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The Development of a Primary Health Care system in the State of Qatar .....page 12

From the Editor

Chief Editor:
A. Abyad
MD, MPH, AGSF, AFCHSE
Email::
aabyad@cyberia.net.lb
Ethics Editor and Publisher
Lesley Pocock
medi+WORLD International
AUSTRALIA
Email:
lesleypocock@mediworld.com.au
publishermwi@gmail.com

In this issue a variety of issues are raised by several authors from the Region including patient safety, development of primary health care in Qatar, and hypoglycemia,

Desouky D et al; evaluated culture of patient safety in Saudi hospitals and improve patient safety and quality of care through implementation of safety systems and creating a culture of safety. The Hospital Survey on Patient Safety Culture questionnaire was used to identify dimensions of patient safety culture. The survey questionnaire was distributed on Al-Hada hospital general hospital in Taif city, Saudi Arabia, to 300 health professionals including nurses, technicians, managers and medical staff. The overall positive responses from the participants ranged from 36.18-82%, where the positive responses are more than the negative. Most of the participators have positive responses about communication, feedback about errors, and the procedure and system at preventing error from happening, however they reported that there is still a lot of patient safety problems in hospital units. The staff in hospital units was not enough but there is a good cooperation between hospital units, and they reported that the supervisor/ manager have important role in improving patient safety. The study calls for the need for increasing attention to patient safety and efforts to improve the performance and quality of service.

Ditta, M.A & Ahmed, B stressed that primary health care plays a vital role in a nation public health care system. The importance of an effective and comprehensive primary health care system is growing with increasing life expectancy and growing chronic disease burden. We document the recent establishment and development of a primary health care system in the state of Qatar. Primary health care corporation Qatar is an arm of the ministry of public health and is delivering safe and effective primary health care services to the population of Qatar via its 26 primary health care centers. The development of primary health care services in Qatar can be used as an example to inform development of similar systems in nations, which lack developed primary health care systems.

Ahmed B & Khan M.N stressed hypogylcaemia can have multiple causes including iatrogenic side effects of diabetic medications. Hypoglycaemia increases morbidity and mortality in diabetic patients. It can also adversely affect the productivity and quality of life of patients. The authors documented several consequences of hypoglycaemia including increase susceptibility to cardiac and neurological events. They recommend tailored and structured patient education to ensure adequate knowledge about the causes and management of hypoglycaemia. We envisage that overtime increasing use of continuous glucose monitoring and automatic hypoglycaemic alerts will reduce the morbidity and mortality burden of hypoglycaemia.

Hatroom, A.A.S investigate and compare the treatment success of ESWL and URS for the treatment of ureteral stones. They retrospectively identified patients with solitary kidney complained of ureteric stones treated with ESWL or URS in Aden, between 2011 and 2014.

The collected parameters were: age, sex, stone size, and stone location. The total study patients were 90. They were 64 (71.1%) males and 26 (28.9%) females. The symptoms were anuria + nausea + vomiting in 80 (88.9%) patients and 10 (11.1%) complaining of dysuria frequency and heamaturia. The mean duration from starting symptoms was 2 ± 0.8 days. The most common side location was lower ureter 44(48.9%).

The treatment procedure URS + DJ (double j - ureteric stent) fixation was predominant with 70 (77.8%) while the treatment procedure DJ + ESWL was done for 20 (22.2%) patients.

There was a highly statistical significant difference between the two groups of treatment procedures related to sex ($p = 0.000$). In the ESWL group, females were more than males 13(14.4%). In the URS group, males were predominant with 57(63.3%) ($p = 0.001$).
Success and stone free rate after ESWL was 85%, while in URS group was successful in all patients - stone-free 100% ($p < 0.05$). The author concluded that URS seems to be more successful in the treatment of ureteral stones, further prospective studies with more patients are needed to clarify our results.

Amin A et al carried a study to figure out the prevalence dyslipidemia among knee osteoarthritis patients and compare their abnormal serum lipid components with non-exposed individuals. A total of 60 patients with knee osteoarthritis and 60 non-exposed (without knee osteoarthritis) individuals were studied in a prospective cohort study that was conducted from March 2018 to May 2019. The mean age of the patients with knee osteoarthritis was 51.8 years. Female-to-male ratio was 2.1:1. It was seen that dyslipidemia increased two folds among patients with knee osteoarthritis than the non-exposed subjects. Patients and non-exposed subjects were significantly different in terms of dyslipidemia prevalence ($p<0.013$). Furthermore, all the lipid components were significantly abnormal in those with knee osteoarthritis. The authors concluded that dyslipidemia is prevalent among knee osteoarthritis patients, and there is a significant association between knee osteoarthritis and high-density lipoprotein, total cholesterol, low-density lipoprotein, and triglyceride. Dyslipidemia prevention may reduce the development of knee osteoarthritis and cardiovascular comorbidities.

Helvaci MR et al, looked at smoking-induced endothelial damage may increase plasma triglycerides. Patients with plasma triglycerides values lower than 60 mg/dL were collected into the first, lower than 100 mg/dL into the second, lower than 150 mg/dL into the third, lower than 200 mg/dL into the fourth, and 200 mg/dL and higher into the fifth groups. The study included 669 cases (393 females), totally. Mean age increased just up to triglycerides value of 200 mg/dL, and there was an increase of triglycerides about 8.1 mg/dL for each year of aging up to this value. Male ratio increased parallel to the increased triglycerides, gradually (32.3% versus 50.0%, $p<0.001$). Body mass index (BMI) increased just up to plasma triglycerides of 150 mg/dL. Fasting plasma glucose, hypertension, diabetes mellitus, and chronic obstructive pulmonary disease increased parallel to the increased triglycerides, gradually. The authors concluded that Plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between the plasma triglycerides and aging, BMI, and smoking, but smoking may be particularly important for plasma triglycerides values of 200 mg/dL and greater.

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Assessment of patient safety culture in tertiary health care settings in Taif City, Saudi Arabia

Dalia El-Sayed Desouky (1,2)
Atheer Alraqi (3)
Rabeah Alsofyani (3)
Najla Alghamdi (3)

(1) Department of Family and Community Medicine, College of Medicine, Taif University, Saudi Arabia
(2) Department of Public Health and Community Medicine, Faculty of Medicine, Menoufia University, Egypt
(3) Medical College, Taif University, Saudi Arabia.

Corresponding author
Dr. Dalia El-Sayed Desouky
Assistant Professor of Public Health & Community Medicine, Department of Public Health and Community Medicine, Faculty of Medicine, Menoufia University, Egypt.
Assistant professor of Public Health & Community Medicine,
Department of Family and Community Medicine,
College of Medicine, Taif University, Alsalama Street, Taif City,
Saudi Arabia,
Tel: +966537125590
Email: daliadesouky1234@gmail.com

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Abstract

Background: A limited amount of data exists about patient safety culture in Saudi Arabia, however the healthcare organizations in Saudi Arabia are assessing patient safety guides to identify opportunities for improvement.

Objectives: The purpose of this study is to evaluate the culture of patient safety in Saudi hospitals and to improve patient safety and quality of care through implementation of safety systems and creating a culture of safety.

Methods: The Hospital Survey on Patient Safety Culture questionnaire was used to identify dimensions of patient safety culture. The survey questionnaire was distributed in Al-Hada general hospital in Taif city, Saudi Arabia, to 300 health professionals including nurses, technicians, managers and medical staff.

Results: The overall positive responses from the participants ranged from 36.18-82%, where the positive responses were more than the negative. Most of the participants had positive responses about communication, feedback about errors, and the procedure and system at preventing errors, however they reported that there are still many patient safety problems in hospital units. The staffing level in hospital units was not enough but there was good cooperation between hospital units, and they reported that the supervisor/manager has an important role in improving patient safety.

Conclusion: The study calls for the need for increasing attention to patient safety and efforts to improve the performance and quality of service.

Key words: assessment, patient, safety, culture, tertiary, Saudi Arabia

Introduction

According to (Mitchell 2008), patient safety is the prevention of adverse events to patients with stress on the system of care delivery that prevents errors and learning from errors that occur within the building and of a safety culture involving patients, health care workers, and organizations (1).

In patient care, it is crucial to assess patient safety guides to identify chances for improvement and to create a starting point for evaluating future improvement efforts (1). In order to achieve this, health care providers should integrate quality and safety into their organization to guarantee proper clinical and administrative practices (1).

Patient safety is a very important component in the culture of any health care organization, and assessment of the healthcare organization's patient safety culture will be the first step for developing a strong safety culture (3). This assessment will improve the quality of health care by identifying areas affecting the patient's safety, and without this assessment health care costs and unexpected patient care new risks will increase (4).

To achieve a successful culture of patient safety in any health care organization, the values and beliefs about what is important in an organization should be understood (5). In addition, executive commitment, effective communication, enthusiastic resources and shared trust by all organizational members should be present in creating a positive patient safety climate inside the organization (3).

Effective hospital employees' communication is vital to achieve patient safety, as communication helps in decision making, treatment planning, and solving problems related to patient care (2). Patient safety will be achieved when all methods of communication are properly used to create a patient safety climate for staff and patients (2).

Dimensions of safety culture are related to several health care outcomes such as medication errors, nurse back injuries, urinary tract infections, patient satisfaction, patients' perceptions of nurse responsiveness and nurse satisfaction (6). Currently some international accreditation organizations necessitate determining the patient safety culture to evaluate the healthcare providers' perception of teamwork, actions taken by management and leadership to support and endorse patient safety, and frequency of event reporting (7).

Better perception about patient safety was associated with higher scores on teamwork within hospital units, organizational learning and continuous improvement, manager' expectations and actions promoting safety, non-punitive response to error, hospital management support for patient safety, and hospital handoffs and transitions (8).

The Hospital Survey on Patient Safety Culture (HSOPSC) is a widely used tool for assessment of patient safety culture (9). A number of studies have been done to assess patient safety culture in health care organizations, using the HSOPSC tool, such as studies done outside Saudi Arabia in Ethiopia (10), Palestine (11) and Kuwait (12), in addition to studies done inside Saudi Arabia (13).
Our study aimed to assess staff awareness regarding patient safety culture in one of the Saudi tertiary care hospitals.

Methods

Study Design and time frame:
A cross-sectional study was done on medical staff in AL-Hada hospital, Taif city, KSA, over one month from July to August 2018.

Sampling methodology:
The hospital community of (AL-Hada armed forces hospital, Taif city) was the sampling frame. The inclusion criteria were all hospital workers (physicians, nurses, pharmacist, dietician, unit assistant /clerk/secretary, Respiratory therapist, physical occupational or speech therapist, technician (e.g. EKG, lab, radiology), administration/ management), and the exclusion criteria was workers who refused to participate in the study. The human resources office of the hospital reported that there are 300 workers in the hospital. All intended hospital staff were contacted, and the response rate was 66.3% and the total number of participants was 199 persons.

The head of every department was contacted to encourage staff to participate in the study.. All of them were contacted at their work place.

Study instrument:
The patient safety culture was measured by the response of health care workers to The Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire and the percentages of the positive responses were assessed.

The HSOPSC measures 12 composites of patient safety culture that include several predictors of patient safety culture (9). The HSOPSC asks the respondents to give their work area a patient safety score and to answer a question on the number of events reported in the past 12 months. [9] The HSOPSC survey contains questions about Communication, openness, feedback and communication about error, frequency of event reported, handoffs and transitions, management support of patient safety, non-punitive responses to error, organizational learning-continuous improvement, overall perception of patient safety, staffing, supervisor/manager expectations promoting patient safety, teamwork across units, teamwork within units.

The questionnaire was in the English language and items were used to collect data about patient safety culture from similar national and international studies [10,11,12,13,14].

Ethical Considerations:
The study was reviewed and approved by the Research Ethics Committee of Taif University and from the director

of AL-Hada hospital. Verbal consents were obtained from all participants before participating in the study.

Statistical analysis:
Data were coded, tabulated and analyzed using (SPSS) version 20. Qualitative data was expressed as numbers and percentages, and a p-value of <0.05 was considered as statistically significant.

Results

Table 1 shows the background characteristics of the study participants. Healthcare professionals who responded to the survey were mainly from pharmacy (16.1%), surgical department (16.1%) and ICU (10.6%). The participants worked in a variety of hospital units such as medicine department (10.1%), pediatric (7.5%), obstetrics (4.5%), laboratory (8.5%), rehabilitation (5%) and radiology department (3.5%). Of the respondents (30.2%) had 1-5 years of professional experience, (45%) had worked 1-5 years in the current work unit, and (76.4%) worked 40-59 hours per week.

Table 2 shows that the responses to the survey in the sections of (the Supervisor/manager or the person whom you directly report to and facility that he/she works in) had an overall positive response that ranged from 36.18 - 82%, and the positive responses were more than negative.

Table 3 shows that the positive overall responses of participants to the survey in the section of communication, ranged from 40.7 - 71.3%.

Table 4 shows the responses of the participants to the section of teamwork within units/Staffing. The overall positive responses of these items ranged from 4.5 - 74.8% which meant that positive responses were more than the negative responses.

Table 5 shows that the positive responses to the following items were as follows: (mistake is made, but is noted and corrected before affecting the patient; how often is this reported which show a positive response) (71.8%), (when we asked about when a mistake is made, but has no potential to harm the patient, how often is this reported which showed a positive response) (72.3%), and when we asked about if a mistake is made that could harm the patient, but does not, how often is this reported, which showed a response of (75.8%). This means that the positive responses of events reported were more than negative responses.

Discussion

In the present study, in all sections the overall positive responses to all survey items ranged from 36.18 - 82%, and the positive responses were more than the negative. This result is in agreement with that revealed from other studies. One of these studies was done in a Saudi Arabian hospital in 2010 (13) , and the other was done in Ethiopia in 2016. (10). On the other hand, another study done in Saudi Arabia showed that the average of positive responses ranged from (19-76%) (13). In the study done in Ethiopia (10), the overall positive responses to items of patient safety culture was lower than the percentage of positive responses observed in the present study.

