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Somatic Symptom Disorder among medical students in Umm Al-Qura University, Makkah Al-Mukarramah, Kingdom of Saudi Arabia

.... page 6

Umm Al-Qura University

Editorial

Chief Editor:
A. Abyad
MD, MPH, AGSF, AFCHSE
Email::
aabyad@cyberia.net.lb
Mobile: 961-3-201901

Ethics Editor and Publisher
Lesley Pocock
medi+WORLD International
AUSTRALIA
Email:
lesleypocock@mediworld.com.au
publishermwi@gmail.com

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This is the fifth issue this year with a variety of papers from the Region of great interest to primary care and family medicine.

Goweda, et al., did a cross sectional to screen for somatic symptom disorder among medical students. A self administered questionnaire was used to collect the data including two sections; socio-demographic information and Somatic Symptom Scale-8 (SSS-8) questions. Out of 374 students, 206 (55.1%) were males, 292 (78.1%) were from the clinical years (Years 4-6), 353(94.4%) were singles, 71(19.0%) were smokers, 83(22.2%) had social stressors and 88(23.5%) had educational problems. On considering only the high SSS-8 total risk scores, the prevalence of SSD is estimated to be 39% (20.3% had very high and 18.7% had high risk). Feeling tired or having low energy was the most prevalent symptom. Female students and students having social stressors and educational problems more vulnerable to have SSD. The authors concluded that there is high prevalence of SSD among our medical students. Accordingly, health education programs and frequent mentoring of the students are highly recommended.

Alam et al., looked at unplanned pregnancies. They followed a cross sectional study. This study aims to ascertain the prevalence of unintended pregnancies among antenatal women attending antenatal clinics in Primary Care in Qatar and to establish any demographic differences among antenatal women around the choice of pregnancy. A validated questionnaire (the London Measure of Unplanned Pregnancy (LMUP)) was used to look at the prevalence and hence the size of the problem. Among 107 participants, scores on the LMUP ranged from 0-12 with a median of 10. Most pregnancies 79.4%, (n=85) were categorized as planned, 17.8% (n=19) as ambivalent, and 2.8% (n=3) as unplanned. The authors stressed that unplanned pregnancies in this population are rare among women attending antenatal clinics. Less planned pregnancies are tended to be more prevalent among Qatari women compared to expatriates. Unplanned pregnancy prevention services need to be included within pregnancy care services in primary care settings to offer preferred contraception on time to effectively maintain the low rate of unplanned pregnancies in the country.

Altamimi, et al., did a cross-sectional study using an online questionnaire has been developed locally in Cluster one in Riyadh, Saudi Arabia. The authors aims to assess the mother's knowledge, reaction, and immediate action towered head trauma of children under five years in Riyadh city, 2020-2021.
The study included 390 mothers who had the inclusion criteria. In this study, we collected data from 390 mothers of children under five years old who responded to our distributed questionnaire. Most of the participants were between 31-40 years old (40 %), while 31.5 % were between 20-30 years old. The authors concluded that the level of knowledge among mothers in Al Riyadh region toward managing head trauma and preventing home injuries among children is sub adequate. Many factors affect this knowledge, including maternal education, monthly income and occupation, and attending first aid training.

Elmeshmeshy, et al., stressed that the current COVID 19 pandemic has led to abrupt changes in medical education with an imperative need to shift to e-learning for continuity of the education.
The study aimed to retrieve a hybrid e-learning experience and the participants' early perception. This is an interventional study. A shortly planned hybrid e-learning was conducted in the family medicine department programs of MD and MSc. Then, the enrolled 30 postgraduates were invited to participate in a web-based anonymous survey to assess their perception of e-learning after a 2- month experience. Twenty-six participants were recruited in the survey. The most perceived e-learning advantages were feasibility, saving costs, and motivation to learn. While the perceived challenges were lack of technical skills and internet connection strength. The authors concluded that the implementation of hybrid e-learning is a significant step forwards and easy to be conducted, but it requires work to be improved.

Alzahrani, et al., conducted a cross-sectional study on of 168 PHC physicians in Jeddah to assess knowledge and practice of physicians towards medication prescription during pregnancy and to determine obstacles in prescribing medications. A questionnaire was distributed to physicians online including questions about their characters and knowledge about medication prescribing (categories), reading sources, and practice. 78.6% of PHC physicians faced obstacles on prescribing medication for pregnant women, where lack of time to read, limited information about patient and treatment and pregnant women education level were the most common obstacles found. Amoxicillin (86.9%), Levothyroxine (75.6%), Methyldopa (73.8%), Calcium carbonate (71.4%), Nasal fluticasone (57.1%), and Penicillin G were the most commonly reported medications as safe during pregnancy by participants (56.5%). The authors concluded that there is an insufficient awareness and practice of PHC physician regarding medication prescribing during pregnancy. It is necessary to raise their awareness about the FDA guidelines.

Mohamad, et al., reviewed the Evaluation and assessment of male infertility in Primary care.

Infertility is a common condition seen in primary care practices. The World Health Organization estimates that 9% of couples worldwide struggle with fertility issues and that the malefactor contributes to 20-30% of all infertility cases. The diagnosis of infertility in men is primarily based on semen analysis. The main parameters of semen include concentration, appearance, and motility of sperm. Recently, the demand for infertility services has increased, and infertile couples are seen frequently by primary care physicians. A flexible, patient-centred approach is indicated. This article outlines the Family Physician`s evaluation of male infertility and indications for referral to a male infertility specialist.

Alobaidi et al., reported on a case of ectopic pregnancy. The authors stressed that Ectopic pregnancy is a condition where pregnancy occurs outside the uterine cavity. It is a life-threatening condition and needs to be acted on urgently when suspected. Ectopic pregnancy should be suspected in any woman in childbearing age presenting with irregular vaginal bleeding like this case presented in this issue.

Aljehani, et al., conducted a cross-sectional study to assess family medicine residents' level of resilience coping self-efficacy during COVID-19 crisis. It was conducted among 208 family medicine residents in the Western region of Saudi Arabia. Resilience and coping self-efficacy were assessed using the Connor-Davidson Resilience Scale-25 items (CD-RISC-25) and coping self-efficacy scale (CSES), respectively. Professional stressors including work environment satisfaction (WES) was assessed. The mean (SD) CD-RISC-25 and CSEC score was 54.53 (19.69) out of 100 and 136.81 (63.67) out of 260, respectively. Suboptimal resilience was independently associated with shorter (<10 min.) consultation time (OR=3.83, p=0.023) and lower CSES score (OR=0.98, p<0.001), with 32.5% variance. The authors concluded that Family medicine residents are at high-risk for psychological distress during COVID-19 crisis, indicated by low resilience and coping self-efficacy levels. The model suggests high impact of WES and spiritual fulfillment in coping self-efficacy indicating relevance in resilience-promoting interventions.

Tawhari, et al., attempt to assess safety culture in "Abu Arish" General Hospital to provide a starting point from which action planning begins and patient safety changes emerge. The methodology of this study was based on the guidelines provided by the Agency for Healthcare Research and Quality (AHRQ). Data were collected using the Hospital Survey on Patient Safety Culture Form. Analysis of data was by Microsoft Excel and the Statistical Package for Social Sciences (SPSS) programs. A survey questionnaire was distributed in "Abu Arish" General Hospital to 207 health care providers, including nurses, technicians, managers and medical staff. The patient safety composites with the highest positive scores were teamwork within units (72%), organizational learning and continuous improvement (70%) and The composites with the lowest scores were non-punitive response to error (22%), staffing (32%), Handoffs & Transitions (38%), frequency of events reported (40%), communication openness (43%), hospital management support for patient safety (43%) and Teamwork Across Units (43%). This study provides an overall assessment of perceptions of safety among hospital staff in a general hospital. There are areas of strengths and weakness in the patient safety culture dimensions. There are several areas for improvement, including non-punitive response to errors, staffing, hospital handoffs & transitions and error reporting

Dr. Haidarah, evaluated the results of total hip replacement for patients with femoral neck fractures in Aden, Yemen. Patients were retrospectively sought who suffered a femoral neck fracture and were all operated on by the author and a senior surgeon in the period from January 2018 to April 2020. The study conducted at the department of orthopedic surgery, in Alnaqeeb private hospital in Almansoora, Aden, Yemen. The study patients were 70. All patients suffered of femoral neck fracture and operated for total hip replacement. They were (50%) females and (50%) males with a ratio female to male 1:1. The mean age of all patients was 68.9 ± 7.8 years (range, 60 to 87 years). The patients of the age group 60 – 70 were predominant with (72.9%). There was statistical significant difference between the age groups and sex of patients (p=0.05). Causes of fractures were fall down (50%) patients, degenerative (25.7%) patients, inflammatory 7 (10%), and road traffic accident in (10%) patients. Neck femur fractures with severe displacement were predominant with (60%). Intraoperative periprosthetic fracture found in 3 (4.3%) patients, post-operative periprosthetic fracture also found in 5 (7.1%) patients. Also, we found implant failure or breakage in (1.4%), dislocations in (12.9%) patients and wound infections in (5.7%). Lower limbs discrepancy found in (1.4%) patient. The author concluded that their study and previous published studies have shown that the complication rates are significantly lower.

