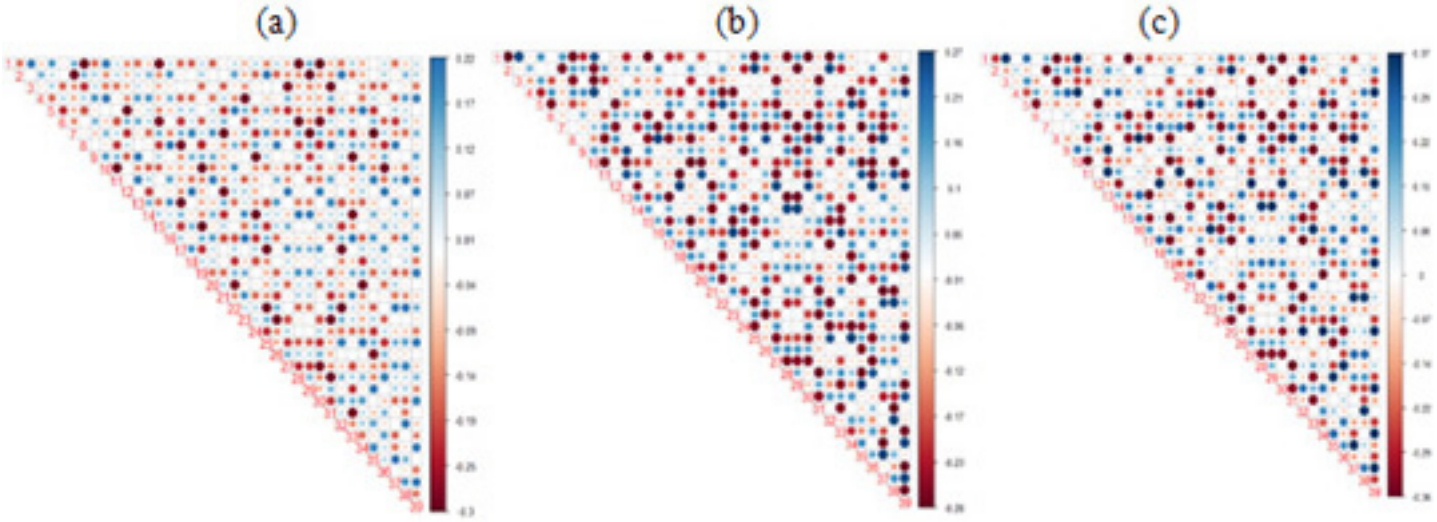


Figure 3. (a) The estimated betas for Session 1; (b) The estimated betas for Session 8; (c) The estimated betas for Session 16.



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.

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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).

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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 from. 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.