The present work showed that most of the participants have positive responses about communication and feedback about errors that ranged from 40.7-71.3%, a result that is similar to that observed in an earlier study conducted in Saudi Arabia (13). In this study (13) the percentage of the positive responses ranged from 22-70%. The percentage of positive responses about communication and feedback reported by participants in the present study is higher than that reported in a study done in Palestine (11), where the percentage of the positive responses was (36%).

The result of the present study showed that the respondents reported that the procedure and system are good at preventing errors from happening but still there are a lot of patient safety problems in the hospital unit. The same result was reported in the previous Saudi study (13).

Our findings show that the staff in hospital units was not sufficient as reported by the participants; however, in the study done in 2010 in Saudi Arabia the participants reported that the staffing level was sufficient in each unit (13).

The results of the current work confirms the findings of the previous Saudi study (13), where the participants reported that the supervisor/ manager has an important role in improving patient safety.

Our results also showed that there is a good cooperation between hospital units; a result that is in agreement with the previous Saudi study (13). Regarding the frequency of events reported, their percentage was higher than in our study (71-75%) when compared to the previous Saudi study (13), where the percentage of events reported ranged from 59.4 - 61%.

Limitations

Limitations of this study were lack of funding and the small sample size, so its result cannot be generalized. Using a self-reported questionnaire had the possibility of recall bias. The present study was a single centered study which is a third limitation that impairs generalization of results.

Conclusion

This study gives a comprehensive assessment of patient safety in one of the tertiary hospitals in Taif city. Results show increased attention to patient safety and efforts to improve the performance and quality of service. However, there are several areas that need to be improved including communication openness, error reporting, leadership and teamwork across hospital units. The survey should be repeated after application of proper interventions to monitor improvement in the culture of patient safety in this hospital and other hospitals in Taif city.

Table 1: Background characteristics of the study respondents

Variable	frequency	percent
Position:		
Many different units	15	7.5
Medicine	20	10.1
Surgery	32	16.1
Obstetrics	9	4.5
Pediatrics	15	7.5
ICU	21	10.6
Rehabilitation	10	5.0
Pharmacy	32	16.1
Laboratory	17	8..5
Radiology	7	35
Other	21	10.6
Hospital experience (years)		
Less than 1 year	41	20.6
1-5 years	81	40.7
6-10 years	44	22.1
11-15 years	18	9.0
16-20 years	8	4.0
21 or more years	7	3.5
Professional experience (years)		
Less than1 year	31	15.6
1-5 years	60	30.2
6-10 years	42	21.1
11-15 years	26	13.1
16-20 years	17	8.5
21 or more years	22	11.1
Work unit experience (years)		
Less than 1 year	45	22.6
1-5 years	91	45.7
6-10 years	35	17.6
11-15 years	19	9.5
16-20 years	3	1.5
21 or more years	6	3.0
Working hours per week		
Less than 20	8	4.0
20-39	13	6.5
40-59	152	76.4
60-79	16	8.0
80-99	5	2.5
100 or more	4	2.0

Table 2: Participants' responses to survey items

Variable	Strongly disagree	Disagree	Neither	Agree	Strongly agree	Average positive response %
1-Important patient care information is often lost during shift changes.	28	80	49	38	4	54.2%
2-Shift changes are problematic for patients in this hospital	19	80	61	33	6	49.7%
3- It is often unpleasant to work with staff from other hospital units	20	73	59	44	3	46.7%
4- Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts.	10	62	62	48	17	36.18%
5- Things "fall between the cracks" when transferring patients from one unit to another .	21	53	74	45	6	37.18%
6- Units in this facility do not coordinate well with each other.	18	68	57	45	11	43%
7- My supervisor/manager overlooks patient safety problems that happen over and over.	13	30	39	86	31	58.7%
8- Management in this facility seems interested in patient safety only after an adverse event happens.	16	56	62	47	18	36.18%
9- Problems often occur in the exchange of information across units in this facility.	11	75	63	45	5	43.2%
10-People support one another in this unit	6	3	30	115	45	80.4%
11-My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedure	7	11	28	109	44	76.8%
12-When a lot of work needs to be done	3	5	27	118	46	82.4%

Table 3: Participants' responses to patient safety culture composites

Variable	never	rarely	sometimes	most of the time	always	Average positive response
1- Staff are afraid to ask questions when something does not seem right	30	64	61	33	11	47.2%
2- Staff feel free to question the decisions or actions of those with more authority	20	35	63	59	22	40.7%
3- We are given feedback about changes put into place based on event reports.	4	16	81	61	37	49.2%
4-Staff will freely speak up if they see something that may negatively affect patient care.	3	13	60	74	49	61.8%
5-We are informed about errors that happen in this unit.	6	12	49	82	50	66.3%
6-In this unit, we discuss ways to prevent errors from happening again.	4	9	44	83	59	71.3%

Table 4: Participants' responses to teamwork within units/Staffing items

Patient safety culture composites	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Average % positive response
1-Our procedures and systems are good at preventing errors from happening	4	8	44	101	42	71.8%
2- We have patient safety problems in this unit	2	7	28	104	58	4.5%
3- Management in this facility provides a work climate that promotes patient safety	3	7	41	120	27	73.8%
4- We have enough staff to handle the workload	37	58	34	57	13	35.17%
5- My supervisor/manager seriously considers staff suggestions for improving patient safety	3	10	37	109	40	74.8%
6- There is good cooperation among units that need to work together	5	19	52	101	22	61.8%
7- The actions of management in this facility show that patient safety is a top priority	4	15	38	89	53	71.3%
8- Units in this facility work well together to provide the best care for patients.	4	8	43	105	39	72.3%

Table 5: Participants' responses to frequency of events reported

Frequency of event reported	Never	Rarely	Sometimes	Most of the time	Always	Average % positive response
1- When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?	4	16	36	82	61	71.8%
2- When a mistake is made, but has no potential to harm the patient, how often is this reported?	1	21	33	80	64	72.36%
3- When a mistake is made that could harm the patient, but does not, how often is this reported?	6	10	32	71	80	75.8%

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Conflicts of interest: none

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The Development of a Primary Health Care system in the State of Qatar

Mohsin Allah Ditta
Bilal Ahmed

Family Medicine Specialist
Omar Bin Khattab Health Center, Primary Health Care Corporation, Doha, Qatar

Corresponding author:
Dr. Mohsin Allah Ditta MBChB MRCGP FRACGP PGCME DFSRH
Omar Bin Khattab Health Center,
Primary Health Care Corporation,
Doha, Qatar.
Phone: +974 3376 6112
Email: mohsin.ditta@doctors.org.uk

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Abstract

Primary health care plays a vital role in a nation's public health care system. The importance of an effective and comprehensive primary health care system is growing with increasing life expectancy and growing chronic disease burden. We document the recent establishment and development of a primary health care system in the state of Qatar. Primary health care Corporation Qatar is an arm of the Ministry of Public Health and is delivering safe and effective primary health care services to the population of Qatar via its 26 primary health care centers. The development of primary health care services in Qatar can be used as an example to inform development of similar systems in nations, which lack developed primary health care systems.

Background

A developed and integrated primary healthcare system has been shown to be a vital part of a nation's public healthcare infrastructure and integral to promoting health and wellness. A well developed and well-resourced primary health care system can play a vital role in reducing use of scarce secondary care resources, improve early detection of disease and improve outcomes for patients. [1]

Primary health care systems have been well established in countries such as the United Kingdom, Australia and Canada and other nations such as the United States are also recognizing the importance of Primary Care. [2] It is also being recognised that establishment of an effective primary care system is vital for the Gulf Cooperation Council (GCC) countries due to increasing incidence of chronic diseases and life expectancy [3].

The World Health Organization has called for development of strong primary health care systems and in its 2018 Astana Declaration for Primary Health care, reiterated the critical importance of primary health care and stated that primary health care "has proven to be a highly effective and efficient way to address the main causes of, and risk factors for, poor health, as well as for handling the emerging challenges that may threaten health in the future" [4].

This paper aims to document the development of an established primary care system in the state of Qatar and how it is organized and managed to meet the needs of the native and expatriate populations.

Organisational Structure

The Ministry of Health in Qatar gave approval for a comprehensive primary health care system as far back as 1978 and Primary Healthcare Corporation (PHCC) was made an independent body in 2012 responsible for delivering primary healthcare to the population of Qatar. PHCC is a large corporate body with multiple departments and levels of management.

Figure 1: Various Directorates within PHCC

1. Office of Managing Director
2. Corporate Communication Department
3. Legal Affairs
4. Health and Information Systems/Information Technology
5. Administration and Finance
6. Facilities and Engineering
7. Operations
8. Clinical Affairs
9. Work force Training
10. Quality and Patient Safety Directorate
11. Service Development
12. Occupational Health and Safety

Each directorate is in turn responsible for multiple sub divisions, for example the clinical affairs directorate is responsible for clinical audit and clinical guidelines (clinical effectiveness), clinical licensing, research and communicable disease and infection prevention. The quality and patient safety directorate is responsible for quality improvement, risk management, performance measurement and policy management.

The operations directorate oversees the functioning of all health care centres and initiatives such as the school health programme, screening programme and home health programme for house bound patients. Qatar is split into central, western and northern regions for the purposes of primary health delivery, with each region having a director and responsible for health centres within their respective regions. Each health centre in turn is led by a senior family medicine consultant who liaises with the regional director and corporate governing bodies to ensure safe and effective functioning of the health centre. A health centre also has an administrative head responsible for non-clinical staff such as reception staff, customer services support assistants and other auxiliary staff such as cleaners and maintenance teams. Under the leadership of the health center manager, a physician in charge provides a further tier of management to the physicians working in health centres and run day to day affairs such as rota organisation and scheduling of training and appraisals and ensuring policies and directives are adhered to for the functioning of the health center and safe delivery of care.

Accessibility

A typical PHCC health center opens 7 days a week and has both a morning shift of 7am to 2pm and an evening shift of 4pm to 11pm and thus provides good access to services, whilst some health centres provide urgent care services and operate a night shift. Thus patients can access primary care services 24 hours a day if needed.

Studies have shown extended access to primary care services reduces attendance to emergency departments for minor ailments and thus reduces pressure on overburdened emergency departments in secondary care. [5] This is particularly important in the context of health care in Qatar as waiting times in emergency departments can be many hours. Urgent care centers providing access to timely primary care services reduce pressure on secondary care.

Any resident of Qatar can access a primary health clinic by registering for a health card at a health center, which costs 100 Qatari Riyals. Thus, expatriates and residents alike are entitled to comprehensive primary care services upon registering their details. Each health center has a catchment area and thus residents of a particular area are encouraged to register with their respective health center.

In most clinics, appointments with health care professionals can be booked on the phone by calling a centralised booking service or by attending a health center and speaking to a member of the reception staff. The vast majority of patients are seen on the same day they request appointments.

Within the health center, the patient journey is dependent on whether they pre book an appointment or attend the health center without an appointment. Those patients with a pre booked appointment usually have their vital signs recorded and height and weight documented by a nurse before they see a physician. Those patients without appointments are triaged by nurses so they can be allocated to an appropriate physician depending on whether they have a presentation of an urgent or routine nature.

Workforce

Each Health center is staffed with both male and female family medicine physicians who have completed residency in family medicine programmes in western countries and across the world. Indigenously trained family medicine graduates are also entering the work force. There are also doctors who are general practitioners who have been working for many decades with vast experience.

There are numerous other staff in PHCC health centres which include nurses, pharmacists, dieticians, diabetic educators, dentist, cleaners, customer service support staff, reception staff, secretaries, radiographers, radiologist, laboratory technicians, and phlebotomists amongst others.

Having a skilled work force is a vital part of delivering excellent primary care services that are of a reputable standard.

Information Technology

The use of technology is widespread in the primary health care system with all notes being computerised and interestingly, both government secondary care and primary care utilize the same medical software so primary care physicians can see what has occurred with patient care in hospital and vice versa. This is actually an excellent state of affairs as even more developed health systems such as the NHS in the United Kingdom have yet to have uniformity of software between primary and secondary care despite their best efforts. In addition, all referrals are done electronically to the respective hospitals and specialties. All prescriptions done in PHCC are also electronic and no paper prescription is needed unless it is for a restricted item that is intended to be used in a non PHCC pharmacy or is a controlled drug, such as narcotics.

Evidence shows that electronic prescribing is an excellent way of digitalising healthcare and has been shown to reduce prescribing errors.[6]

Furthermore, PHCC utilises IT to have a fully functioning intranet system, which includes a policy portal with clinical guidelines for staff, a learning management system in which staff can register for CPD courses, and an incident reporting portal amongst many other features.

Specialised Services

Despite PHCC being responsible for primary care it also provides specialist clinics in designated health centres. Health centres without these specialist clinics can then be referred to the designated health centres. Specialist clinics include Ear Nose and Throat clinic, Paediatric Clinic, Ophthalmology Clinic and Dermatology Clinic. Other services such as optometry, audiology, dietetics, physiotherapy and health education are also available in designated health centers.

Preventative Approach

The Primary health care corporation also manages the national bowel and breast screening initiative in Qatar. Bowel screening is offered to men and women between the ages of 50 to 74 years and the screening test is recommended annually.

The Breast screening programmes are offered to women aged 45 to 69 years and are repeated 3 yearly. National screening programmes for breast cancer utilising mammography have been shown to result in early detection and reduced mortality. [7] Currently, the majority of colorectal cancers world wide are detected at an advanced stage so national screening programmes for the early detection of this disease is important in an attempt to reduce morbidity and mortality. [8]

PHCC also invites its patients to do routine health checks, which include measurement of blood pressure, BMI, cholesterol and blood sugar amongst other investigations such as ECGs in high-risk patients. This is part of a preventative health care approach to detect and manage disease early.