Somatic Symptom Disorder among medical students in Umm Al-Qura University, Makkah Al-Mukarramah, Kingdom of Saudi Arabia

Reda Goweda (1,2)
Marwan Adel Alshinawi (3)
Basim Mazin Janbi (3)
Umar Yousuf Muhammad Idrees (3)
Raed Mohammed Babukur (3)
Hassan Ali Alhazmi (3)
Hani Aiash (1)

(1) Department of Family Medicine, Faculty of Medicine, Suez Canal University, Egypt
(2) Department of Community Medicine, Faculty of Medicine, Umm Al-Qura University, Saudi Arabia
(3) Medical student , Faculty of Medicine, Umm Al-Qura University, Saudi Arabia

Corresponding author:
Reda Goweda
Assistant professor, Family medicine department ,
Suez canal university
Egypt
Mobile: 00201003583933, 00966565528216
Email : redagoweda@yahoo.com , rbgoweda@uqu.edu.sa

Abstract

Background: A somatic symptom disorder (SSD) occurs when a person feels extreme, exaggerated anxiety about physical symptoms that results in major distress and/or problems of functioning.

Objective: This study aims to screen somatic symptom disorder among medical students.

Methods: This cross-sectional study was conducted on medical students during the academic year 2019/2020. 374 medical students were recruited for this study. Self administered questionnaire was used to collect the data including two sections; socio-demographic information and Somatic Symptom Scale-8 (SSS-8) questions.

Results: Out of 374 students, 206 (55.1%) were males, 292 (78.1%) were from the clinical years (Years 4-6), 353 (94.4%) were singles, 71 (19.0%) were smokers, 83 (22.2%) had social stressors and 88 (23.5%) had educational problems. On considering only the high SSS-8 total risk scores, the prevalence of SSD is estimated to be 39% (20.3% had very high and 18.7% had high risk). Feeling tired or having low energy was the most prevalent symptom. Female students and students having social stressors and educational problems were more vulnerable to have SSD.

Conclusions: There is high prevalence of SSD among our medical students. Accordingly, health education programs and frequent mentoring of the students are highly recommended.

Key words: somatic, symptom, disorder, medical students

Introduction

A somatic symptom disorder is a type of mental disorder, previously recognized as a somatoform disorder(1). In the general population, it was found that the prevalence of somatic symptom disorder is 5% to 7% (2). There is increased risk for suicidal ideation among those with somatic symptom disorder, as reported by evidence(3).

The Diagnostic and Statistical Manual of Mental Disorders, 5th ed.)DSM-5(altered the diagnostic term "Somatoform Disorders" to "Somatic Symptom and Related Disorders (SSD)." SSD now denotes a constellation of disorders characterized by feelings or behaviors related to somatic symptoms. Body Dysmorphic Disorder, Pain Disorder, and Hypochondriasis - three disorders formerly part of Somatization in DSM-IV-TR, have now been detached. The purpose of this change was to increase the importance of SSD among primary care practitioners(2,4).

Diagnosis of somatic symptom disorder requires physical symptoms that cannot be clearly explained by as a result of a substance abuse or due to a general medical condition. Additionally, it is not attributable to another psychiatric disorder (e.g., anxiety disorder) (5).

Diagnostic tests results are either within accepted ranges or do not clarify the patient's symptoms. On medical history and physical examination there is no evidence of medical disorders which could explain the patient's symptoms (6).

For diagnosis of somatic symptom disorder, symptoms should persist for at least six months and the patient should be worried about their condition (7, 8).

Patient Health Questionnaire-15 was the most com¬mon instrument used to screen for somatoform disorders (9), but recently Somatic Symptom Scale-8)SSS-8(was developed and has been proven a reliable and valid self-report mea¬sure of SSD (10).

The CARE MD (consulta¬tion/cognitive behavior therapy, assessment, regular visits, empathy, medical/psychiatric interface, do no harm) management method was established to support family doctors in theirapproach with patients who have SSDs (11).

Patients who have fewer physical symptoms have a good prognosis. Good communication skills and strong relationship between patients and primary care physicians are recommended (12).

Aim of the study: To estimate the prevalence of somatic symptom disorder among medical students

Methods

This cross-sectional study was conducted on medical students of Faculty of medicine, Umm Al-Qura University University, KSA during the academic year 2019/2020.

Out of all faculty students, 340 were selected based on (Prevalence of SSD is 33.8 % (13) and Confidence intervals taken at 95% with a 5% margin of error). We added 10% more to the number in order to accommodate those who refused or had incomplete data, hence the total sample size was 374 students. All medical male and female students of years two to six who accepted to participate in this study were included, while currently pregnant students, and those with chronic and acute known medical illnesses, psychiatric disorders such as depression, and anxiety, and intern medical students were excluded.

A self administered questionnaire was sent to the students. The Questionnaire contains two divisions: the first one is social demographic data (gender, academic year, marital status, social stressors and educational problems); the second section is SSS-8 questions which were developed and proven a reliable and valid self-report mea¬sure of SSD (10). It includes nine questions (back pain, chest pain or shortness of breath, dizziness, feeling tired or having low energy, headaches, pain in your arms, legs, or joints, stomach or bowel problems and trouble sleeping). Each question in this scale has five responses and each response carried a score: Very much = 4, Quite a bit = 3, somewhat = 2, A little bit = 1 and Not at all = 0. Scores can range from the lowest possibility of 0 to a maximum of 32. If a student score is lower, there is less likelihood of SSD. Probability of having SSD is as follows: None to minimal)0 to 3(, low)4 to 7(, medium)8 to 11(, high)12 to 15(, very high)16 to 32(.

A pilot study was done on 10% of the sampled participants to assess the validity of the questionnaire, emphasize obstacles related to data collection instrument, and to ensure standardization.

The study was carried out after receiving ethical approval from the Umm Al-Qura University Deanship of Research)approval NO. KAPO-O2-K-012-2020-03-366). Participation was voluntary. Additionally, written and verbal consent was taken from the students after explanations of the aim and methods of the study and ensuring confidentiality.

Data was analyzed using IBM advanced SPSS statistical package version 20. We used t-test for comparing means of total scores among different groups.

Results

After sample size estimation, 374 students were approached, and all of them completed the questionnaire. 206 (55.1%) were males, 292 (78.1%) were from the clinical years (Years 4-6), 353(94.4%) were singles, 71(19.0%) were smokers, 83(22.2%) had social stressors and 88(23.5%) had educational problems. (Table 1)

Table 1: General characteristics of the participants

		N (%)
Gender	Male	206 (55.1%)
	Female	168 (44.9%)
Academic year	Basic-year students (Years 2&3)	82 (21.9%)
	Clinical- Years (Years 4-6)	292 (78.1%)
Marital status	Single	353(94.4%)
	Married	21(5.6)
Smoker	Yes	71(19.0%)
	No	303(81.0%)
Social stressors	Yes	83(22.2%)
	No	291(77.8%)
Educational problems	Yes	88(23.5%)
	No	286(76.5%)

Regarding responses to SSS-8, feeling tired or having low energy was the most prevalent symptom as 72(19.3%) of the participants answered that this symptom bothers them very much while chest pain or shortness of breath was the least prevalent symptom because 228(61.0%) answered not at all. (Table 2)

Table 2: Responses to the Somatic Symptom Scale-8

	Not at all	A little bit	Somewhat	Quite a bit	Very much
Back pain	142(38.0%)	102(27.3%)	106(17.6%)	43(11.5%)	21(5.6%)
Chest pain or shortness of breath	228(61.0%)	79(21.1%)	38(10.2%)	20(5.3%)	9(2.4%)
Dizziness	223(59.6%)	82(21.9%)	51(13.6%)	12(3.2%)	6(1.6%)
Feeling tired or having low energy	52(13.9%)	66(17.6%)	90(24.1%)	94(25.1%)	72(19.3%)
Headaches	136(36.4%)	100(26.7%)	70(18.7%)	47(12.6%)	21(5.6%)
Pain in your arms, legs, or joints	188(50.3%)	77(20.6%)	51(13.6%)	39(10.4%)	19(5.1%)
Stomach or bowel problems	161(43.0%)	71(19.0%)	39(13.1%)	38(10.2%)	55(14.7%)
Trouble sleeping	131(35.0%)	75(20.1%)	56(15.0%)	46(12.3%)	66(17.6%)

According to SSS-8 total risk score, out of 374 students 76(20.3%) had very high risk for SSD, 70(18.7%) had high risk, 74(19.8%) had medium risk, 92(24.6%) had low risk and 62(16.6%) had none to minimal risk. If we consider only the high SSS-8 total risk scores, the prevalence of SSD is estimated to be 39%. (Table 3)

Table 3: Participants' risk according to total score of the Somatic Symptom Scale-8