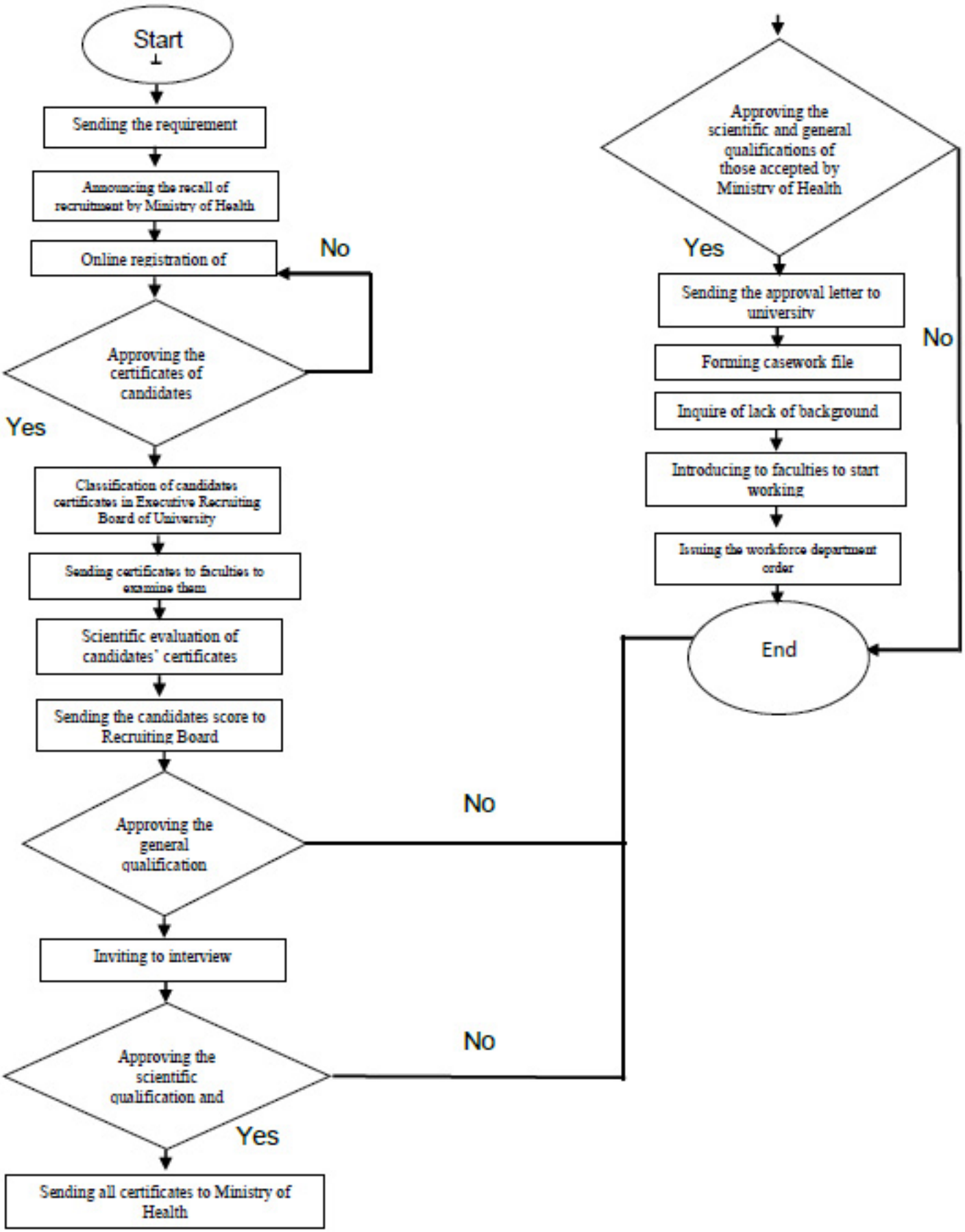
E) General and scientific qualifications of candidates approved by the executive board of the university and approved by the central board of the Ministry of Health, according to standards approved by the Supreme Council of the Iranian Cultural Revolution.

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 ther 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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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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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 Rank	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 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 Rank	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

		Material motivation	Social motivation	Spiritual motivation		Total
Variable		Mean SD	Mean SD	Mean SD	Mean Rank	Mean SD
Field of Study	Nursing	62.80±19.87	56.20±21.99	75.50±20.539	101.79	63.89±16.859
	Midwifery	65.26±18.27	62.07±18.38	76.52±19.502	103.44	63.38±13.55
	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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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 quantitative 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 Inadequate equipment
	Lack of opportunities for learning and skill development	Traditional care delivery Professional incompetence
	Unfair salaries	
	Complex nature of work	Critical conditions of patients in ICUs Low safety for critical care nurses
	Unprofessional practice	Workforce' lack of experience Disbelief in standard care delivery
Poor organizational culture	Strict supervision of nurses	
	Poor professional interactions	Professional distrust Poor interdisciplinary collaboration
	Reluctance to perform care measures	
	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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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 (PV<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 and151 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 (PV<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 (PV<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 (PV<0.001). Also, other variants were significantly much better in survivor neonates than non-survivor neonates, and these differences were statistically significant (PV<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. Asthere 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

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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 caesearian section; and in the control group, 27 out of 35 (77.1%) patients had history of vaginal delivery and the rest had history of caesearian 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.