Accreditation

External regulation and accreditation of an organisation is an integral part of quality control and clinical governance. PHCC is accredited by Accreditation Canada International which is a healthcare accreditation body that has surveyed and visited 25 primary health centres in Qatar and conducted many surveys including patient and staff surveys. PHCC has achieved diamond level accreditation, which is the highest level offered by the organisation and is a good indicator of the quality of healthcare being delivered by PHCC. Staff surveys have also demonstrated the accreditation process has promoted awareness of patient safety and quality issues. [9]

Summary

Primary health care is becoming increasingly recognised as a vital and integral part of a nation's healthcare structure and delivery. Qatar has developed a comprehensive primary health care system and continues to expand its facilities both in number and quality. Its current 26 primary health care centres provide safe and effective primary health care that is responsive to the needs of its service users. It has well established facilities and an expanding highly skilled international workforce to complement the highly respected secondary care system. This article presents Qatar as a model for other nations in the Middle East and North Africa region when developing and enhancing their own primary care systems.

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Hypoglycemia: Its effect on patients with diabetes

Bilal Ahmed [1]
Muhammed Naeem Khan [2]

(1) Omar Bin Khattab Health Center, Primary Health Care Corporation, Doha, Qatar.
(2) Q1 Medical, 286-288 Derrimut Road, Hoppers Crossing Melbourne, Victoria 3029, Australia

Corresponding author:
Dr. Bilal Ahmed, MBBS, MRCGP, FRSPH
Omar Bin Khattab Health Center, Primary Health Care Corporation,
Doha,
Qatar
Email: drbilaldmc@hotmail.com

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Abstract

Hypogylcaemia is the presence of abnormally low blood sugar and can have multiple causes including iatrogenic side effects of diabetic medications. Hypoglycaemia increases morbidity and mortality in diabetic patients. It can also adversely affect the productivity and quality of life of patients.

We document the several consequences of hypoglycaemia including increased susceptibility to cardiac and neurological events.

We recommend tailored and structured patient education to ensure adequate knowledge about the causes and management of hypoglycaemia.

We envisage that over time increasing use of continuous glucose monitoring and automatic hypoglycaemic alerts will reduce the morbidity and mortality burden of hypoglycaemia.

Key words: hypoglycaemia, iatrogenic side effects, diabetes

Terms:
DM: Diabetes Mellitus,
DCCT: (Diabetes Control and Complications Trial),
IQ: Intelligence Quotient,
HbA1c: Hemoglobin A1c,
MRI: Magnetic Resonance Imaging,
GLP 1: Glucagon- like peptide – 1 receptor agonist,
SGLT-2: Sodium – glucose co transporter -2,
DPP-4 Dipeptidyl peptidase 4,
CGM: continuous glucose monitoring.

Introduction

Hypoglycemia is a common complication experienced by diabetic patients. It is the iatrogenic side effect of diabetic treatments, which results in increased morbidity and mortality. A working group of the American Diabetes Association and the Endocrine Society[1] defined iatrogenic hypoglycemia as "all episodes of an abnormally low plasma glucose concentration that exposes the individual to potential harm"[1]. It is not possible to assign a single threshold value to hypoglycemia episodes as it shifts to lower plasma glucose concentrations with recurrent hypoglycemic events and higher plasma glucose levels with poorly controlled diabetes.

Hypoglycemia has grave implications in terms of healthcare costs, adverse effects on productivity and the quality of life of patients [2,3,4,5,6]. The American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) strongly advise that in type 2 diabetic patients who are at high risk of hypoglycemia with advanced complications and have comorbid conditions, initiation of treatments which can cause hypoglycemia should be delayed unless essentially required [7]. Healthcare professionals need to realize the importance of hypoglycemia and their role in the delivery of patient-centered care to their patients. Hypoglycemia and its detrimental affects otherwise can result in severe morbidity and mortality [8].

Pathophysiology

In diabetics, severe hypoglycemia is due to defective glucose counter-regulation and hypoglycemia unawareness. Recurrent iatrogenic hypoglycemia, shifts glycemic threshold to lower plasma glucose concentration resulting in defective glucose counter-regulation[9].

Figure 1 and Figure 2 highlight that hypoglycemia unawareness is caused by the attenuated sympathoadrenal responses to hypoglycemia in both type 1 and type 2 diabetes.

Hypoglycemia can cause adrenergic symptoms and neuroglycopenic signs which can produce physical and psychological effects such as sweating, palpitations, shaking, hunger, confusion, drowsiness, odd behaviour, speech difficulty, loss of coordination, and headaches[10].

Hypoglycemia can produce clinical effects, which can have serious short term and long term consequences.

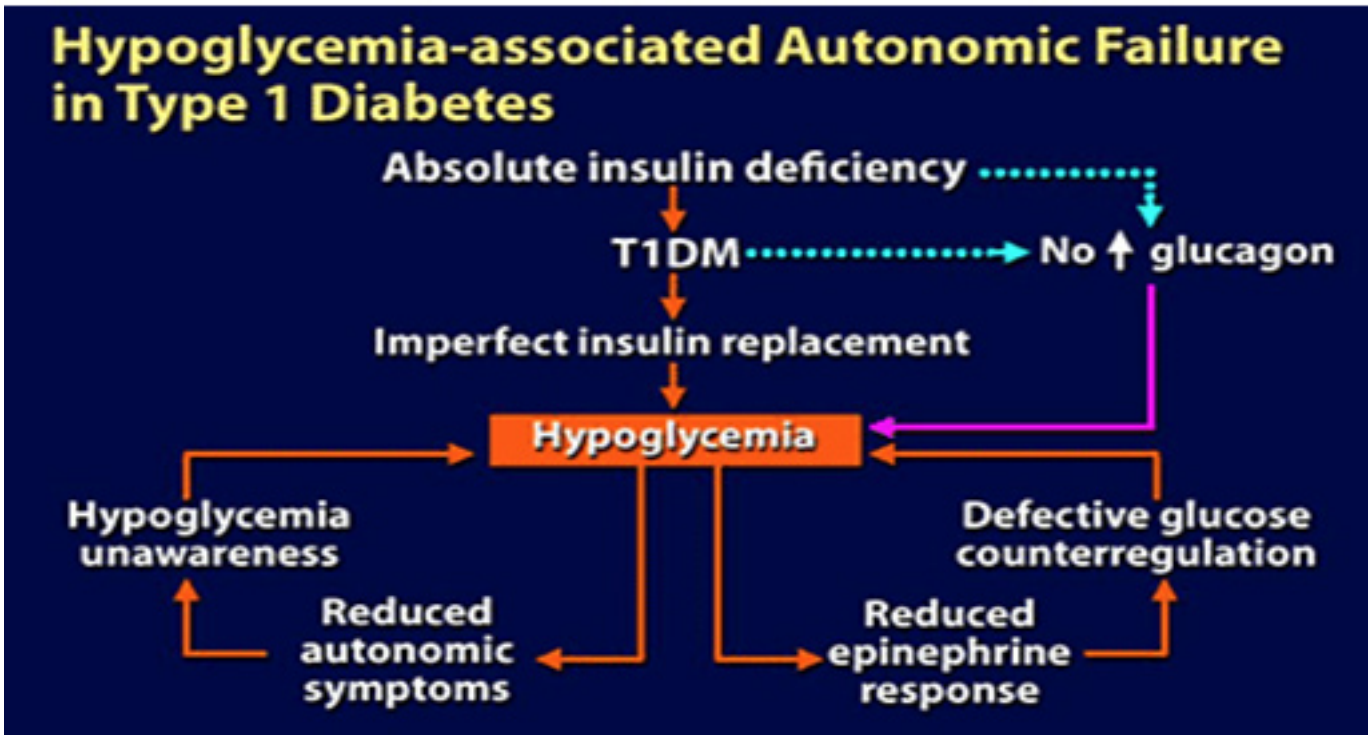

Figure 1: http://www.medscape.org/viewarticle/544445

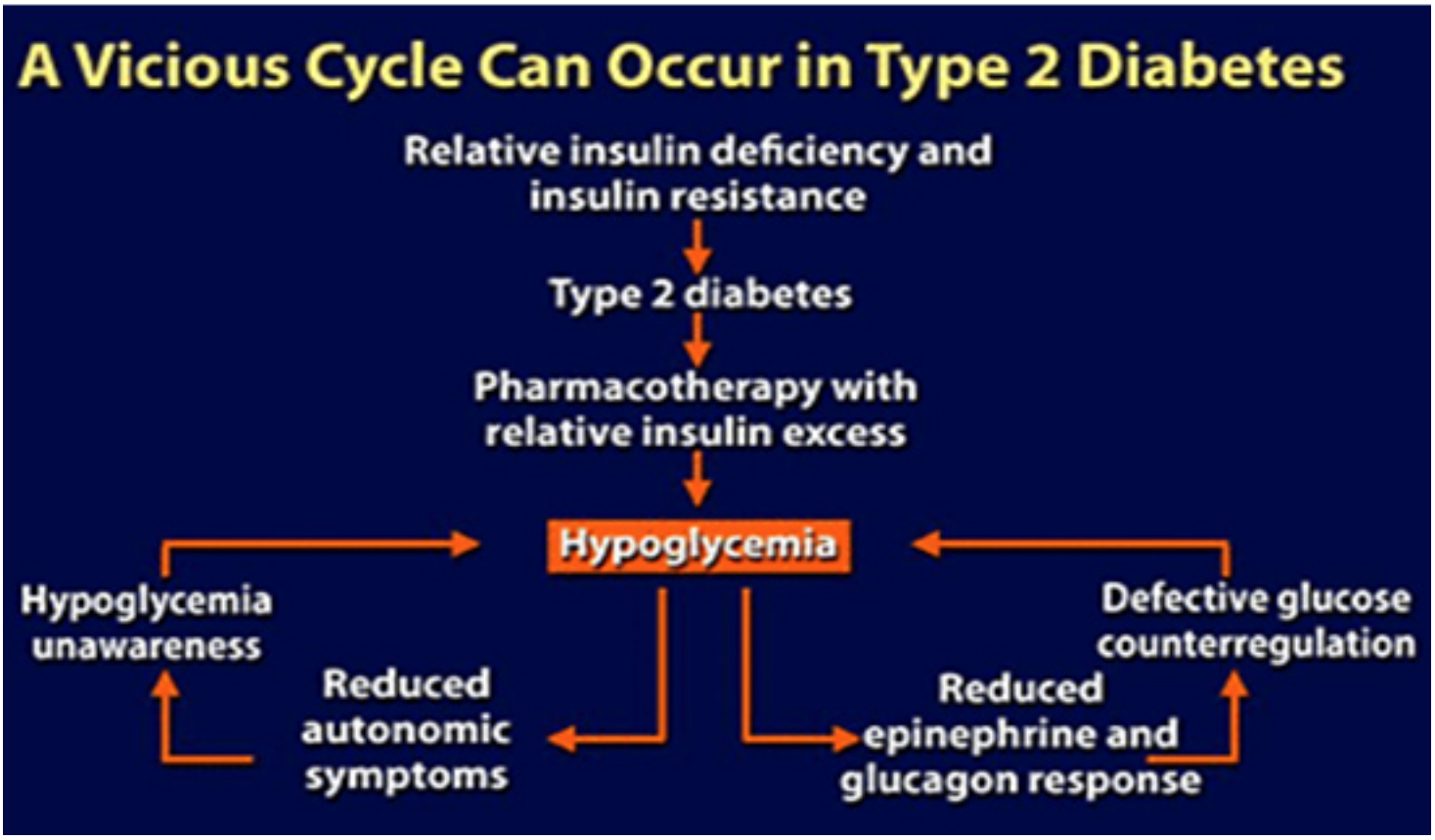

Figure 2: http://www.medscape.org/viewarticle/544445

Signs and symptoms of hypoglycemia:

Table 1. Signs and Symptoms of Hypoglycemia

Early Adrenergic Symptoms	Neuroglycopenic Signs
• Pallor	• Confusion
• Diaphoresis	• Slurred speech
• Tachycardia	• Irrational or uncontrolled behavior
• Shakiness	• Extreme fatigue
• Hunger	• Disorientation
• Anxiety	• Loss of consciousness
• Irritability	• Seizures
• Headache	• Pupillary sluggishness
• Dizziness	• Decreased response to noxious stimuli

Table 1: Tomky, D., M.S.N., R.N., C-A.N.P., C.D.E. 2005. Detection, Prevention, and Treatment of Hypoglycemia in the Hospital. Diabetes Spectrum. Jan, Vol 18, no. 1, pp. 39 - 44

Short-term effects of hypoglycemia:
Hypoglycemia causes some unpleasant effects. Mild hypoglycemic episodes are transient and quickly self-treated. However, mild to moderate neuroglycopenia can affect the performance of many activities at home or at work. It can result in serious harm such as hypoglycemia occurring when driving, which can cause fatal motor vehicle accidents[11]. Immediate hypoglycemia can precipitate problems with balance, coordination, vision, and level of consciousness. It can result in falls and serious injuries like fractures, head injury and joint dislocation whereas if hypoglycemia is severe and prolonged it can cause seizures, coma and in some cases strokes[12] .

Long-term effects of hypoglycemia:
Long-term sequelae of hypoglycemia beyond its short-term implications can result in acquired hypoglycemia syndromes. It can cause counter-regulatory hormonal deficiencies which normally corrects hypoglycemia and can also cause impaired awareness of hypoglycemia[13]. In some occupations hypoglycemia can result in individuals losing their jobs and people treated with insulin can be removed from working in dangerous areas, or their years-long professional roles may be lost if their work involves putting the public at risk. Insulin treatment and hypoglycemic episodes can incur restrictions on driving licensing in many countries[14]. It can affect other important spheres of life such as educational, social, sporting and travel activities [15].

Hypoglycemic episodes can produce fear amongst the patients. It can adversely affect their behaviour, quality of life and can affect adherence to their treatment thus resulting in suboptimal treatment for glycemic control[16].