SSD risk	N (%)
None to minimal (0 to 3)	62(16.6%)
Low (4 to 7)	92(24.6%)
Medium (8 to 11)	74(19.8%)
High (12 to 15)	70(18.7%)
Very high (16 to 32)	76(20.3%)

On comparing means of SSS-8 total risk score among different groups it was found that there was a significant relation between males and females' total score with females having a higher risk score than males (p 0.002). Additionally, students with social stressors and educational problems have more risk scores than those without (p 0.000). Conversely, there was no significant difference between basic-year and clinical years students (p =0.115), single and married (p=0.241), smokers and non-smokers (p=0.935). (Table 4)

Table 4: Comparison between means of the Somatic Symptom Scale-8 total score among different groups

		Mean ±SD	p
Gender	Male	8.96±6.30	0.002
	Female	10.96±6.18	
Academic years	Basic-year students (Years 2&3)	10.83±6.63	0.115
	Clinical (Years 4-6)	9.59±6.63	
Marital status	Single	9.95±6.31	0.241
	Married	8.29±6.43	
Smoker	Yes	9.80±6.86	0.935
	No	9.87±6.19	
Social stressors	Yes	12.52±6.04	0.000
	No	9.10±6.20	
Educational problems	Yes	12.90±6.08	0.000
	No	8.92±6.10	

Discussion

After searching Pubmed and Google it was found, to the best of our knowledge that this study is the earliest one to screen medical students for somatic symptom disorders using the SSS-8.

In the present study if we consider only the high SSS-8 total risk scores, the prevalence of SSD is estimated to be 39% (20.3% had very high and 18.7% had high risk).

It was estimated that the prevalence of SSD is five to seven percent in the general population (14). The prevalence of our study is similar to the prevalence of study by Schaefert et al., which documented prevalence of 36.5% after recruitment of 491 outpatients from ten outpatient clinics in China (15). A similar proportion was found in China where 33.8% of the participants were identified with SSD (13).

A systematic review was done and found that prevalence rates for somatoform disorders in the general population range from 11 to 21% in younger, 10 to 20% in the middle-aged, and 1.5 to 13% in the older age groups (16). A study conducted in Belgium disclosed that SSD is the third highest psychiatric disorder, with a prevalence rate of 8.9% (17). In a study done by Chinawa et al. they reported the prevalence of psychosomatic disorder among medical students was 14.3% (18).

Furthermore, Firth et al. found that the prevalence of psychosomatic disorder among medical students was (31.2%) (19), and another study carried out on new medical graduates showed a prevalence of (26%) (20). Previous studies found the prevalence rates of somatoform disorders ranging from (22% to 58%) (21).

The differing prevalence rates between our study and other studies may rise from the target population, while ours were medical students other target populations were either general population or specific patients. The second difference is the tool was used for diagnosis and screening while others followed the diagnostic criteria of DSM- 5 for SSD diagnosis, we used the SSS-8 which is a new tool. Furthermore, some studies focus on SSD alone, while some of the prior studies included most mental disorders. The prevalence among medical students is higher than the general population; this may result from more exposure to stress of education and training.

In the present study the most prevalent symptom among our students was feeling tired or having low energy followed by troubled sleeping and stomach or bowel problems. A previous study reported headache, back pain, abdominal pain, painful limbs, fatigue, feeling dizzy, and change of bowel habit (22). Kroenke and Mangelsdorff found that headache, chest discomfort, easy fatigability, dizziness, and difficult breathing were the most prevalent complaints reported in their study (23).

With regard to gender, in our study it was found that SSD is higher in females. Our findings are also consistent with previous studies which reported that women are likely to present with SSD more than men, with an estimated woman-to-men ratio of (10:1) (24). Chinawa et al. found that prevalence of somatoform disorder among females is slightly higher than males (14.4% and 14.2% respectively) (18). Additionally our findings are similar to the reported results from Bailer et al, demonstrating the predominance of females in somatoform disorder (females to males ratio of 14.2%: 2.8%) (25).
Prior studies reported that somatization disorder is more common among females, and they reported more symptoms than males (26) , for example, a study by Bener et al. showed that the prevalence of somatoform disorder was slightly higher in females (24.2%) than in males (23.7%) (22). Conversely, in a finding reported by Flink et al. the prevalence was higher among male patients(21), while there was no gender statistical differences among medical students with somatic disorder in a study done by Chinawa et al. (18).

Gender difference may be explained by multifactorial interactions such as genetic, psychosocial, cultural, and hormonal factors (27).

In our study it was found that students with social stressors and educational problems are more at tisk of having SSD. This is in agreement with a previous study done by Creed et al. (28). In a study conducted to search the causal attributions for SSD, it was found that 90% of the participants approved the supposition that work stressors may be a possible cause of the SSD symptoms (29).

The present study found no statistically significant difference between means of SSS-8 total score among academic years, marital status and smoking status.

Conclusion

There is high prevalence of SSD among our medical students. Accordingly, health education programs and frequent mentoring of the students are highly recommended. Additionally, further studies including different medical colleges from different regions of Saudi Arabia are recommended.

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Evaluation of knowledge and practice of primary health care physicians regarding medication prescribing during pregnancy in Jeddah, Saudi Arabia 2021

Reham O. Alzahrani (1)
Reem M. Alqahtani (2)
Shada M. Alharbi (3)

(1) Family medicine resident at King Abdulaziz University Hospital, Jeddah city, Saudi Arabia
(2) Consultant Family physician, King Abdulaziz University, Jeddah city, Saudi Arabia
(3) Senior specialist at Al Azizyha PHC center, Jeddah city, Saudi Arabia

Corresponding author
Dr. Reham O. Alzahrani
Jeddah, Saudi Arabia
Tel.: 00966538381707
Email: Rehamalza@hotmail.com

Abstract

Background: Despite adequate guidelines that support medication prescribing during pregnancy, primary health care physicians' practice in Saudi Arabia is still not assessed.

Objectives: to assess knowledge and practice of physicians towards medication prescription during pregnancy and to determine obstacles in prescribing medications.

Methods: Across-sectional study was done on of 168 PHC physicians in Jeddah, Saudi Arabia. A questionnaire was distributed to physicians online, including questions about their knowledge about medication prescribing (categories), reading sources, and practice.

Results: 78.6% of PHC physicians faced obstacles in prescribing medication for pregnant women, where lack of time to read limited information about patient and treatment and pregnant women education level were the most common obstacles found. Amoxicillin (86.9%), Levothyroxine (75.6%), Methyldopa (73.8%), Calcium carbonate (71.4%), Nasal fluticasone (57.1%), and Penicillin G were the most commonly reported medications as being safe during pregnancy by participants (56.5%). Doxycycline (64.9%), methotrexate (63.7%), warfarin (54.2%), and statins were the most commonly

reported unsafe medications. Participants aged 25-35 years had a significantly higher percentage of facing a lack of time to read as an obstacle in prescribing medication for pregnant women, whereas GPs had a significantly higher percentage of facing obstacles, such as the level of education of pregnant women, a lack of privacy in a PHC, and a lack of pregnancy education.

Conclusion: There is insufficient awareness and practice of PHC physicians regarding medication prescribing during pregnancy. It is necessary to raise their awareness about the FDA guidelines.

Keywords: knowledge, practice, PHC, medication, pregnancy, Jeddah

Introduction

During pregnancy medication use is common and almost 90% of pregnant women took either prescribed or over-the-counter medication (1). About 8 out of 10 women reported the use of some medications during their pregnancies (2). Although not all medications are safe to take during pregnancy, some medications have maternal side effects and others have a special concern in fetal teratogenicity. Drug prescription during pregnancy is sometimes mandatory, particularly for those with a medical history of acute or chronic illnesses (3).

Pregnancy involves a variety of maternal physiological changes which poses the risk of developing symptoms like; morning sickness, constipation, heartburn, hypertension, and infections. In such cases, the use of medications might be unavoidable (4). Thus, all pregnant women should be educated and have insight into the risks and benefits of the medications they use (5).

Part of the education responsibility relies on the primary healthcare physicians. In Saudi Arabia, primary health care centers are positioned to be the first access point to the health care system. So, maternal and child health are considered to be a cornerstone of their daily practice (6).

In order to improve medical practice and decrease risk during pregnancy, the U.S Food and Drug Administration (FDA) established categories of five letter risk - A, B, C, D or X - indicating potential birth defects and fetal harm, as resources of accessing the drug information that health care professionals need in prescribing medication[7]. Category A indicates there is no risk to the foetus in the first trimester of pregnancy and no evidence of risk in the later trimesters, and category B indicates that animal reproduction studies have failed to demonstrate a risk to the foetus and there are no adequate and well-controlled studies in pregnant women, and category C indicates that animal reproduction studies have shown an adverse effect on the foetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks. Category D indicates that there is positive evidence of human foetal risk based on adverse reaction data from investigational or marketing experience or human studies, but potential benefits may justify use of the drug in pregnant women despite potential risks, and category X indicates that studies in animals or humans have demonstrated foetal abnormalities and/or there is positive evidence of human foetal risk based on adverse reaction data from investigational or marketing experience or human studies (7). In that regard, despite the sufficient guidelines that support medication prescribing in pregnancy, primary health care physicians' practice is still not up to the mark in Saudi Arabia (7).