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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, psycho-mental 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≤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 × 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 × Group	2	1.117	3.373	0.037
Error	78	16.410		

The findings showed that the main effect of the group (F2.78 = 14127.948, p<0/05), the main effect of week (F2.78 = 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

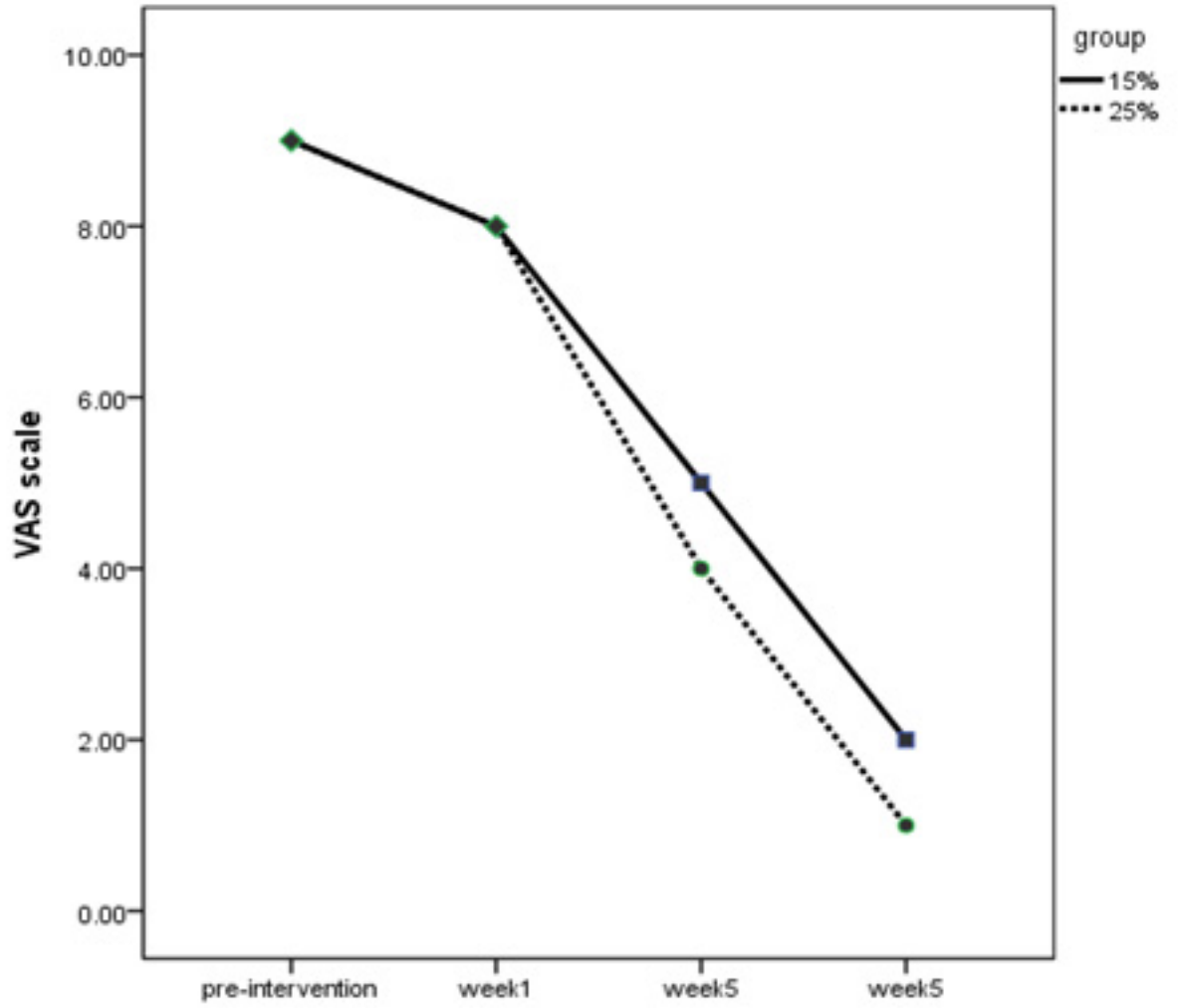
The results of Kolmogorov-Smirnov test showed that the distribution of data was normal (P>0.05). T-test showed that there was no significant difference in the WOMAC scale between the two groups before the intervention (t = 0.841, p>0.05). Two-way analysis of variance (week × group) of 3×2 was used to analyze the data. The results are presented in Table 2.