The patients can then resort to under-dosing to avoid unpleasant effects of hypoglycemia. Hypoglycemia episodes can also encourage patients to eat more which is a defensive mechanism to prevent hypoglycemia. It can result in excessive weight gain. It can also have a profound negative effect on personal life. It can lead to difficult marital life and domestic disharmony[17].

Cardiovascular effects of hypoglycemia:
Hypoglycemia results in sympathetic system activation, which results in the release of large quantities of catecholamines. It is responsible for the hemodynamic effects of regional blood flow and marked influence on the cardiovascular system[18]. The increased cardiac workload puts profound cardiovascular (CV) stress especially in patients with pre–existing CV disease. It can at times result in Myocardial Ischemia (MI) or cardiac failure.

Cardiac arrhythmias:
Hypoglycemia can have adverse effects on the cardiac cycle. It affects cardiac electrophysiology by affecting cardiac repolarization resulting in pro-arrhythmogenic changes[19]. It produces ST segment changes, T – wave morphological alteration and prolongation of the Q – T interval. Sympathetic system activation and release of catecholamines produce a fall in plasma Potassium (K) levels. Thus, hypoglycaemia can lead to arrhythmias[20]. Recently continuous glucose monitoring studies have established a link between hypoglycemia and abnormal cardiac rhythms. Ventricular arrhythmias were noted in patients with asymptomatic biochemical hypoglycemia (glucose levels < 3.1mmol/l) particularly during the night[21]. Hypoglycemic episodes at night tend to be longer, 170 minutes during the night versus 62 minutes during the day [22]. The change in the balance of sympathovagal cardiac response could be responsible for arrhythmias induced by hypoglycemia at night. Vagal activation following activation of counter-regulation hormones to counter hypoglycemia promotes ventricular ectopic beats, changes in heart rate and bradycardia which at times can progress to a fatal arrhythmia[22]. Nocturnal hypoglycemia and its effects on Type 1 Diabetics can be more fatal. Type 1 Diabetics could suffer life-threatening arrhythmia and can be found dead in bed which can be referred to as the 'Dead in bed syndrome'. A review of the glucose monitoring records of a 23 year old type 1 diabetic patient who was found dead in bed showed he had a hypoglycemic event. [23]. The 'dead in bed' syndrome is associated with type 1 diabetes, but patients who are treated with insulin for type 2 diabetes have also been found dead and were assumed to have had an acute coronary syndrome or stroke.

Pathophysiological response to hypoglycemia and cardiovascular risk:
Hypoglycemia can trigger pathophysiological responses, which can persist in the body for several days. These reactions can affect vascular and autonomic functions, which in turn increases cardiovascular risk. In type 2 diabetic patients fasting glycaemia <4.5 mmol/l is thought to be associated with enhanced thrombin formation and formation of denser fibrin clots, especially when strict glycemic control was achieved (HbA1c<6.0%)[24]. It was noted that repeated periods of asymptomatic low glycaemia in type 2 diabetes promotes a prothrombotic state, leading to increased mortality following hypoglycemia[24].

Adequate glycemic control can be cardio-protective whereas repeated or severe hypoglycemia can trigger in a diabetic individual, cardiovascular dysfunction or instability, resulting in an acute cardiac event. From the evidence presented above it would be sensible to deduce that nocturnal hypoglycemia, in particular for those diabetics treated with insulin, should be avoided. Intensive management, which results in strict glycemic control in those patients who have cardiovascular disease, can cause serious cardiovascular complications of hypoglycemia which can be fatal.

Neurological effects of hypoglycemia:
Cognitive impairment
Physiological and biochemical functions of the brain are entirely dependent on the continuous supply of glucose as their primary source of energy. Any threat to the supply of its energy source called neuroglycopenia, can show an immediate deficit in its working. Failure to take appropriate corrective measures or failure of counter-regularly mechanisms can result in severe irreversible brain

damage. Cognitive functions, particularly those which are attention demanding, involve rapid responses and engage complex thought processes to undertake multitasking, are severely affected [25]. In a study involving type 1 diabetes patients, it was noted that complete cognitive recovery time can exceed 60 minutes even after restoration of normoglycemia. This recovery time is also influenced by the former state of awareness of hypoglycemia[26]. The majority of immediate undesirable effects of hypoglycemia which result in serious impairment to carry out normal day to day activities are the result of impaired cognitive function. It results in erratic and irrational behavior, confusion, visual and balance problems, falls and accidents and severe neurological sequelae like seizures and coma. Hypoglycemic episodes which cause seizures can result in sudden death by inducing cardiac arrhythmias[27].

Hypoglycemia and Cerebral Ischemia:

It is established that during acute hypoglycemia, blood flow to certain parts of the brain is increased to enhance the supply of glucose to the most vulnerable areas of the brain[28]. It is an adaptive response of the brain to recurrent hypoglycemia, which can result in permanent changes in the regional blood flow in the brain. It may lead to the loss of auto-regulation of blood supply increasing the risk of localized cerebral ischemia occurring during hypoglycemic episodes. Transient ischemic attacks and hemiplegia are recognized morbidity of hypoglycemia mainly affecting the elderly population who have a coexisting cerebrovascular disease[29].

Hypoglycemia and neurological development:

MRI studies on youth with type 1 diabetes have found some effects of antecedent hypoglycemia on brain structure[30]. This finding is consistent with the idea that the developing brain may be more vulnerable to hypoglycemia insults. Any detrimental effect on the cognitive function and development depends on the age of the individual exposed at the time of the recurrent hypoglycemic insults. In a 16-year follow-up study, it was suggested that children who had type 1 Diabetes Mellitus and who were < 5 years and had experienced severe hypoglycemia episodes were found to have reduced cognition compared to children with Type 1 DM who had no early exposure to hypoglycemia[31]. Similarly, in another study, it was noted 106 children with type 1 diabetes (aged 6 – 17 years) and control children who had no diabetes, had no difference in cognitive function at baseline; after 12 years of follow-up children with type 1 diabetes had lower verbal and full-scale IQs than in the control group. It was noted that the lower verbal IQ was associated with frequency of hypoglycemia exposure[32]. It is also a fact that the brain appears to be resistant to the effects of recurrent hypoglycemia in the middle years of life, as established by the DCCT (Diabetes Control and Complications Trial), 20 year follow- up study. No difference in cognitive abilities between the intensive and standard treatment arms was found. The subjects in the intensive treatment arm did suffer from a higher frequency of hypoglycemic episodes but had no notable impact on their cognition[33]. However, the elderly may be more vulnerable to the effects of hypoglycemia. Hypoglycemic insults in patients with type 2 diabetes mellitus may have a detrimental effect on their cognition and can put them at risk of developing dementia. The relationship between hypoglycemia and cognitive decline is possibly bidirectional[34,35].

Measures to prevent hypoglycemia and its adverse effects on patients:

Patient education

There is clear evidence that educating patients about diabetes, its management and preventing its complications improves patient outcomes.[36] The educational programme enables patients, and their carers to recognize symptoms of hypoglycemia and provides them with the guidelines to treat it appropriately with oral carbohydrates or glucagon. It is also imperative that patients have a clear understanding of how their medications work so they can minimise the risk of hypoglycemic episodes. There is clear evidence that structured educational programs delivered in routine clinical settings reduced severe hypoglycemic rates, improved hypoglycemic awareness and reduced psychological distress[37].

Dietary intervention

Diabetic patients need to recognize foods containing carbohydrates and their effect on blood glucose. It should be a part of the patient education programme, which improves patient knowledge about various diets and their glycemic index. Patients who are on a long acting and fixed insulin must be encouraged to follow a predictable meal plan whereas patients on more flexible insulin regimens must be aware that prandial insulin injections need to be used at meal times. Patients on insulin or hypoglycemia-inducing medication should be encouraged to carry carbohydrates at all times to treat hypoglycemia.

Exercise management

Glucose utilization increases with physical activity. Prolonged strenuous exercise, recently increased exercise intensity and inadequate energy supply during exertional activity increases risk of hypoglycemia[38]. It is important that patients are advised to monitor their blood glucose levels before and after exercise. They must ensure that they consume enough calories beforehand to prevent hypoglycemia during exertional activities or exercise sessions. They must carry readily absorbable carbohydrates to correct hypoglycemia when embarking on any exertional activity, which is out of their norm. Similarly, on days when they plan to undertake a strenuous activity, they must readjust their insulin dose, especially those patients who had previous episodes of exercise-induced hypoglycemia.

Medication review:

Hypoglycemic episodes which are not related to factors like missed meals, exercise induced and alcohol intake may be due to excessive diabetic medication doses. It is important that patients who are on insulin or hypoglycemia-inducing medication should have regular monitoring and review of medication. Any vulnerable periods highlighted from their blood glucose monitoring should warrant prompt

medication dose adjustment to prevent hypoglycemic episodes. These adjustments may include changing types of insulin or reducing the dose of the medication. Recent advances in continuous subcutaneous insulin infusion offer great flexibility in dosing and preventing iatrogenic hypoglycemia. Recent advances in pancreatic islet cells transplantation, in future, can result in improvement in glycemic control and prevention of iatrogenic hypoglycemia[39].

Glucose monitoring:
It is important for patients who are at risk of hypoglycemia that they have vigorous glucose monitoring, as severe hypoglycemic episodes can lead to severe morbidity and can be fatal. Patients on insulin, sulfonylureas, or glinides must monitor their blood glucose whenever they experience symptoms of hypoglycemia. They must ingest carbohydrates to correct the hypoglycemia promptly and collect information that can be used by the clinician to adjust their medications to avoid future hypoglycemia. Patients having basal - bolus insulin therapy should monitor their blood glucose before each meal and calculate the dose of rapid-acting insulin accordingly. Such safe monitoring and dosing practices will likely reduce the risk of hypoglycemia.

Novel treatments:
Long-acting analogues of insulin have been developed which have shown some modest benefit in lowering the risk of nocturnal hypoglycemic events in insulin-treated patients[40]. Similarly, new classes of oral and injectable glucose-lowering drugs such as incretin mimetics (GLP – 1 receptor agonists and DPP-4 inhibitors) and the SGLT-2 inhibitors have demonstrated reduced frequency of severe hypoglycemia[41]. High risk of mortality and morbidity associated with hypoglycemia makes use of these medications a preference to sulphonylureas particularly in vulnerable groups such as the frail elderly. The current limitation of using these drugs is the cost implication, as these medications are more expensive than sulphonylureas and metformin. In future, therapies that would effectively manage diabetes without the risk of hypoglycemia will be preferred both by clinicians and patients.

Recent advances:
New tools and monitoring systems have been developed for real-time and continuous glucose monitoring. It provides helpful information to the patients resulting in measures to avoid hypoglycemia, e.g. suspending insulin delivery on a pump or taking a snack to improve calorie consumption. New continuous glucose monitors come with audible and vibratory alarms which can be particularly helpful in avoiding nocturnal hypoglycemia and improving hypoglycemic awareness. In a hyperinsulinemic hypoglycemic clamp study in type 1 diabetics with hypoglycemic unawareness, four weeks of real-time CGM use restored the epinephrine response and improved adrenergic symptoms[42]. Real-time continuous glucose monitoring (CGM) has demonstrated its benefits in preventing severe hypoglycemia in people with impaired hypoglycemic awareness[43]. Real-time CGM might ultimately be the way forward through which the risks of hypoglycemia can be substantially reduced.

The other way forward is addressing the method of insulin delivery. Continuous subcutaneous insulin delivery systems lessen the risk of severe hypoglycemia in children and adults with type 1 diabetes[44]. A meta-analysis concluded, the risk of hypoglycemia with type 1 diabetes was much lower while using continuous subcutaneous insulin infusion than using multiple daily injections with the greatest benefit to the patients with the most severe hypoglycemia while on multiple daily injections[45].

Recently, work has been underway on the artificial pancreas, which connects continuous glucose monitoring to an insulin pump through sophisticated predictive algorithms. When it comes to use, it will eliminate hypoglycemic episodes. Several internationally collaborative groups are working on this project. The first step in this direction is the development of low-glucose suspend pump. This device shuts off insulin delivery for up to 2 hours once the interstitial glucose concentration reaches a preset threshold; it will be a great asset in preventing mortality and morbidity from nocturnal hypoglycemia once it comes into full use[46]. A study using sensor- segmented insulin- pump therapy with the threshold – suspend feature, showed the reduction in nocturnal hypoglycemia, without any increase in glycated haemoglobin value[47].

Conclusion

Adequate education of patients and their relatives can help in reduction of the risk of severe hypoglycemic episodes. Patients may not understand straightforward and fundamental information about recognizing and management of hypoglycemia. Even if the information is provided, it can easily be neglected and at times, its grave consequences are ignored. Clinicians need to remain alert to the potential risks of hypoglycemia in individual patients and should robustly review patients who are on high-risk therapies.

Formal patient training programmes have clearly shown benefit in reducing the risk of hypoglycemic episodes. It has shown better management of severe, life-threatening hypoglycemic events by patients and their relatives. In our day to day practice, the resources and time required to provide such intensive training and standard educational measures about dietary modification, practical advice about physical exercise, emphasis on careful glucose monitoring and appropriate adjustment of medications are still far from the desired standards. More specific therapeutic strategies are required based on individual patient needs, especially for those patients who have developed impaired awareness of hypoglycemia. In these patients frequent or continuous blood glucose testing is essential and permanent sub-cutaneous insulin infusion can be of great value.

Hypoglycemia because of its effects on the cardiovascular system and the brain can lead to severe morbidity and mortality. Glycemic targets need to be adjusted on the individual patient basis. They need to be safe and have to be less strict in high-risk groups such as patients with coronary heart disease, very young children and the frail elderly.

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Extracorporeal shock wave lithotripsy and ureterorenoscopy procedures of ureteric stone disease in patients with a solitary kidney in Aden

Ali Ahmed Salem Hatroom

Correspondence:
Ali Ahmed Salem Hatroom
Assistant Professor of Urology,
Department of Special Surgery,
Faculty of Medicine, University of Aden,
Yemen
Email: alihatroom777@gmail.com

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Abstract

Objective: To investigate and compare the treatment success of ESWL and URS for the treatment of ureteral stones.