A study conducted in Ethiopia, showed that the main sources of information of dispensed medication for pregnant women was (41.9%) pharmacists and (21.3%) were general practitioner physicians, besides, they reported about 6.8% of the pregnant women stated that they only checked the leaflet of the medication rather than asking physicians (8). In Italy in 2018, a study conducted among pregnant women, regarding medication use during pregnancy, stated that (75.3%) of advice was from physicians, who are the most common source of receiving information during pregnancy (9).

In Saudi Arabia, one study was conducted in Riyadh, showed that (66%) of healthcare professionals have been prescribing teratogenic medications for pregnant women (10). In 2013, another study was conducted in Taif city, Saudi Arabia, among pregnant women, and reported that they have been receiving drug information from pamphlet rather than physicians or pharmacists, due to inadequate supervision of physicians (11). Thus, primary health care physicians should be aware and have adequate medical knowledge towards medication prescription for pregnant women attending PHC.

Adequate supervision of the medications used during pregnancy should be undertaken. Thus, physicians should be aware of medications they prescribe for pregnant women attending PHC centers (5).

To the best of our knowledge, insufficient studies have been done in Saudi Arabia assessing knowledge and practice of PHC physicians about medication prescribed during pregnancy. The aim of this study was to assess knowledge and practice of PHC physicians towards medication prescription during pregnancy and to determine obstacles that physicians face in prescribing these medications.

Subjects and Methods

Study Design, setting and time frame: a cross-sectional study was done on PHC physicians at Ministry of Health (MOH) Jeddah, Saudi Arabia in the time from August to November 2021. Jeddah city is the second largest city in Saudi Arabia and is located on the Red Sea and is the gateway to Makkah, the holiest city in Islam. Jeddah has five MOH hospitals and a total of 48 PHC centers attached to it.

Study participants: the inclusion criteria were family medicine physicians (family medicine residents, specialist and consultant), general practitioners, and dentists. And the exclusion criteria were other specialty physicians and those who did not want to participate in the study.

Sample size: By using Epi-info version 7, the sample size was 148 PHC physicians based on the following assumptions: the expected frequency knowledge regarding medication prescribing during pregnancy as 50% (since there is no specific figure), with confidence interval (95%) and acceptable margins of error (5%). The sample was increased by 10% to be 168 physicians to compensate for the possible drop-out.

Sampling technique: Stratified random sampling technique with proportional allocation was done to select primary healthcare centers, representing all the five sectors in Jeddah. Consequently, all PHC physicians

in the selected PHCCs were invited to fill in the study questionnaire. This process continued till the required sample size was reached. Questionnaires were sent by hand and online to the participants by the researcher and her trained assistants.

Data collection tool: A self-administered questionnaire was distributed to all physicians who work in PHC, Jeddah. Data were collected during the daytime working hours from participants either male or female by distributing a self-administered questionnaire in General Clinics. The questionnaire included items to collect data about age, gender, nationality, specialty, (GP, residents, Specialists), scientific degree, years of experience and knowledge about medication prescribing (categories) reading sources (websites, leaflet). Practice data was collected and items about obstacles regarding medication prescribing were added.

Ethical approval: Ethical approval for the study was obtained from the Ministry of Health Research committee and written consent were taken from all participants.

Data analysis: Data were analyzed statistically by the SPSS program version 26. To test the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test ($\chi2$) was used. A p-value of 0.05 was considered statistically significant.

Results

Table 1 shows that 64.9% of studied participants had an age ranging from 25-35 years, 57.1% were females, 75% had 10 years of working experience and most of them (36.9%) were general practitioners (GPs). The most common sources of checking pregnancy safety information for medicine used were secondary resources: websites or applications (e.g Uptodate, BMJ, Epocrates Micromedex) (82.7%), regulatory agencies websites (Food and Drug Administration [FDA] (55.4%) and Product leaflet/insert (44.6%).

Table 2 demonstrates that the most common practice always followed by the participants on prescribing medication to pregnant women were: check each time the medication history of pregnant women (e.g folic acid and other vitamins) (70.8%), discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition (e.g thyroid disease, DM, HTN) (65.5%), ask if presenting women are pregnant or not before prescribing a medication (63.1%), follow up medication of pregnant women (60.7%) and check for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women (57.1%).

(Figure 1) illustrates that most of the participants (No.:132 (78.6%)) were facing different types of obstacles regarding prescribing medication for pregnant women.

(Figure 2) shows that of the 132 participants facing obstacles regarding prescribing medication for pregnant women, the most common obstacles faced were: Lack of time to read (82.6%), limited information about patient and treatment (60%), pregnant women education level (58.3%), lack of education about pregnancy (57.5%) and no knowledge about pregnancy medicines available resources (53%).

Table 3 shows that the most common medications reported by the participants to be safe during pregnancy were: Amoxicillin (86.9%), Levothyroxine (75.6%), Methyldopa (73.8%), Calcium carbonate (71.4%), Nasal fluticasone (57.1%) and Penicillin G (56.5%). And the most the most common medications reported by the participants not to be safe during pregnancy were: Doxycycline (64.9%), Methotrexate (63.7%), Warfarin (54.2%), Statins (48.8%), Diazepam (35.1%), Estazolam (34.5%) and Pseudoephedrine hydrochloride (31.5%).

On assessing the relationship between participants' age and practice experience and their practice and frequency of prescribing medication to pregnant women, all tests were non-significant at a p-value of (> 0.05). Table 4 shows that in comparison with male participants, female participants had a significant higher percentage of always: 1) prescribing a medication to pregnant women, 2) checking each time the medication history of pregnant women, 3) ask if coming women is pregnant or not before prescribing a medication, 4) follow up medication of pregnant women, 5) discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition, 6) provide clear and evidence-based information on the safety of specific medicines during pregnancy, 7) have any experience of using medications during pregnancy that caused teratogenicity and 8) check for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women (p=< 0.05).

Table 5 shows that consultants had a significantly higher percentage of prescribing a medication to pregnant women compared to other positions (p=< 0.05). Family medicine (FM) residents had a significantly higher percentage of: 1) checking each time the medication history of pregnant women (e.g folic acid and other vitamins), 2) follow up medication of pregnant women, 3) discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition and 4) checking for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women (p=< 0.05).

Figure 3 illustrates that participants with an age ranging from 25-35 years had a significantly higher percentage of those who were facing lack of time to read as an obstacle in prescribing medication for pregnant women (p=< 0.05). Figures 4, 5 and 6 illustrate that GPs had a significant higher percent of those who were facing the level of education of pregnant women (more educated women are more aware, willing to share information with physicians), lack of privacy in a PHC and lack of education regarding pregnancy as obstacles in prescribing medication for pregnant women (p=< 0.05).

Table 1. Distribution of studied participants according to their demographics, experience, position and source of checking pregnancy safety information for a medicine used (No.:168)

Variable	No. (%)
Age	
25-35 years	109 (64.9)
36-45 years	43 (25.6)
≥46	16 (9.5)
Gender	
Male	72 (42.9)
Female	96 (57.1)
Practice experience	
10 years	126 (75)
11-19 years	24 (14.3)
≥20 years	18 (10.7)
Position	
Consultant	17 (10.1)
Family medicine resident	37 (22)
General practitioner	62 (36.9)
Dentist	20 (11.9)
Family medicine specialist	32 (19)
When checking pregnancy safety information for a medicine you will use, what is the source?	
Product leaflet/insert	75 (44.6)
Secondary resources: websites or applications (e.g Uptodate, BMJ, Epocrates Micromedex)	139 (82.7)
British National Formulary (BNF)	47 (28)
Regulatory agencies websites (Food and Drug Administration [FDA]	93 (55.4)
Drug and poison information center Expert healthcare provider	41 (24.4)
Other	57 (33.9)

Table 2. Distribution of studied participants according to their practice and frequency of prescribing medication to pregnant women (No.:168)

Variable	Never	Sometimes	Usually	Always
Do you prescribe a medication to pregnant women?	9 (5.4)	114 (67.9)	19 (11.3)	26 (15.5)
Check each time the medication history of pregnant women (e.g folic acid and other vitamins)	12 (7.1)	11 (6.5)	26 (15.5)	119 (70.8)
Ask if coming women are pregnant or not before prescribing a medication?	1 (0.6)	23 (13.7)	38 (22.6)	106 (63.1)
Follow up medication of pregnant women	8 (4.8)	24 (14.3)	34 (20.2)	102 (60.7)
Discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition (e.g thyroid disease, DM, HTN)	9 (5.4)	17 (10.1)	32 (19)	110 (65.5)
Provide dear evidence-based information on the safety of specific medicines during pregnancy	16 (9.5)	25 (14.9)	49 (29.2)	78 (46.4)
Have any experience of using medications during pregnancy that caused teratogenicity?	94 (56)	26 (15.5)	21 (12.5)	27 (16.1)
Check for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women?	6 (3.6)	23 (13.7)	43 (25.6)	96 (57.1)