The findings showed that the main effect of the group (F2.78 = 5671/901, p <0.05), the main effect of week (F2.78 = 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 × 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

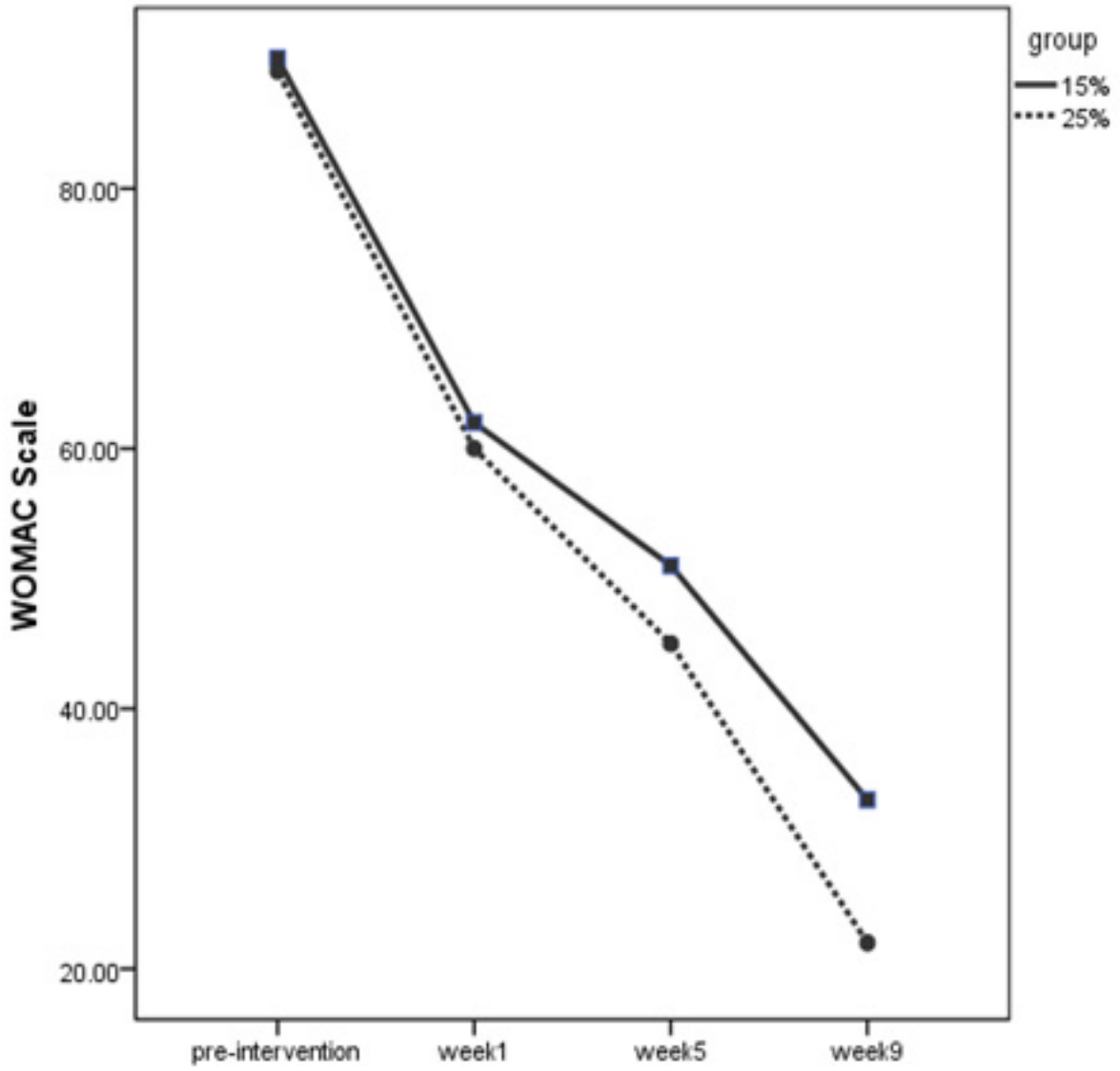
The purpose of this study was to investigate the effect of dextrose injection on pain control associated with knee osteoarthritis. The findings showed that injection of 15% and 25% of dextrose had a significant effect on the visual scale of pain and function of patients so that during treatment, scales 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-arterial 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 kina 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 proliferrant 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.