Materials and method: We retrospectively identified patients with solitary kidney who complained of ureteric stones, treated with ESWL or URS in Aden, between 2011 and 2014.

The collected parameters were: age, sex, stone size, and stone location.

Results: The total study patients were 90. They were 64 (71.1%) males and 26 (28.9%) females with male to female ratio 2.5:1.

Their age ranged from 17 to 58 years and the mean age was 36.9±11.7 years.

The age group 41 – 50 years represents the highest percentage of patients 31 (34.5%).

Most patients 68 (75.6%) were aged between 21 – 50 years.

The symptoms were anuria + nausea + vomiting in 80 (88.9%) patients and 10 (11.1%) complaining of dysuria frequency and haematuria. The mean duration from starting symptoms was 2 ± 0.8 days. The most common side location was lower ureter 44(48.9%).

The treatment procedure URS + DJ (double j – ureteric stent) fixation was predominant with 70 (77.8%) while the treatment procedure DJ + ESWL was done for 20 (22.2%) patients. There was a significant association between patients' age groups and sex (p-value = 0.001).

The frequency of ureteric stones was significantly higher among males in the age group 41-50 years 26 (28.9%) while in females the frequency was significantly higher in age group 31-40 years 11 (12.2%). Also, there was a high statistically significant difference between the two groups of treatment procedures related to sex (p = 0.000). In the ESWL group, females were more than males 13(14.4%). In the URS group, males were predominant with 57(63.3%) (p = 0.001).

Success and stone free rate after ESWL was 85%, while in the URS group it was successful in all patients - stone-free 100% (p < 0.05).

Conclusion: URS seems to be more successful in the treatment of ureteral stones; further prospective studies with more patients are needed to clarify our results.

Key words: ESWL, URS, ureteral stones, treatment success

Introduction

The surgical management of ureteric stones has changed over the past few decades because of advances in instruments and techniques (1).

Extracorporeal shock wave lithotripsy (ESWL) and ureteroscopy, with or without intracorporeal lithotripsy, are the most common interventions used to treat ureteral stones. ESWL treatment is less invasive than ureteroscopy, but has some limitations such as a high retreatment rate, and is not available in all centres (2).

Ureteroscopy and extracorporeal lithotripsy have become a highly effective, minimally invasive treatment for ureteric calculi (2). The routine placement of ureteric stents after fragmentation and retrieval of ureteroscopic stones is questionable. The main advantages of stenting are the prevention of ureteric obstruction and renal pain that may develop as a result of ureteric oedema from balloon dilation or stone manipulation during ureteroscopy. Ureteric stents may aid in the passage of residual stone fragments secondary to the passive ureteric dilation that occurs with an indwelling ureteric stent and may prevent or delayed the formation of the ureteric stricture (3,4). However, stent placement is associated with considerable morbidity as stent-related complications are reported in 10-85% of cases. Related complications such as migration, infection, pyelonephritis, breakage, encrustation, and stone formation are not uncommon (5). Placement of ureteric stents also results in additional costs. Furthermore, unless a pull string is routinely used at the distal end of the stent; secondary cystoscopy is required to remove the stent, which has cost implications and the potential to add to the disruption of patients' lives.

Patients with a functionally or anatomically solitary kidney require carefully planned surgery in order to optimize the chance for recovery after one effective surgical procedure, and minimize the risk of complications (6).

Objective

To investigate and compare the treatment success of ESWL and URS in patients for the treatment of ureteral stones

Materials and Method

We retrospectively identified patients with ureteric stones treated with ESWL or URS at Urology unit, Surgical Department, Saber Hospital and Al-Saeedi Hospital in Aden, between 2011 and 2014. Patients with solitary kidney and who complained of ureteric stones and a stone diameter of 5–20mm were included.

Pretreatment stone size and location were generally assessed by ultrasonography (US) and radiological examination [X-ray and or non-contrast computed tomography (CT) of the abdomen]. The following preoperative parameters for each patient were noted: age, sex, stone size, and stone location (upper ureter, middle ureter, lower ureter).

Success rate after intervention was assessed by patient being stone-free. As a primary endpoint, we assessed stone-free rates for each treatment method during follow-up using X-ray, US or CT.

The data was entered into a computer and analyzed using SPSS version 17, statistical package. For variables difference, chi-square tests, and P values were calculated, with differences at the 5% level being regarded as significant.

Results

During the four year study period, 90 patients with solitary kidney and who had ureteric stones were seen in our private health center.

There were 64 (71.1%) males and 26 (28.9%) females with ratio male to female 2.5:1 (Figure 1, and Table 1).

Table 1 also reveals the age of patients ranged from 17 to 58 years. The mean age of the patients is 36.9±11.7 years. The age group 41 – 50 years represents the highest percentage of patients 31(34.5%) and the lowest percentage is the age group ≤ 20 years with 10 (11.1%). Most of our study patients 68 (75.6%) were aged between 21 – 50 years while patients aged ≤ 20 years and > 50 years were only 22 (24.4%). It also shows the symptoms, which were Anuria + Nausea + Vomiting in 80 (88.9%) patients and 10 (11.1%) complaining of dysuria frequency and heamaturia; also, the mean duration from starting symptoms was 2 ± 0.8 days.

The most common side location of ureteric stones was lower ureter 44 (48.9%) followed by middle ureter 28(31.1%) and upper ureter 18 (20.0%).

Table 1 also shows the distribution of treatment procedures for patients in which ureteroscopic laser lithotripsy (URS) + DJ (double j – ureteric stent) fixation procedure was predominant with 70 (77.8%) while the treatment procedure DJ + Extracorporeal Shock Wave Lithotripsy (ESWL) after 2 weeks was done for 20 (22.2%) patients.

Using Chi square test it was found that there was significant association between patients' age groups and sex in the occurrence of ureteric stones (p-value = 0.001).

The frequency of ureteric stones was significantly higher among males in age group 41-50 years 26 (28.9%). The frequency of ureteric stones was significantly higher among females in age group 31-40 years 11 (12.2%) as shown in Table 2.

By comparing the two treatment procedures in managing the ureteric stones in patients with solitary kidney as shown in Table 3, there was a highly statistical significant difference between the two groups of treatment procedures related to sex (p = 0.000).

In the treatment group ESWL females were more than males 13(14.4%) while males were 7 (7.8%). In the treatment group URS males were predominant with 57 (63.3%).

Most patients treated with ESWL 13(14.4%) were aged between 21 – 50 years.

There was also a statistically significant difference between groups of treatment procedures (ESWL & URS) regarding age groups (p = 0.001).

Success and stone free rate after ESWL was 85%, while in the URS treatment group it was successful in all patients who all become stone-free (100%).

There was a statistical significance between the two treatment groups (Table 3).

Figure 1: Distribution of patients related to sex

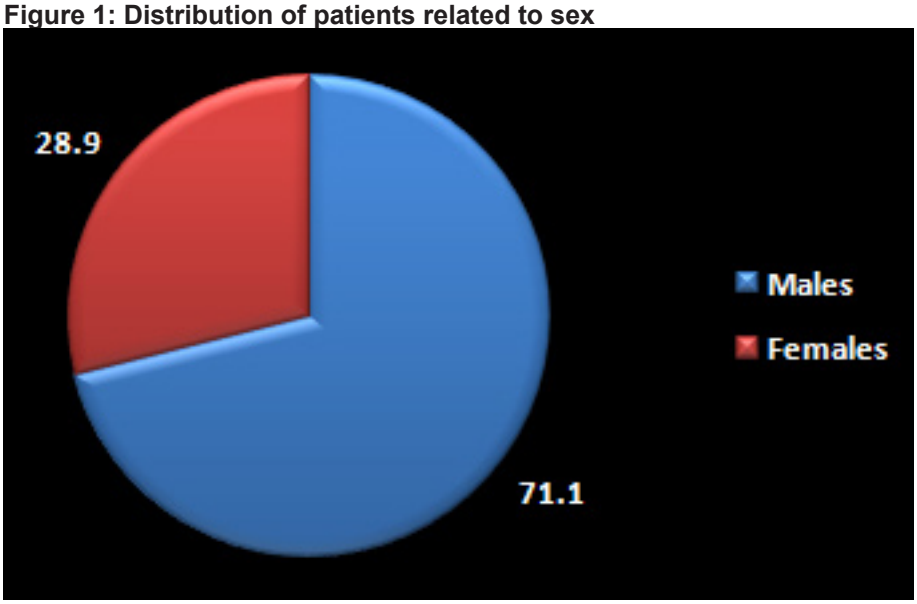

Table 1: Demographic, clinical characteristics and treatment procedures of the parents (no=90)

Variables	No	%
Sex:		
Males	64	71.1
Females	26	28.9
Range of age & mean age (years):	17 to 58; 36.9±11.7	
Age (years):		
≤ 20	10	11.1
21-30	20	22.2
31-40	17	18.9
41-50	31	34.5
> 50	12	13.3
Symptoms:		
Anuria+Nausea+Vomiting	80	88.9
Dysuria frequency haematuria	10	11.1
Duration from starting symptoms: Mean (days)	2 ±0.8	
Location of stones:		
Lower Ureter	44	48.9
Middle Ureter	28	31.1
Upper Ureter	18	20.0
Range of stone size and mean size:	>5-<20 mm; 10.5±4.6 mm	
Treatment procedure:		
DJ + ESWL After 2 week	20	22.2
URS+DJ fixation	70	77.8

Table 2: Association between frequency of ureteric stones and age groups and sex among study patients

Age	Males		Females		Total	
	No	(%)	No	(%)	No	(%)
≤ 20	8	(8.9)	2	(2.2)	10	(11.1)
21-30	12	(13.3)	8	(8.9)	20	(22.2)
31-40	6	(6.7)	11	(12.2)	17	(18.9)
41-50	26	(28.9)	5	(5.6)	31	(34.5)
> 50	12	(13.3)	0	(0.0)	12	(13.3)
Total	64	(71.1)	26	(28.9)	90	(100)

Chi-square: 19.534 ; p-value: 0.001

Table 3: Relation between sex, age groups, and success with treatment procedures groups (ESWL and URS groups).

Variables	ESWL		URS		p-value
	No	(%)	No	(%)	
Sex:					
Males	7	(7.8)	57	(63.3)	P = 0.000
Females	13	(14.4)	13	(14.4)	
Age groups:					
≤ 20	4	(4.4)	6	(6.7)	P = 0.001
21-30	3	(3.3)	17	(18.9)	
31-40	9	(10.0)	8	(8.9)	
41-50	1	(1.1)	30	(33.3)	
> 50	3	(3.3)	9	(10.0)	
Success	17	(85)	70	(100)	
Failure	3	(15)	0	(0.0)	P = 0.001

Discussion

Urinary stones are the third most common affliction of the urinary tract, exceeded only by urinary tract infections and pathologic conditions of the prostate. Stone disease has been a major problem afflicting the human population ever since antiquity. The disease is both very common among men and women with estimated prevalence among the population of 2–3% and an estimated lifetime risk of 12% for white males (7) and 5–6% for white females (8). The increased incidence of urinary stones in the industrialized world is associated with improved standards of living (mainly including the high dietary intake of proteins and minerals) as well as with race, ethnicity and region of residence (9).

In our study the number of treated males 64 (71.1%) was usually higher than females 26 (28.9), with a ratio male to female 2.5:1.

The reported prevalence rate of stone disease is 5%-12% in men, 4%-7% in women (10). Stone formation is affected by gender, age and geography. Men's possibility of forming stones is more than women's. However, the ratio has decreased from a 3:1-male to female predominance to less than 1.3:1 (11).

Published literature reports that men have been shown to have higher prevalence rates of stone disease 10.6–12% than women 4.8–7.1% (12,13).

In developing countries the male-to-female ratio ranges from 1.15:1 in Iran (14) and 1.6:1 in Thailand (15) to 2.5:1 in Iraq (16) and 5:1 in Saudi Arabia (17).

Literature on ureteral stone disease has documented that males are at greatest risk of developing urolithiasis (18). The incidence rate among men is two times higher and the prevalence rate about four times higher among men compared to women (18).

The present study revealed that the age of patients ranged from 17 to 58 years. The mean age of the patients is 36.9±11.7 years. Most of our study patients 68 (75.6%) were aged between 21 – 50 years while patients aged ≤ 20 years and > 50 years were only 22(24.4%).

Hesse et al (19) reported that people aged ≥65 years are 2.5 times more likely to have stone disease than 35–49 years olds.

Hughes (20) reported that ages between 20 and 30 years have increased incidence of ureteric stones and the incidence is relatively constant above 30 years until the age of 70 years.

In our study we found that 80 (88.9%) of patients complained of anuria + nausea + vomiting and 10 (11.1%) complained of dysuria frequency and haematuria; also, the mean duration from starting symptoms was 2 ± 0.8 days.

Sreedharan et al (21) reported that in the clinical presentation of these patients, most of the patients (95.1%) reported with ureteric colic pain. The mean duration of pain was 4.1 days with a standard deviation of 3.4 days (range minimum one day to 30 days).

In the current study we found that the treatment procedure ureteroscopy lithotripsy (URS) + DJ fixation was predominant with 70 (77.8%) while the treatment procedure DJ + Extracorporeal Shock Wave Lithotripsy (ESWL) was 20 (22.2%).

Depending on stone size and position, most ureteric stones are managed expectantly, with ESWL, or by ureteroscopic extraction and disintgration (URS).

Most ureteric stones of size 5 mm or less will pass, and the relatively uncommon ureteric calculus of 20 mm or greater is best managed by ureteroscopy, percutaneous or laparoscopic means. For those ureteric calculi of dimensions that lie between 5 mm and 20 mm the treatment alternatives are ESWL or URS (22).