Figure 1. Percentage distribution of studied participants according to facing obstacles regarding prescribing medication for pregnant women
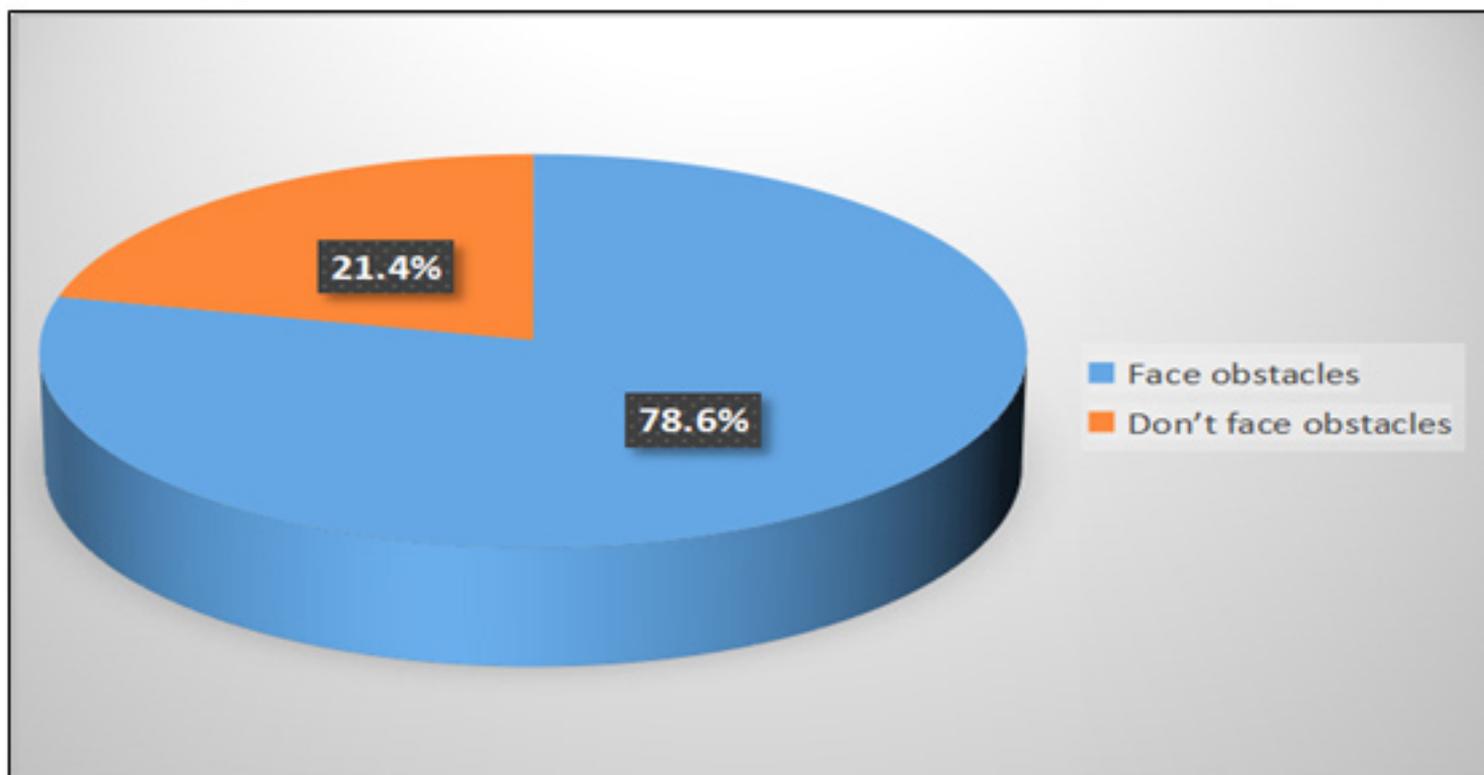
Table 3. Distribution of studied participants' opinion about safety of medications given to pregnant women (No.:168)

Variable	Don't know	Risk/ benefit	Not safe during pregnancy	Safe during pregnancy
Doxycycline	35 (20.8)	11 (6.5)	109 (64.9)	13 (7.7)
Amoxicillin	4 (2.4)	7 (4.2)	11 (6.5)	146 (86.9)
Penicillin G	43 (25.6)	9 (5.4)	21 (12.5)	95 (56.5)
Warfarin	36 (21.4)	19 (11.3)	91 (54.2)	22 (13.1)
Metformin	18 (10.7)	30 (17.9)	44 (26.2)	76 (45.2)
Methyldopa	24 (14.3)	9 (5.4)	11 (6.5)	124 (73.8)
Estazolam	84 (50)	15 (8.9)	58 (34.5)	11 (6.5)
Statins	43 (25.6)	14 (8.3)	82 (48.8)	29 (17.3)
Methotrexate	37 (22)	7 (4.2)	107 (63.7)	17 (10.1)
Valproic acid	50 (29.8)	28 (16.7)	68 (40.5)	22 (13.1)
Levothyroxine	20 (11.9)	7 (4.2)	14 (8.3)	127 (75.6)
Aspirin	21 (12.5)	25 (14.9)	27 (16.1)	95 (56.5)
Diazepam	61 (36.3)	27 (16.1)	59 (35.1)	21 (12.5)
Acetaminophen	23 (13.7)	8 (4.8)	21 (12.5)	116 (69)
Loperamide	77 (45.8)	16 (9.5)	37 (22)	38 (22.6)
Ranitidine	37 (22)	21 (12.5)	36 (21.4)	74 (44)
Chlorpheniramine	56 (33.3)	28 (16.7)	37 (22)	47 (28)
Dextromethorphan hydrobromide	59 (35.1)	22 (13.1)	43 (25.6)	44 (26.2)
Diphenhydramine	54 (32.1)	27 (16.1)	35 (20.8)	52 (31)
Pseudoephedrine hydrochloride	66 (39.3)	24 (14.3)	53 (31.5)	25 (14.9)
Kaolin and pectin	114 (67.9)	19 (11.3)	23 (13.7)	12 (7.1)
Nasal fluticasone	36 (21.4)	23 (13.7)	13 (7.7)	96 (57.1)
Calcium carbonate	25 (14.9)	9 (5.4)	14 (8.3)	120 (71.4)

Figure 2. Percentage distribution of studied participants according to type of obstacles faced regarding prescribing medication for pregnant women
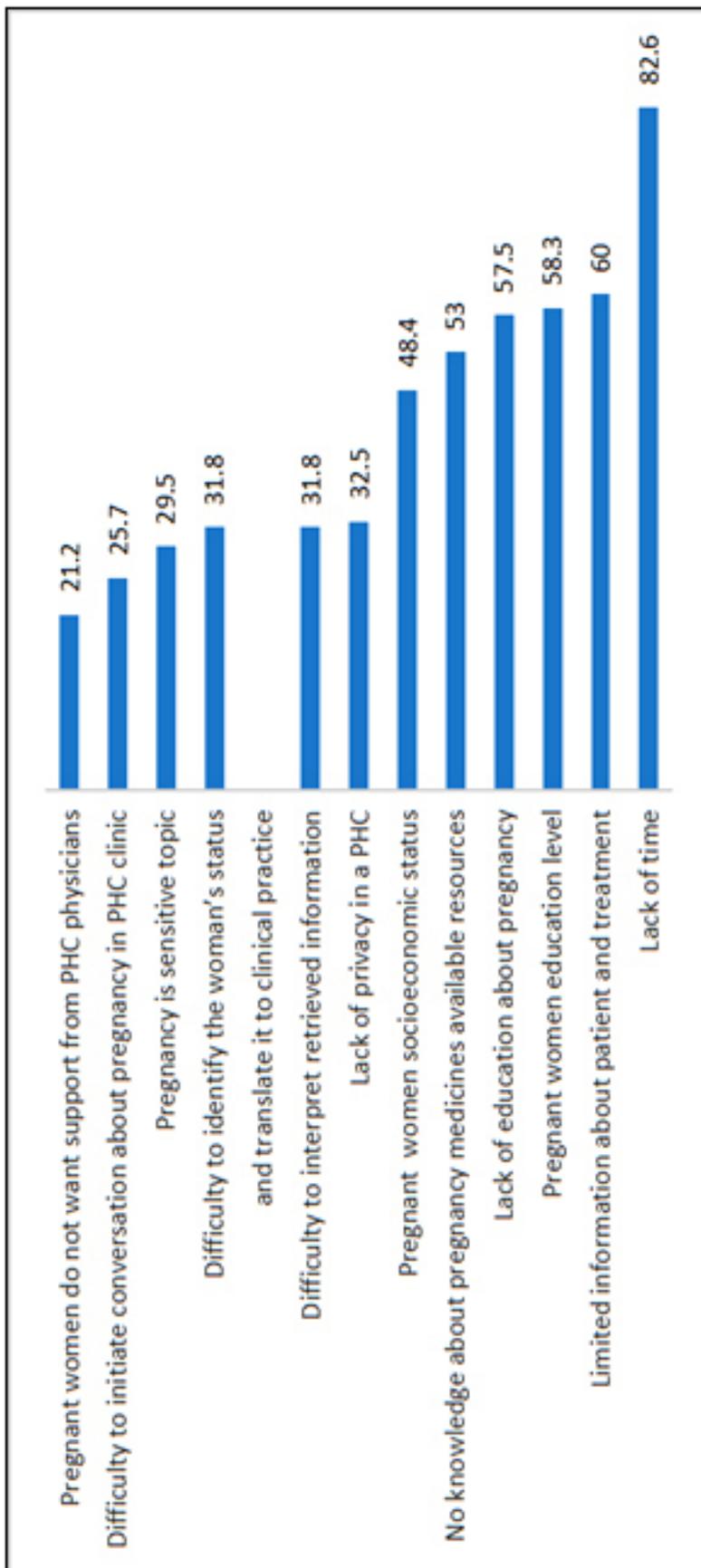
Table 4. Relationship between participants' gender and their practice and frequency of prescribing medication to pregnant women (No.:168)