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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 nalyzed 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 dependent 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.

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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 though stratified and simple random sampling. Perceived organizational justice was assessed through Niehoff and Moorman questionnaire and Elonenet 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 mangers 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 ef¬fectiveness 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 ikert 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 R2	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 toward 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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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 weigh 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 cortication 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 ventromedal, that play a role in regulating eating behavior. This receptor is also expressed in the corpuscular cells of the adrenal glands and the beta panacea 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 u.p-1 mitochondrial protein in fat cells. Leptin stimulates the synthesis of ucp-1 by altering synaptic transmission of neurons in the arcoat 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 from, 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 µg / ml ± 3.3 µg / ml. Also, the amount of insulin was 27.1 ± 28.11 IU / mL. And the mean glucose was 159 mg / 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

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Etiology, Epidemiologic Characteristics and Clinical Pattern of Children with Febrile Convulsion Admitted to Hospitals of Germi 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 Germi 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 Germi 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 Germi 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 complexseizure. 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 Germi 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 Germi 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 / Seizure Type		Simple Seizure	Complex Seizure	P-value
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 / Seizure Type		Simple Seizure	Complex Seizure	P-value
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 regardingchildhood 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 Abbaskhanian, 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.

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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±615/5) was significantly higher than the role play group (17/02±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±2/92) was significantly higher compared to the role play group (4/04±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 whopossess 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 feedbacksin 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 withthe 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 give 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 changedplaces 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 Zahedmehr 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 Zahdmehr (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 (098/0 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 ± 98/27) was significantly higher than role-play group (5/374 ± 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.

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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 $n2$=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 paradayigm(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 forgivingness 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 Saeedehet 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'salpha0.96 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 to well-known groups. This scale has a concurrent validity and correlates with Locke-Wallace's Marital Satisfaction Scale.

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 (qi = 263.21, p<0001); this indicates an adequate correlation between the dependent variables for the continuation of the analysis. (Table2)

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, Pillais index was used for the purpose of evaluating the significance of multivariate effects. Pillais index showed that the effect of the group on the linear combination of dependent variables was significant (Partial *n*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 *n*2= 0.04, P<0.001, F= (1&38) =1), couple agreement (Partial *n*2= 0.03, P<0.001, F= (1&38) =8.70), couple correlation (Partial *n*2= 0.03, P<0.001, F= (1&38) =10.00) and couple adjustment (Partial *n*2= 0.03, P<0.001, F= (1&38) =3.76). The effect of group on expression of affection is not statistically significant (Partial *n*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	o.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 experiment 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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