In the present study there was a high statistically significant difference between the two groups of treatment procedures ESWL and URS related to sex (p = 0.000).

In the treatment group of ESWL, females were more than males 13 (14.4%) while males were 7 (7.8%). In the treatment group of URS, males were predominant with 57 (63.3%).

Also, there was a statistically significant difference between groups of treatment procedures ESWL and URS regarding age groups (p = 0.001).

Success and stone free rate after ESWL was 85%, while in the URS group was 100%.

There was a statistical significance between the two treatment groups.

Miller et al (23) mentioned that some early studies reported success and stone free rate after ESWL in up to 90%.

Mobley et al (24) mentioned that in a remarkable study from the United States, 18,825 patients were treated with one to three sessions of ESWL for ureteral stones of variable location and size. All patients were treated within a 6 year follow up period (1988–1993) and the mean stone free rate was 83.8%.

Iqbal et al (25) mentioned that the success rate (stone free rate) of URS has been around 80% in the proximal ureter.

It is seen in literature that URS has a higher stone-free rate for stones smaller than or equal to 10 mm in the distal ureter and stones larger than 10 mm in the proximal ureter (26). It is pertinent here that besides the influence of stone size and position, the efficiency of the URS procedure depends on the experience and skill of the operating urologist as well (27). In another study stone- free rate after URS was 86.7% (28).

Conclusion

We concluded that in comparison with ESWL, URS methods can be preferred due to their successful rates (stone free rates) and lower complication rates in ureteral stones. However more prospective studies with a higher number of patients will help to reach more clear conclusions.

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Symptomatic Knee Osteoarthritis and Dyslipidemia. A study from Kurdistan of Iraq

Asso Amin (1)
Raof Merza (1)
Mohammed J. Baban (2)
Hawar Khan (2)
Khalid A. Hama-ghareeb (1)
Mohammed IM Gubari (1)
Soran Noori (3)
Saman Sadeq (3)
Alan Saeed (4)

(1) Department of Medicine, College of Medicine, Ministry of Higher Education, Kurdistan Regional Government, Iraq.
(2) Department of Rheumatology, Sulaimany General Medical Teaching Hospital, Sulaimany, Iraq.
(3) Department of Orthopedic, Sulaimany Surgical Teaching Hospital, Sulaimany, Iraq.
(4) Department of Family Physician, PHCC-Qatar, Doha, Qatar.

Correspondence:
Dr Asso Amin,
Department of Medicine, College of Medicine,
Ministry of Higher Education, Kurdistan Regional Government,
Iraq.
Email: delanamin@hotmail.com

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Abstract

Background: As a complex multifactorial condition, knee osteoarthritis has been considered as a leading cause of disabilities. Dyslipidemia is a metabolic component that can probably play a role in knee osteoarthritis development and comorbidities; however, this relationship is still debated. The present study was carried out in order to figure out the prevalence of dyslipidemia among knee osteoarthritis patients and to compare their abnormal serum lipid components with non-exposed individuals.

Patients and methods: A total of 60 patients with knee osteoarthritis and 60 non-exposed (without knee osteoarthritis) individuals were studied in a prospective cohort study that was conducted from March 2018 to May 2019. The patients were chosen from those who referred to the Rheumatology Division in Sulaymaniyah, the Kurdistan Region of Iraq. EULAR and ACR diagnostic and classification criteria and radiographic confirmation for definite osteophyte were utilized to diagnose the primary knee osteoarthritis. Required data were collected using a questionnaire, taking blood samples and by conducting several laboratory tests.

Results: The mean age of the patients with knee osteoarthritis was 51.8 years. Female-to-male ratio was 2.1:1. It was seen that dyslipidemia increased two folds among patients with knee osteoarthritis than the non-exposed subjects. Patients and non-exposed subjects were significantly different in terms of dyslipidemia prevalence ($p<0.013$). Furthermore, all the lipid components were significantly abnormal in those with knee osteoarthritis.

Conclusion: Dyslipidemia is prevalent among knee osteoarthritis patients, and there is a significant association between knee osteoarthritis and high-density lipoprotein, total cholesterol, low-density lipoprotein, and triglyceride. Dyslipidemia prevention may reduce the development of knee osteoarthritis and cardiovascular comorbidities.

Key words: knee osteoarthritis, dyslipidemia, serum lipid components, radiography

Introduction

As the most common chronic, heterogeneous, and debilitating arthritic disorder, osteoarthritis (OA) mainly impacts diarthrodial joints [1-5]. Quality of life can be negatively affected by osteoarthritis, which in turn raises the healthcare and social costs [6]. The prevalence of OA ranges from 3.8-70% depending on different regions of the world [7], and it has been reported to affect 1 million people in Iraq, Yemen, Saudi Arabia, and Syria [8]. In addition, it has been indicated that OA was more prevalent among men than women. However, studies demonstrated that beyond 50 women are more likely to have OA than same age men [9].

The most common type of OA is knee osteoarthritis (KOA) [10]. The prevalence of KOA has been reported to be 12% in those over the age of 55 years [11].

OA is associated with pain and functional limitations [12] and is typically believed to be the result of obesity and aging [13]. In addition to age and obesity, metabolic syndrome (MetS) has been referred to as a major risk factor for OA development [14]. Association between OA and MetS is referred to as metabolic OA, indicating the association between OA and obesity, dyslipidemia, and hypertension [15].

Due to the high prevalence of knee osteoarthritis (KOA) particularly in the middle-aged individuals, the debilitating effect of osteoarthritis and consequently has a negative impact on quality of life. Moreover, due to the reported association between OA and dyslipidemia, the present investigation was carried out in order to study the prevalence of dyslipidemia among individuals with symptomatic KOA.

Materials and Methods

Study design and sample: The present investigation was a prospective cohort study which was carried out in the Rheumatology Division in Sulaymaniyah, Iraqi Kurdistan from March 2018 to May 2019. For this purpose, 60 patients with symptomatic KOA (41 females and 19 males) were chosen as the exposed for the study. Following both ACR classification of OA of the knee [27] and EULAR evidence-based recommendations for the diagnosis of knee osteoarthritis [28], 60 non-exposed (no symptomatic KOA) with the same age range were selected in order to be compared to the exposed.

Selection of the target sample was based on some inclusion and exclusion criteria. The inclusion criteria involved patient consent, age, duration of knee pain not exceeding 2 years, presence of definite osteophyte in at least one joint, and normal body mass index (BMI). Patients with possible secondary causes of dyslipidemia were excluded.

Data collection: The exposed and non-exposed individuals randomly visited the Rheumatology Division, and the required data were collected by conducting face-to-face interviews using a researcher-designed questionnaire.

Statistical analysis: In order to analyze the collected data, Statistical Package for Social Sciences version 25 was used. The descriptive results were expressed as mean ± standard deviation (SD). Normality of the data was verified using Kolmogorov Smirnov test. The categorical variables were analyzed through Chi-square test, and Fisher's exact test was used when more than 20% of the cells were less than five. Pearson's and Spearman's tests were used for the correlation between the variables. Level of significance probability value (p-value) was set at ≤0.05.

Results

A total of 60 patients with KOA were studied. Analyzing the collected data revealed that their mean age was 51.8 (±3.745) years. Regarding their sex, there were 41 (68.3%) females and 19 (31.7%) males, and the female-to-male ratio was 2.1:1 (See Table 1).

The results obtained from analyzing the data collected from the 60 non-exposed subjects indicated that their mean age was 50.95 (±5.077) years. In terms of their sex distribution, 41 (68.3%) females and 19 (31.7%) males were in the control group, with a female-to-male ratio of 2.1:1.

The study demonstrated that 34 cases (56.7%) had bilateral KOA and 26 (43.3%) unilateral KOA. Out of the unilateral cases, 14 had right-side while 12 had left-side KOA, respectively (See Table 2).

The results showed that KOA pain duration ranged from 3 to 18 months, with 47 cases (78.3%) having a disease span of less than 12 months, and 13 (21.7%) more than 12 months (See Figure 1).

Comparing the cases and controls through t-test, revealed that levels of serum lipid had a significant increase in the KOA patients compared to the controls. There was a significant difference between the two groups in terms of all lipid variables including high-density lipoprotein (HDL) at a p-value of 0.001, total cholesterol (TC) at a p-value of 0.001, low-density lipoprotein (LDL) at a p-value of 0.019, and triglyceride (TG) at a p-value of 0.002 (See Table 3).

According to the results obtained from the Chi-square test, the cases had significantly higher levels of abnormal TC, TG, LDL, and HDL compared to the control. Based on these results, it was concluded that KOA had a significant relationship with elevated level of TC (p-value=0.024), TG (p-value=0.016), LDL (p-value=0.018), and HDL (p-value=0.032) (See Table 4).

Compared to the 15 controls (12.5%), 28 cases with KOA (23.3%) had different types of dyslipidemia, and this difference was significant, showing a significant relationship between KOA and dyslipidemia at a p-value of 0.013 (See Figure 2).

Table 1. Demographic characteristics of KOA cases

Variable	Frequency (N)	Percentage (%)
Sex		
Male	19	31.7
Female	41	68.3
Total	60	100.0
Age mean ± SD (51.8 ± 3.745)		
42-44 years	7	11.7
45-49 years	16	26.7
50-54 years	19	31.7
55-59 years	18	30.0
Total	60	100.0

Table 2. Type and site of KOA pattern distribution

Knee involvement pattern	Frequency (N)	Percentage (%)
Bilateral	34	56.7
Unilateral	26	43.3
Right	14	23.3
Left	12	20.0
Total	60	100.0

Figure 1: Duration of KOA pain (months)

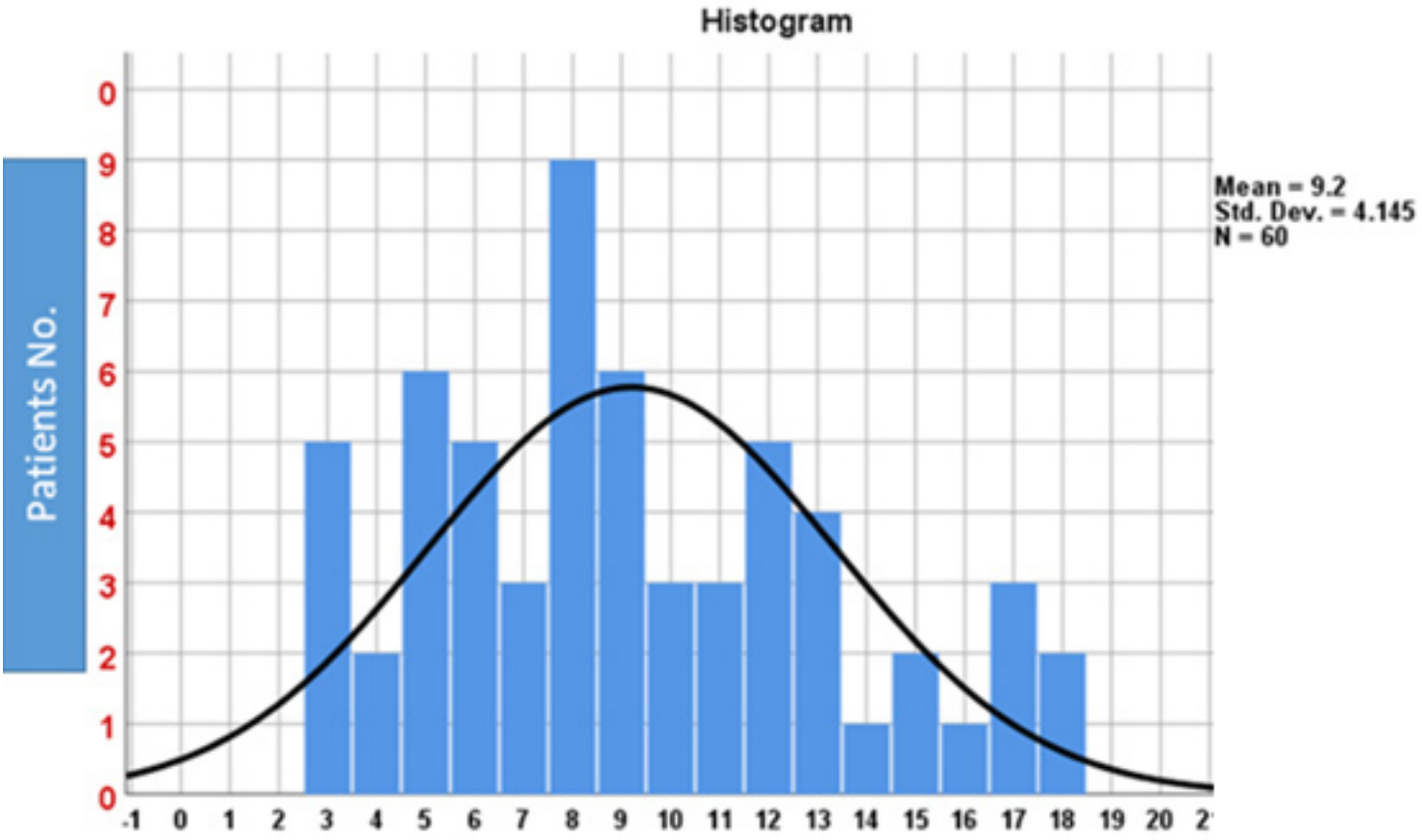

Table 3. Analyzing and comparing means with Independent sample T-test

Lipid variable	Type	Mean	SD	P-Value
TC	KOA exposed	189.70	40.305	0.001
	Non-exposed	168.18	28.759	
TG	KOA exposed	166.40	104.694	0.002
	Non-exposed	120.43	40.820	
LDL	KOA exposed	121.47	26.347	0.019
	Non-exposed	110.23	25.550	
HDL	KOA exposed	45.85	9.293	0.001
	Non-exposed	51.18	7.405	

P- Value {Sig (2-Tailed)}is significant whenever it is less than or equal to .05

Table 4. Significant ratio of normal and abnormal percentage and distribution of lipids among exposed and non-exposed