Variable	Gender		χ2	p-value
	Male	Female		
Do you prescribe a medication to pregnant women?				
Never	5 (55.6)	4 (44.4)		
Sometimes	56 (49.1)	58 (50.9)	9.33	**0.025**
Usually	6 (31.6)	13 (68.4)		
Always	5 (19.2)	21 (80.8)		
Check each time the medication history of pregnant women (e.g folic acid and other vitamins)				
Never	8 (66.7)	4 (33.3)		
Sometimes	9 (81.8)	2 (18.2)	16.08	
Usually	15 (57.7)	11 (42.3)		**0.001**
Always	40 (33.6)	79 (66.4)		
Ask if coming woman is pregnant or not before prescribing a medication?				
Never	1 (100)	0 (0.0)		
Sometimes	18 (78.3)	5 (21.7)	16.58	**0.001**
Usually	17 (44.7)	21 (55.3)		
Always	36 (34)	70 (66)		
Follow up medication of pregnant women				
Never	5 (62.5)	3 (37.5)		
Sometimes	18 (75)	6 (25)	19.26	**< 0.001**
Usually	18 (52.9)	16 (47.1)		
Always	31 (30.4)	71 (69.6)		
Discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition				**< 0.001**
Never	8 (88.9)	1 (11.1)	25.39	
Sometimes	13 (76.5)	4 (23.5)		
Usually	18 (56.3)	14 (43.8)		
Always	33 (30)	77 (70)		
Provide a clear and evidence-based information on the safety of specific medicines during pregnancy				
Never	13 (81.3)	3 (18.8)	16.63	**0.001**
Sometimes	8 (32)	17 (68)		
Usually	26 (53.1)	23 (46.9)		
Always	25 (32.1)	53 (67.9)		
Have any experience of using medications during pregnancy that caused teratogenicity?				
Never	42 (44.7)	52 (55.3)		
Sometimes	9 (34.6)	17 (65.4)	3.59	0.308
Usually	12 (57.1)	9 (42.9)		
Always	9 (33.3)	18 (66.7)		
Check for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women?				
Never	5 (83.3)	1 (16.7)	9.05	**0.029**
Sometimes	11 (47.8)	12 (52.2)		
Usually	23 (53.5)	20 (46.5)		
Always	33 (34.4)	63 (65.6)		

Table 5. Relationship between participants' position and their practice and frequency of prescribing medication to pregnant women (No.:168) (continued next page)

| Variable	Position					χ2	p-value
	Consultant	Family medicine resident	General practitioner	Dentist	Family medicine specialist		
Do you prescribe a medication to pregnant women?						31.4	0.002
Never	0 (0.0)	1 (11.1)	5 (55.6)	3 (33.3)	0 (0.0)		
Sometimes	8 (7)	23 (20.2)	46 (40.4)	16 (14)	21 (18.4)		
Usually	1 (5.3)	8 (42.1)	6 (31.6)	0 (0.0)	4 (21.1)		
Always	8 (30.8)	5 (19.2)	5 (19.2)	1 (3.8)	7 (26.9)		
Check each time the medication history of pregnant women (e.g folic acid and other vitamins)						56.96	< 0.001
Never	0 (0.0)	0 (0.0)	3 (25)	9 (75)	0 (0.0)		
Sometimes	1 (9.1)	3 (27.3)	3 (27.3)	3 (27.3)	1 (9.1)		
Usually	4 (15.4)	6 (23.1)	6 (23.1)	2 (7.7)	6 (23.1)		
Always	12 (10.1)	28 (23.5)	28 (23.5)	6 (5)	25 (21)		
Ask if coming women are pregnant or not before prescribing a medication?						15.5	0.215
Never	0 (0.0)	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)		
Sometimes	2 (8.7)	6 (26.1)	9 (39.1)	1 (4.3)	5 (21.7)		
Usually	2 (5.3)	12 (31.6)	15 (39.5)	0 (0.0)	9 (23.7)		
Always	13 (12.3)	19 (17.9)	37 (34.9)	19 (17.9)	18 (17)		
Follow up medication of pregnant women						35.48	> 0.001
Never	0 (0.0)	1 (12.5)	3 (37.5)	4 (50)	0 (0.0)		
Sometimes	0 (0.0)	5 (20.8)	11 (45.8)	4 (16/7)	4 (16.7)		
Usually	5 (14.7)	15 (44.1)	11 (32.4)	2 (5.9)	1 (2.9)		
Always	12 (11.8)	16 (15.7)	37 (36.3)	10 (9.8)	27 (26.5)		
Discuss the importance of medication adherence with pregnant women who are using medicines for chronic health condition						47.48	< 0.001
Never	0 (0.0)	0 (0.0)	3 (33.3)	6 (66.7)	0 (0.0)		
Sometimes	1 (5.9)	3 (17.6)	11 (64.7)	1 (5.9)	1 (5.9)		
Usually	2 (6.3)	14 (43.8)	10 (31.3)	3 (9.4)	3 (9.4)		
Always	14 (12.7)	20 (18.2)	38 (34.5)	10 (9.1)	28 (25.5)		

Table 5. Relationship between participants' position and their practice and frequency of prescribing medication to pregnant women (No.:168) (continued)

Provide clear and evidence-based information on the safety of specific medicines during pregnancy						13.07	0.364
Never	0 (0.0)	1 (6.3)	10 (62.5)	3 (18.8)	2 (12.5)		
Sometimes	1 (4)	8 (32)	9 (36)	3 (12)	4 (16)		
Usually	6 (12.2)	14 (28.6)	15 (30.6)	4 (8.2)	10 (20.4)		
Always	10 (12.8)	14 (17.9)	28 (35.9)	10 (12.8)	16 (20.5)		
Have any experience of using medications during pregnancy that caused teratogenicity?						15.53	0.213
Never	8 (8.5)	21 (22.3)	29 (30.9)	15 (16)	21 (22.3)		
Sometimes	3 (11.5)	7 (26.9)	11 (42.3)	0 (0.0)	5 (19.2)		
Usually	2 (9.5)	7 (33.3)	8 (38.1)	3 (14.3)	1 (4.8)		
Always	4 (14.8)	2 (7.4)	14 (51.9)	2 (7.4)	5 (18.5)		
Check for updates concerning the safety information for medicines when deciding to prescribe a medication to pregnant women?						25.35	0.013
Never	0 (0.0)	0 (0.0)	3 (50)	3 (50)	0 (0.0)		
Sometimes	1 (4.3)	8 (34.8)	7 (30.4)	4 (17.7)	3 (13)		
Usually	1 (2.3)	14 (32.6)	17 (39.5)	3 (7)	8 (18.6)		
Always	15 (15.6)	15 (15.6)	35 (36.5)	10 (10.4)	21 (21.7)		

Figure 3. Relationship between participants' age and facing lack of time as an obstacle in prescribing medication for pregnant women (No.:168)