Lipid type	Value	KOA cases	Non-exposed	Odds Ratio	95% confidence interval	Σ^2	P-value
TC	Abnormal	14 (23.3%)	5 (8.3%)	3.3	1.1 - 9.9	5.065[a]	0.024
	Normal	46 (76.7%)	55 (91.7%)				
TG	Abnormal	19 (31.7%)	8 (13.3%)	3.01	1.1 - 7.5	5.783[a]	0.016
	Normal	41 (68.3%)	52 86.7%)				
LDL	Abnormal	13 (21.7%)	4 (6.7%)	3.8	1.1 - 12.6	5.551[a]	0.018
	Normal	47 (78.3%)	56 (93.3%)				
HDL	Abnormal	20 (33.3%)	9 (15.0%)	2.8	1.1 - 6.8	5.502[a]	0.032
	Normal	40 (66.7%)	51 (85.0%)				

Figure 2: Dyslipidemia among KOA exposed and non-exposed

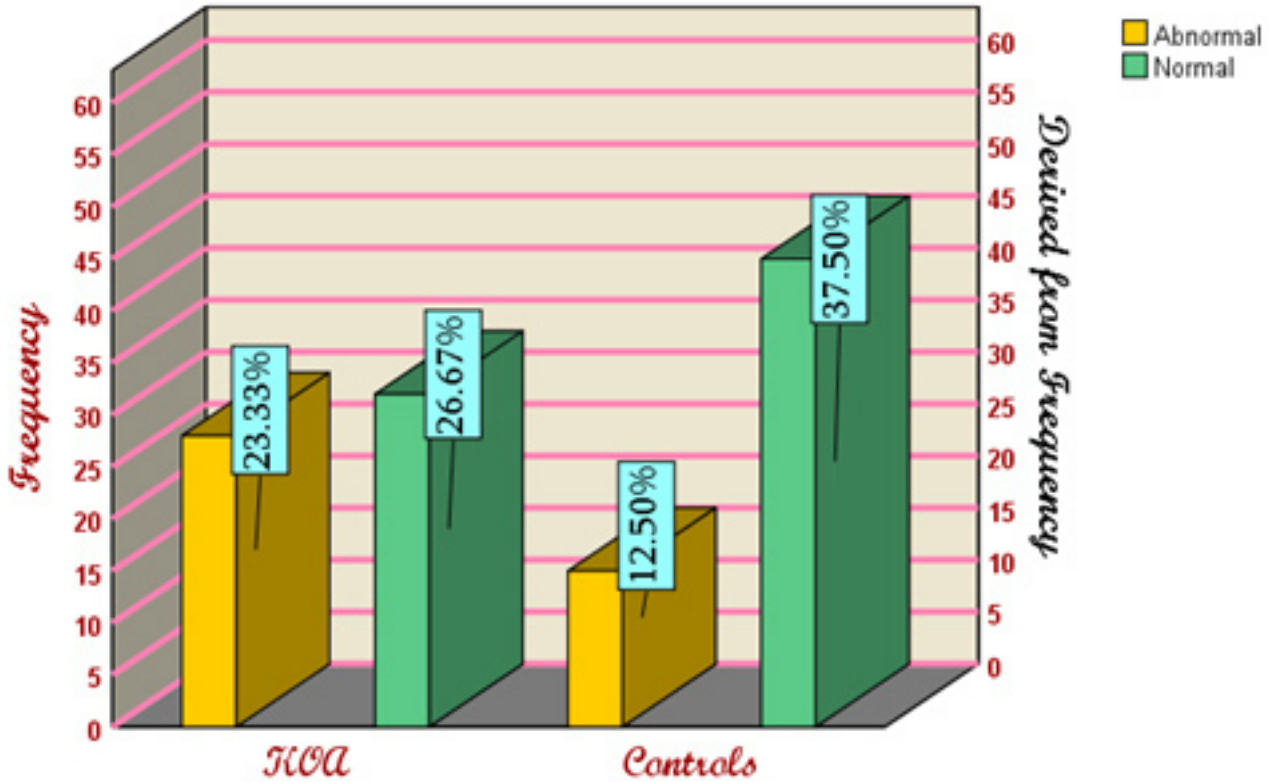

Table 5. Correlation of dyslipidemia with gender and age

Lipid	Gender		P-value	Age		P-value
	Male	Female		4th decade	5th decade	
Normal	10 (16.7%)	22 (36.7%)	0.580	15 (25.0%)	14 (36.8%)	0.151
Abnormal	9 (15%)	19 (31.7%)		8 (13.3%)	13 (34.2%)	
TOTAL	19 (31.7%)	41 (68.3%)		23 (38.3%)	27 (71%)	

Table 6. Correlation of dyslipidemia with duration and joint pattern

Lipid	Duration/months		P-value	KOA joint pattern		P-value
	3-9/m	10-18/m		Bilateral	Unilateral	
Normal	27 (45.0%)	5 (8.3%)	<0.0001	12(20%)	20(33.3%)	0.001
Abnormal	9 (15.0%)	19 (31.7%)		22(36.7%)	6(10.0%)	
TOTAL	36 (60.0%)	24 (40.0%)		34(56.7%)	26(43.3%)	

Table 7. Correlation between joint pain pattern with duration of pain

Duration	Pattern		P-value
	Unilateral KOA	Bilateral KOA	
3-9 months	21 (35.0%)	15 (25.0%)	0.004
10-18 months	5 (8.3%)	19 (31.7%)	
TOTAL	26 (43.3%)	34 (56.7%)	

The results revealed that there was no statistically significant association between sex and age in patients with KAA in terms of dyslipidemia (See Table 5).

The study revealed, that there was a significant relationship between dyslipidemia and pain duration in KOA patients ($p<0.0001$). Dyslipidemia was more common among patients with knee pain of more than 10 months. Also, dyslipidemia was significantly correlated with bilateral knee joint involvement at a p-value of 0.001 (See Table 6).

Finally, there was a significant connection between pain duration of either ≤ 9 or ≥ 10 months and the site of knee joint involvement ($p=0.004$). The study revealed that bilateral involvement was more prevalent in patients with knee pain duration of ≥ 10 months (See Table 7).

Discussion

Knee osteoarthritis (KOA) has been defined by the European League against Rheumatism as a condition in which the patients experience functional limitation and/or usage-related pain in their knee(s).[17].Studies has shown that KOA is quite common among middle-aged adults particularly those who are over the age of 55 [11]. In line with this report, the results of the present analysis revealed that the patients' mean age was 51.8 years, with most patients (61.7%) belonging to the age groups 50-54 and 55-59 years. Similarly, Silverwood et al. (2015) reported age of over 50 years to be a risk factor for knee pain/OA [18].

Furthermore, the current results highlighted that most of the patients with KOA (68.3%) were females. In the same way, results from a study carried out by Corti and Rigon (2003) pointed out that women are more likely to develop KOA [9]. According to the current study, more than half of the KOA cases (56.7%) were bilateral, compared to 43.3% unilateral. Similarly, Fathi (2018) studied unilateral versus bilateral primary knee osteoarthritis in Egyptian patients and reported that 65% of the patients had bilateral KOA and 35% unilateral [19].

Comparing patients with KOA and the non-exposed subjects in terms of their serum lipid variables (i.e. high-density lipoprotein, total cholesterol, low-density lipoprotein, and triglyceride) they were significantly higher in the KOA patients ($p<0.05$). Likewise, Garcia-Gil et al. (2017) who studied serum lipid levels and risk of hand osteoarthritis (HOA) concluded that the patients with HOA had a significantly higher level of total cholesterol (TC) and triglyceride (TG), but not high-density lipoprotein (HDL) and low-density lipoprotein (LDL) [20].

The analysis of this study revealed that abnormal lipid levels, were significantly higher in the cases than the controls, leading to the conclusion that KOA is significantly correlated with increased levels of TC, TG, LDL, and HDL ($p<0.05$). Correspondingly, Gandhi et al. (2010) noticed a significant relationship between etiopathogenesis of osteoarthritis and hyperlipidemia [21], highlighting the significance of keeping lipid levels within the normal limit. In the same way, Velasques et al. (2010) demonstrated that OA initiation and progression are significantly affected by various interrelated

lipids, metabolic and humoral mediators; therefore, they reported a strong relationship between OA and metabolic factors including dyslipidemia [22].

This study unveiled that dyslipidemia prevalence was found in 23.3% of the KOA patients. This finding agrees with the outcome of a meta-analysis carried out by Baudart et al. (2017) who reported that 30% of the studied KOA patients had dyslipidemia [23]. Moreover, Farnaghi (2014) reported an association between high serum TC and OA. In justifying this association, it was stated that mitochondrial DNA oxidative damage is caused by, and cell dysfunction happens as, a result of high cholesterol-challenged articular cartilage, leading to further apoptosis and overproduction of reactive oxygen species, which in turn leads to development of abnormalities similar to characteristic features associated with OA [24].

Moreover, our study has revealed that serum lipid levels, and KOA duration were significantly correlated ($p<0.0001$). This finding was not established in any previous research. Additionally, we found a significant relationship between bilateral knee involvement and dyslipidemia with p-value of 0.001. Similarly, Irshad et al (2014) and Al-arfaj (2003) reported a significant relationship between hypercholesterolemia and involvement of both right and left joints in KOA patients [40, 43].

Conclusion

Knee osteoarthritis was found to be more prevalent among middle-aged patients and women. Compared to non-exposed individuals, patients with KOA have a higher mean level of serum lipids including total cholesterol, triglyceride, low-density lipoprotein, and high-density lipoprotein. Dyslipidemia is two-fold higher in patients with knee osteoarthritis than non-exposed individuals. Development and progression of KOA might be restricted and controlled by preventing and controlling dyslipidemia.

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Smoking-induced endothelial damage may increase plasma triglycerides

Mehmet Rami Helvaci (1)
Abdulrazak Abyad (2)
Lesley Pocock (3)

(1) Specialist of Internal Medicine, MD
(2) Middle-East Academy for Medicine of Aging, MD
(3) medi+WORLD International

Corresponding author:
Dr Mehmet Rami Helvaci,
07400, Alanya,
Turkey
Phone: 00-90-506-4708759
Email: mramihelvaci@hotmail.com

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Abstract

Background: Smoking-induced endothelial damage may increase plasma triglycerides.

Methods: Patients with plasma triglycerides values lower than 60 mg/dL were collected into the first, lower than 100 mg/dL into the second, lower than 150 mg/dL into the third, lower than 200 mg/dL into the fourth, and 200 mg/dL and higher into the fifth groups.

Results: The study included 669 cases (393 females), totally. Mean age increased just up to triglycerides value of 200 mg/dL, and there was an increase of triglycerides about 8.1 mg/dL for each year of aging up to this value. Male ratio increased parallel to the increased triglycerides, gradually (32.3% versus 50.0%, p<0.001). Body mass index (BMI) increased just up to plasma triglycerides of 150 mg/dL. Fasting plasma glucose, hypertension, diabetes mellitus, and chronic obstructive pulmonary disease increased parallel to the increased triglycerides, gradually. Whereas low density lipoproteins and white coat hypertension increased just up to plasma triglycerides of 200 mg/dL. Prevalence of smoking increased parallel to the increased triglycerides, gradually (16.9% versus 39.1%, p<0.001). Interestingly, the most significant increase of smoking was seen after the triglycerides value of 200 mg/dL, and there was no significant effect of aging or excess weight on these patients.

Conclusions: Plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between the plasma triglycerides and aging, BMI, and smoking, but smoking may be particularly important for plasma triglycerides values of 200 mg/dL and greater.

Key words: Smoking, triglycerides, acute phase reactant, chronic endothelial damage, accelerated atherosclerosis

Introduction

Chronic endothelial damage may be the most common kind of vasculitis, and the leading cause of aging and death in human beings (1-4). Much higher blood pressure (BP) of the afferent vasculature may be the major underlying cause by inducing recurrent injuries on endothelium, and probably whole afferent vasculature including capillaries are mainly involved in the process. Therefore the term of venosclerosis is not as famous as atherosclerosis in the literature. Secondary to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic nature and reduce blood supply to terminal organs and increase systolic BP further. Some of the well-known components of the inflammatory process are physical inactivity, animal-rich diet, overweight, smoking, alcohol, hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, impaired fasting glucose, impaired glucose tolerance, white coat hypertension (WCH), and chronic inflammatory processes including rheumatologic disorders, chronic infections, and cancers. Some of the irreversible consequences of the chronic inflammatory process include obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, peripheric artery disease (PAD), chronic obstructive pulmonary disease (COPD), chronic renal disease (CRD), coronary heart disease (CHD), mesenteric ischemia, osteoporosis, and stroke (5-9). Although early withdrawal of the causative factors may delay terminal consequences, after development of cirrhosis, COPD, CRD, CHD, PAD, or stroke, endothelial changes cannot be reversed completely due to their fibrotic nature. The underlying causes and terminal consequences were researched under the titles of metabolic syndrome, aging syndrome, or accelerated endothelial damage syndrome in the medical literature, extensively (10-13). Although its normal limits have not been determined clearly yet, higher plasma triglycerides may be significant indicators of the metabolic syndrome (14). Due to the strong association between higher plasma triglycerides and prevalence of CHD, the Adult Treatment Panel (ATP) III adopts lower cutpoints for triglycerides abnormalities than did ATP II (15, 16). Although ATP II determined the normal triglycerides value as lower than 200 mg/dL in 1994, the World Health Organisation in 1999 (17) and ATP III in 2001 reduced its normal limit as lower than 150 mg/dL (15). Although these cutpoints are usually used to define limits of the metabolic syndrome, there are suspicions about the safest limits of plasma triglycerides in medicine. Beside that, smoking may be found among one of the most common causes of vasculitis all over the world. It is a major risk factor for the development of atherosclerotic endpoints including CHD, PAD, COPD, cirrhosis, CRD, and stroke (18, 19). We tried to understand whether or not there is a significant relationship between smoking and plasma triglycerides values in the present study.