	25-35 years	36-45 years	46-55 or more
■ Face lack of time obstacle	56.5	35.3	8.2
■ Don't face lack of time	73.5	15.7	10.8
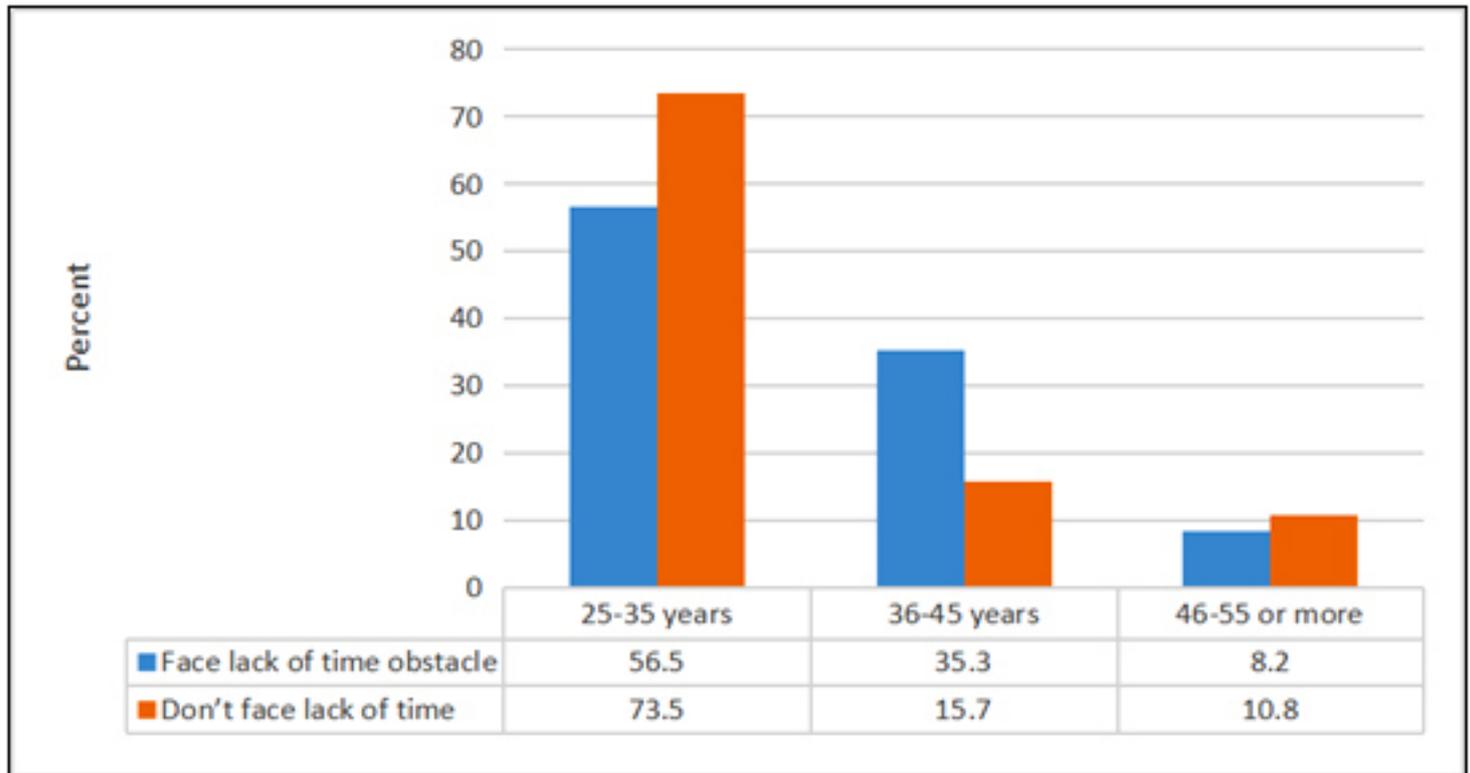
N.B.: (χ2 = 8.49 , p-value = 0.014)

Figure 4. Relationship between participants' position and facing level of education of pregnant women (more educated women are more aware, willing to share information with physicians) as an obstacle in prescribing medication for pregnant women (No.:168)

	Consultant	FM resident	GP	Dentist	FM specialist
■ Face obstacle of pregnant women education	8.8	27.5	38.8	8.8	16.3
■ Don't face this obstacle	11.4	17	35.2	14.8	21.6
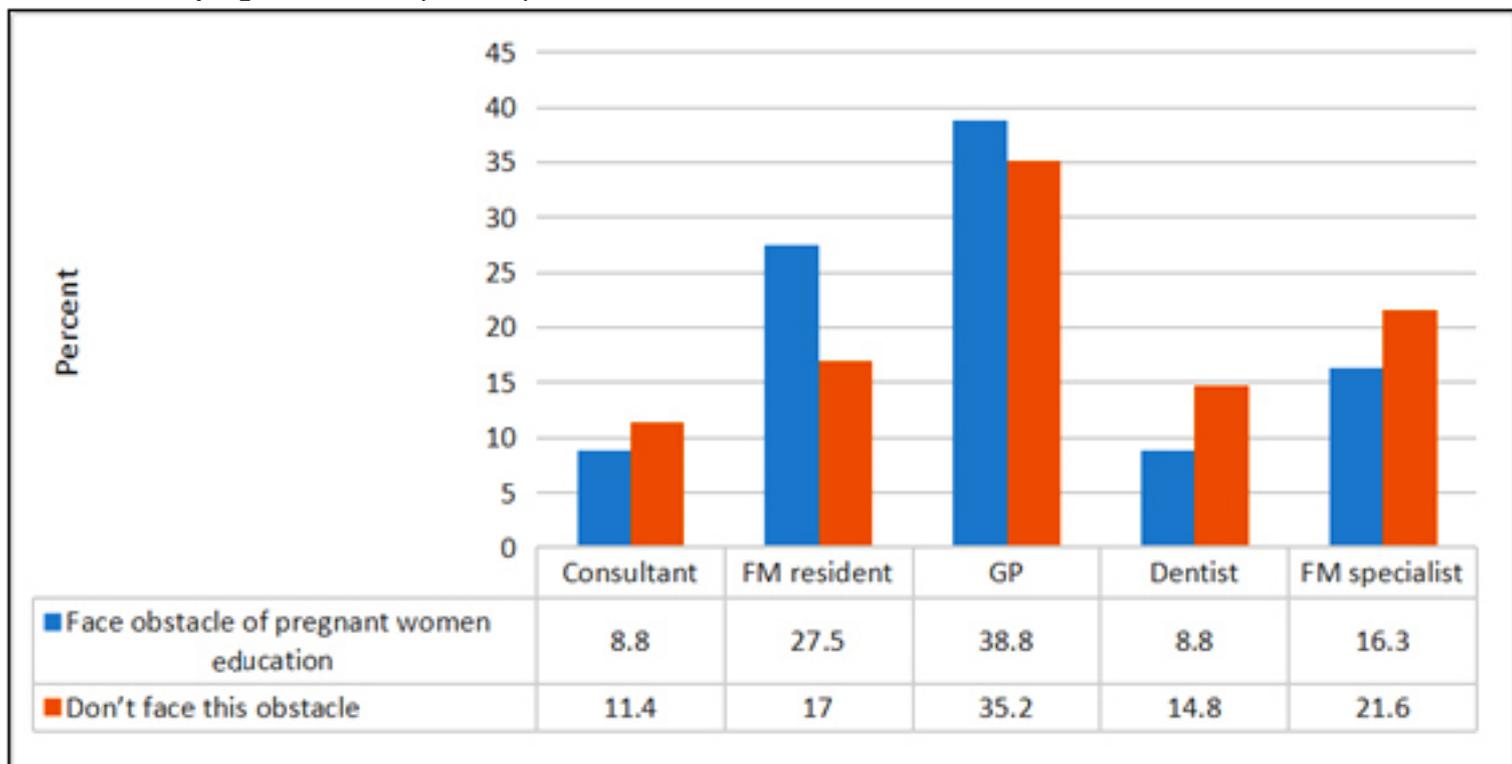
N.B.: (χ2 = 11.81, p-value = 0.019)

Figure 5. Relationship between participants' position and facing lack of privacy in a PHC as an obstacle in prescribing medication for pregnant women (No.:168)