Material and Methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between August 2005 and March 2007. Consecutive patients above the age of 15 years were studied. Their medical histories including HT, DM, COPD, and already used medications were learnt, and a routine check up procedure including fasting plasma glucose (FPG), triglycerides, and low density lipoproteins (LDL) was performed. Current daily smokers with six pack-months and cases with a history of three pack-years were accepted as smokers. Patients with devastating illnesses including type 1 DM, malignancies, acute or chronic renal failure, chronic liver diseases, hyper- or hypothyroidism, and heart failure were excluded to avoid their possible effects on weight. Additionally, anti-hyperlipidemic drugs, metformin and/or acarbose users were excluded to avoid their possible effects on blood lipid profiles and/or body weight (20, 21). Body mass index (BMI) of each case was calculated by the measurements of the same physician instead of verbal expressions. Weight in kilograms is divided by height in meters squared (15). Cases with an overnight FPG level of 126 mg/dL or greater on two occasions or already using antidiabetic medications were defined as diabetics (15). An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG level between 110 and 126 mg/dL, and diagnosis of cases with a 2-hour plasma glucose level of 200 mg/dL or greater is DM (15). Additionally, office blood pressure (OBP) was checked after a 5-minute rest in seated position with a mercury sphygmomanometer on three visits, and no smoking was permitted during the previous 2 hours. A 10-day twice daily measurement of blood pressure at home (HBP) was obtained in all cases, even in normotensives in the office due to the risk of masked HT after a 10 minutes of education about proper BP measurement techniques (22). An additional 24-hour ambulatory blood pressure monitoring was not required due to its similar effectivity with the HBP measurements (3). Eventually, HT is defined as a mean BP of 135/85 mmHg or greater on HBP measurements, and WCH as an OBP of 140/90 mmHg or greater but a mean HBP measurement of lower than 135/85 mmHg (22). The spirometric pulmonary function tests were performed in required cases and the criterion for diagnosis of COPD is post-bronchodilator forced expiratory volume in one second/forced vital capacity of less than 70% (23). Eventually, patients with plasma triglycerides values of lower than 60 mg/dL were collected into the first, lower than 100 mg/dL into the second, lower than 1500 mg/dL into the third, lower than 200 mg/dL into the fourth, and 200 mg/dL and higher into the fifth groups. The mean age, male ratio, BMI, FPG, triglycerides, and LDL, and prevalence of smoking, WCH, HT, DM, and COPD were detected in each group and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 669 cases (393 females and 276 males), totally. The mean plasma triglycerides values of the groups were 51.0, 78.2, 121.8, 174,7, and 301.7 mg/dL, respectively. The mean age increased just up to the plasma triglycerides value of 200 mg/dL, and there was an increase of triglycerides about 8.1 mg/dL for each year of aging up to this value. Male ratio increased parallel to the increased plasma triglycerides values, gradually (32.3% versus 50.0%, p<0.001). BMI increased just up to the plasma triglycerides value of 150 mg/dL. FPG, HT, DM, and COPD increased parallel to the increased plasma triglycerides values, gradually, whereas LDL and WCH increased just up to the plasma triglycerides value of 200 mg/dL, gradually. Prevalence of smoking increased parallel to the increased plasma triglycerides values, gradually (16.9% versus 39.1%, p<0.001). Interestingly, the most significant increase of smoking was seen just after the plasma triglycerides value of 200 mg/dL, and there was not any significant effect of aging or excess weight on these patients (Table 1).

Discussion

Excess weight may lead to both structural and functional abnormalities of many organ systems in the body. Adipose tissue produces leptin, tumor necrosis factor-alpha, plasminogen activator inhibitor-1, and adiponectin-like cytokines which act as acute phase reactants in the plasma (24, 25). Excess weight-induced chronic low-grade vascular endothelial inflammation may play a significant role in the pathogenesis of accelerated atherosclerotic process all over the body (1, 2). Additionally, excess weight may cause an increased blood volume as well as an increased cardiac output thought to be the result of increased oxygen need of the excessive fat tissue. The prolonged increase in the blood volume may lead to myocardial hypertrophy terminating with a decreased cardiac compliance. Beside this, the prevalence of high FPG and total cholesterol and low high density lipoproteins (HDL) increased parallel to the higher values of BMI (26). A combination of these cardiovascular risk factors will eventually terminate with an increase in left ventricular stroke work, higher risks of arrhythmias, cardiac failure, and sudden cardiac death. Similarly, the prevalence of CHD and stroke increased parallel to the higher BMI values in the other studies (26, 27), and risk of death from all causes including cancers increased throughout the range of moderate to severe weight excess in all age groups (28). The relationships between excess weight and increased BP and plasma triglycerides values were described in the metabolic syndrome (14), and clinical manifestations of the syndrome included obesity, dyslipidemia, HT, insulin resistance, and proinflammatory and prothrombotic states (12). Similarly, prevalence of smoking (42.2% versus 28.4%, p<0.01), excess weight (83.6% versus 70.6%, p<0.01), DM (16.3% versus 10.3%, p<0.05), and HT (23.2% versus 11.2%, p<0.001) were all higher in the hypertriglyceridemia group in the other study (29). On the other hand, the prevalence of hyperbetalipoproteinemia was similar both in the hypertriglyceridemia (200 mg/dL or higher) and control groups (18.9% versus 16.3%, p>0.05, respectively) in the above study (29). Similarly, plasma LDL values increased just up to the plasma triglycerides value of 200 mg/dL in the present study. Beside that, the mean BMI values increased just up to the plasma triglycerides value of 150 mg/dL, significanty (p<0.05 for each step), but no more in the present study.

Smoking causes a chronic inflammatory process on the vascular endothelium, particularly on the respiratory tract and lungs, terminating with an accelerated atherosclerosis, end-organ insufficiencies, early aging, and premature death. Therefore smoking should be accepted as one of the major components of the metabolic syndrome. Strong and irreversible atherosclerotic effects of smoking are the most obvious observed in Buerger's disease (Thromboangiitis obliterans). It is an obliterative disease characterized by inflammatory changes in the small and medium-sized arteries and veins, and it has never been reported in the absence of smoking in medicine. Beside the strong atherosclerotic effects of smoking, smoking in the human body and nicotine administration in animals may be associated with a decreased BMI (30). Evidence revealed an increased energy expenditure during smoking both on rest and light physical activity (31), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (32). According to an animal study, nicotine may lengthen intermeal time and simultaneously decrease amount of meal eaten (33). Additionally, BMI seems to be the highest in former and the lowest in current smokers (34). Smoking may be associated with a postcessation weight gain (35). Similarly, although CHD was detected with a similar prevalence in both genders in a previous study (36), prevalence of smoking and COPD were higher in males against the higher mean values or prevalence of the BMI, LDL, triglycerides, WCH, HT, and DM in females. This result may indicate both the strong atherosclerotic and weight decreasing roles of smoking (37). Similarly, the incidence of myocardial infarction is increased six-fold in women and three-fold in men who smoke 20 cigarettes per day (38). In another definition, smoking is more dangerous for women probably due to the higher BMI and its consequences in them. Parallel to the above results, the proportion of smokers is consistently higher in men in the literature (21). So smoking is probably a powerful atherosclerotic risk factor with some suppressor effects on appetite. Smoking-induced weight loss may be related with the smoking-induced chronic vascular endothelial inflammation all over the body, since loss of appetite is one of the major symptoms of disseminated inflammation in the body. Physicians can even understand healing of patients via their normalizing appetite. Several toxic substances found in cigarette smoke get into the circulation by means of the respiratory tract, and cause a vascular endothelial inflammation until their clearance from the circulation. But due to the repeated smoking habit of the individuals, the clearance process never terminates. So the patients become ill with loss of appetite, permanently. In another

Table 1: Characteristics features of the study cases according to plasma values of triglycerides

Variable	Lower than 60 mg/dL	p-value	Lower than 100 mg/dL	p-value	Lower than 150 mg/dL	p-value	Lower than 200 mg/dL	p-value	200 mg/dL or higher
Number	65		158		188		110		148
Age (year)	36.1 ± 16.6 (17-79)	0.011	41.9 ± 17.0 (16-83)	0.001	47.1 ± 15.0 (16-82)	0.005	51.3 ± 12.0 (19-73)	Ns*	49.5 ± 11.6 (21-86)
Male ratio	32.3%	Ns	36.0%	Ns	40.4%	Ns	43.6%	Ns	50.0%
Smoking	16.9%	Ns	18.3%	0.05>	25.0%	Ns	24.5%	0.001>	39.1%
BMI† (kg/m2)	24.4 ± 4.5 (16.7-38.1)	0.003	27.0 ± 5.9 (16.7-49.3)	0.000	29.3 ± 6.0 (18.4-50.5)	Ns	29.9 ± 4.8 (19.2-49.0)	Ns	30.1 ± 5.1 (21.0-51.1)
FPG‡ (mg/dL)	98.5 ± 39.6 (77-377)	Ns	107.1 ± 52.0 (59-400)	Ns	104.7 ± 31.9 (71-327)	0.029	116.2 ± 48.5 (68-386)	Ns	122.0 ± 49.1 (74-338)
Triglycerides (mg/dL)	51.0 ± 7.7 (27-59)	0.000	78.2 ± 11.1 (60-99)	0.000	121.8 ± 14.9 (100-149)	0.000	174.7 ± 14.8 (150-199)	0.000	301.7 ± 108.7 (200-1.144)
LDL§ (mg/dL)	99.5 ± 23.4 (56-161)	0.02	114.4 ± 34.1 (43-269)	0.021	132.5 ± 31.2 (64-228)	Ns	138.8 ± 29.9 (50-210)	Ns	129.9 ± 38.7 (10-239)
WCH‖	16.9%	0.01>	25.3%	Ns	30.8%	Ns	34.5%	Ns	33.7%
HT**	6.1%	0.001>	12.6%	0.01>	20.7%	Ns	23.6%	Ns	24.3%
DM***	3.0%	0.001>	10.7%	Ns	13.2%	Ns	16.3%	0.01>	25.6%
COPD****	6.1%	Ns	9.4%	Ns	12.7%	Ns	13.6%	0.01>	22.9%

*Nonsignificant (p>0.05) †Body mass index ‡Fasting plasma glucose §Low density lipoproteins ‖White coat hypertension **Hypertension ***Diabetes mellitus ****Chronic obstructive pulmonary disease

explanation, smoking-induced weight loss is an indicator of being ill instead of being healthy (32-34). After smoking cessation, normal appetite comes back with a prominent weight gain in the patients but the returned weight is their physiological weight, actually.

Although the obvious consequences of excess weight on health, nearly three-quarters of cases above the age of 30 years have excess weight (39). The prevalence of excess weight increases by decades, particularly after the third decade, up to the eighth decade of life (39). So 30th and 70th years of age may be the breaking points of life for weight, and aging may be the major determiner factor of excess weight. Probably, partially decreased physical and mental stresses after the age of 30 years and debility and comorbid disorders-induced restrictions after the age of 70 years may be the major causes for the changes of BMI at these ages. Interestingly, the mean age and BMI increased just up to the plasma triglycerides values of 200 mg/dL and 150 mg/dL, respectively, in the present study. So smoking remained as the major causative factor for the hypertriglyceridemia after the plasma triglycerides values of 200 mg/dL in the present study. On the other hand, the mean age and triglycerides value of the first group were 36.1 years and 51.0 mg/dL, respectively. They were 41.9 years and 78.2 mg/dL in the second, 47.1 years and 121.8 mg/dL in the third, and 51.3 years and 174.7 mg/dL in the fourth groups, respectively. In another definition, the triglycerides values increased about 8.1 mg/dL for each year of aging up to 200 mg/dL in the plasma. So aging alone may be another risk factor for chronic low-grade inflammation on vascular endothelium all over the body. In this way, we may estimate the approximate age of patients by using their plasma triglycerides values below 200 mg/dL in the absence of any comorbid disorder or smoking.

Although ATP III reduced the normal border of plasma triglycerides as lower than 150 mg/dL in 2001 (15), whether or not much lower limits provide additional benefits for health is unclear. In the present study, prevalence of smoking was the highest in the highest triglycerides having group which may also indicate the inflammatory roles of smoking in the metabolic syndrome, since triglycerides may actually be some acute phase reactants in the plasma. The mean FPG and BMI and prevalence of HT, DM, and COPD increased parallel to the plasma triglycerides values from the first up to the last groups, gradually. As one of our opinions, significantly elevated mean age by the increased plasma triglycerides values may be secondary to aging-induced decreased physical and mental stresses, which eventually terminate with onset of excess weight and other components of the metabolic syndrome. Interestingly, although the mean age increased from the lowest triglycerides having group up to the triglycerides value of 200 mg/dL, it then decreased. The similar trend was also seen with the mean LDL value. These trends may be due to the fact that although the borderline high triglycerides values (150-199 mg/dL) is seen together with physical inactivity and overweight, the high triglycerides (200-499 mg/dL) and very high triglycerides values (500 mg/dL and higher) may be secondary to both genetic factors and terminal consequences of the metabolic syndrome including smoking, obesity, DM, HT, COPD, cirrhosis, CRD, PAD, CHD, and stroke (15). But although the underlying causes of the high and very high plasma triglycerides values may be a little bit different, probably risks of the terminal endpoints of the metabolic syndrome do not change in them. For example, prevalence of HT, DM, and COPD were the highest in the highest triglycerides having group in the present study. Eventually, although some authors reported that lipid assessment can be simplified by measurements of total cholesterol and HDL (40), the present study and most of the others indicated a causal relationship between higher triglycerides and terminal consequences of the metabolic syndrome (41).

As a conclusion, plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between plasma triglycerides values and aging, BMI, and smoking, but smoking may be particularly important for plasma triglycerides values of 200 mg/dL and greater.

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