	Consultant	FM resident	General practitioner	Dentist	FM specialist
■ Face lack of privacy in PHC	2.3	37.2	44.2	4.7	11.6
■ Don't face this obstacle	12.8	16.8	34.4	14.4	21.6
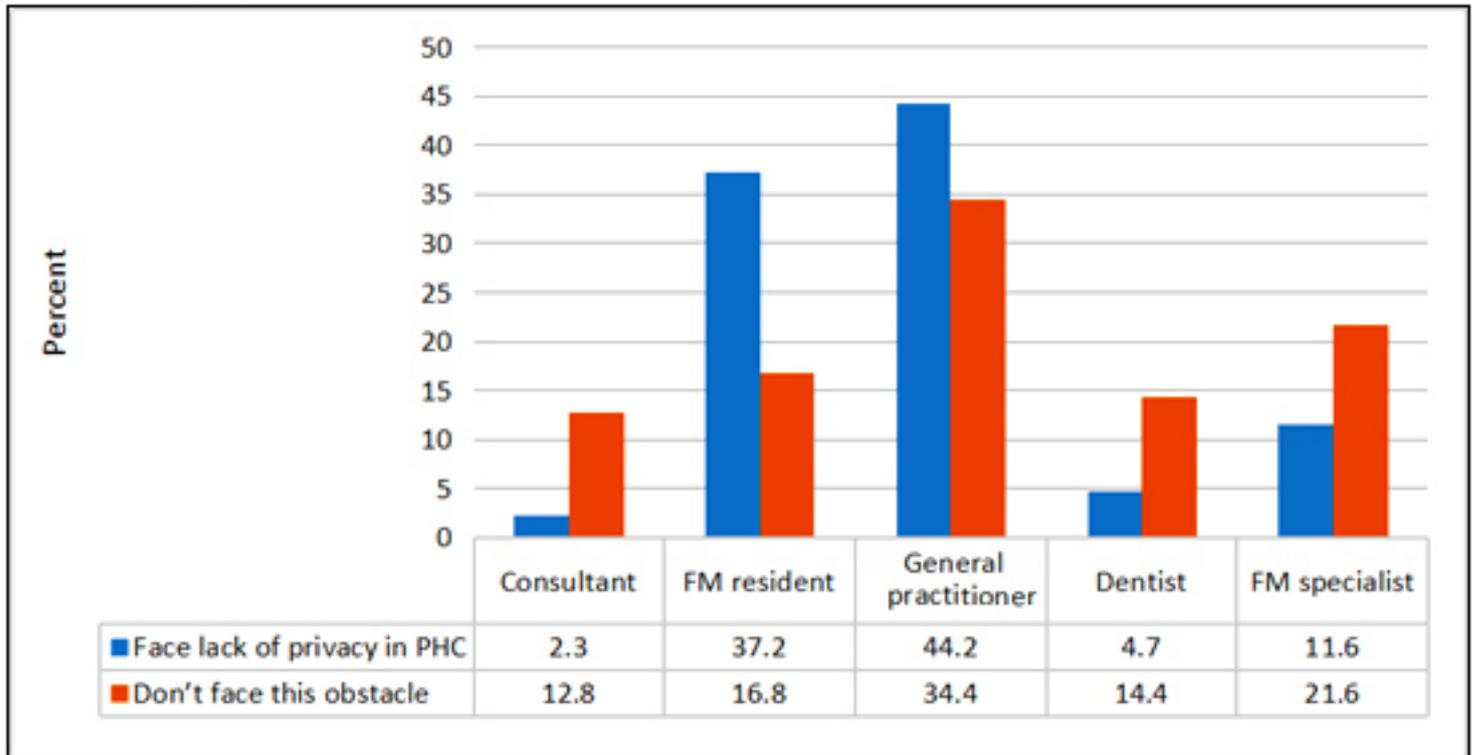
N.B.: (χ2 = 14.57 , p-value = 0.006)

Figure 6. Relationship between participants' position and facing lack of education regarding pregnancy as an obstacle in prescribing medication for pregnant women (No.:168)

	Consultant	FM resident	General practitioner	Dentist	FM specialist
■ Face lack education regarding pregnancy	2.6	27.6	46.1	11.8	11.8
■ Don't face this obstacle	16.3	17.4	29.3	12	25
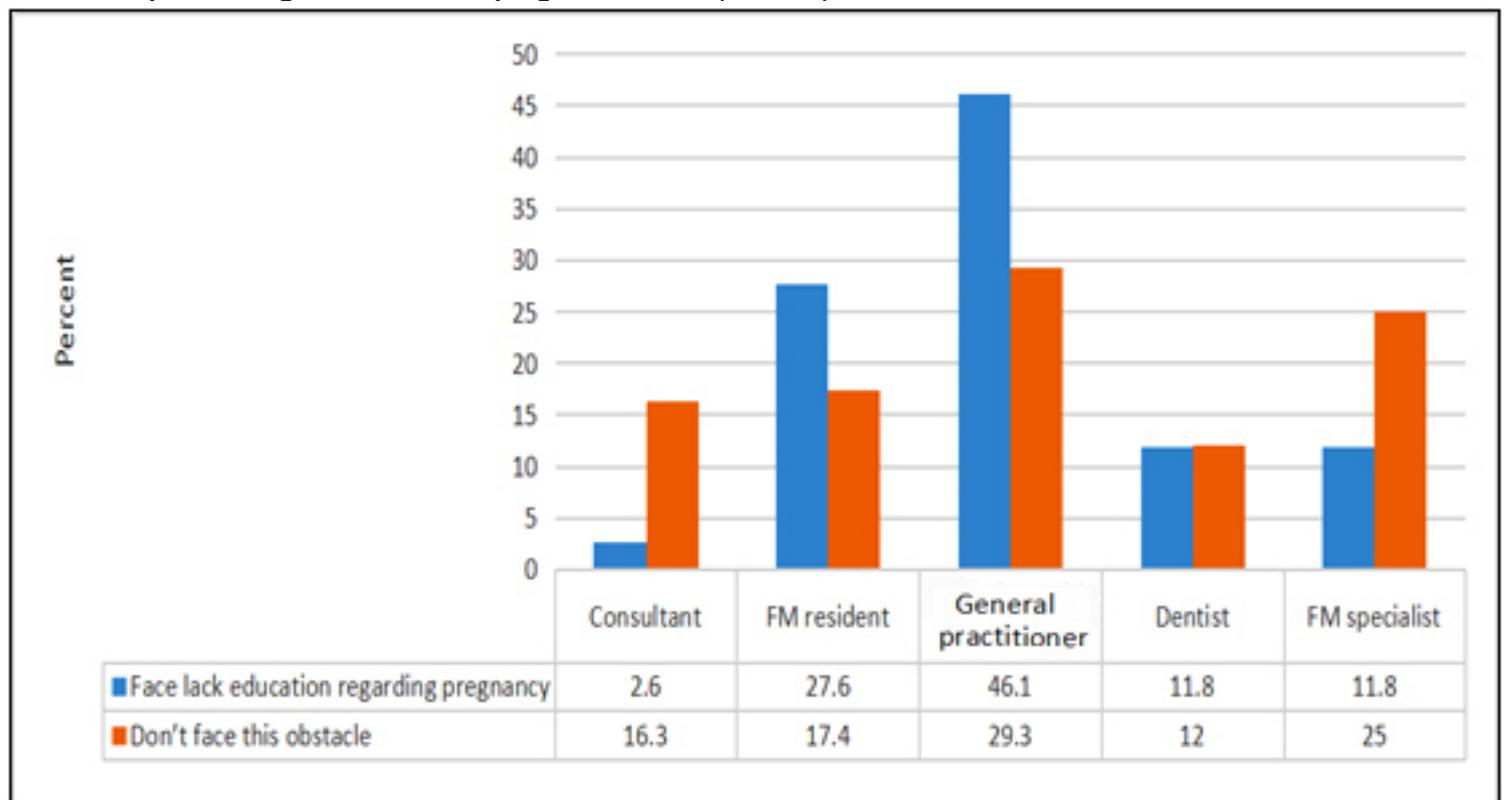
N.B.: (χ2 = 16.6 , p-value = 0.002)

Discussion

PHC Physicians should be aware of all medications they prescribe for pregnant women attending PHC centers. In order to improve quality of care given to pregnant women during their visits to PHC centers, this study aimed to assess knowledge and practice of PHC physicians toward some of the medications for most common diseases. In addition, physicians were asked about the most common obstacles they face in medication prescribing for pregnant women.

Regarding the knowledge, this study revealed that most of the participants have insufficient knowledge about some of medications they prescribe for pregnant women. Among studied physicians, the most common medications reported by the participants to be safe during pregnancy were: Amoxicillin (86.9%), Levothyroxine (75.6%), Methyldopa (73.8%) and Calcium carbonate (71.4%) and acetaminophen (69%). While the most the most common medications reported to not be safe during pregnancy were: Doxycycline (64.9%), Methotrexate (63.7%) and Warfarin (54.2%). This agrees with a study done in Ethiopia, where 61.8% of the participants chose acetaminophen to be safe during pregnancy (12). This result also agrees with that found in a previous Saudi study, where acetaminophen was considered as being safe for use in pregnant women (13).

In the present study, 45% of the participants chose metformin to be safe during pregnancy. In contrast to an Ethiopian study, only 6.6% knew that budesonide is safe (12). This work revealed that 33% of the participants didn't know about chlorpheniramine \ is a category B antihistamine, 23% reported that it was safe and 28% reported it to be unsafe. The previously mentioned Ethiopian study found that about 18.4% of the study participants knew that chlorpheniramine could be used after weighing risks and benefits for individual patients.

The present study found that 86.9% of the participants reported that amoxicillin is safe during pregnancy which is category B in FDA classification (7,14). This is compared to 64.5% in the Ethiopian study (12).

About 75% (75.6%) of the participants of the present work chose Levothyroxine to be safe, which is category B (FDA). However, 11.9% didn't know about the medication and 8.9% wrongly answered that it is not safe. Of them, 73.8% chose Methyldopa to be safe, which is category B and 14.3% didn't know about it. And 71.4% of them chose Calcium carbonate to be safe during pregnancy, which is category C and generally regarded as safe. Very few PHC physicians (7%) knew that kaolin and pectin is safe in pregnancy which is category B and a drug used as an antidiarrheal, while, 67%.9 didn't know about the medication. At the same time, 35% of the participants did not know about Dextromethorphan, and 25% and 26% reported it to be safe and not safe respectively. This drug is category C (FDA), and appears to be safe.

Pseudoephedrine was not known by 39% of the participants, however 31% don't know that it is safe and category B (FDA). For Diphenhydramine which belongs to category B, about 32% of participants didn't know about the medication and 31% chose it as safe. Among the most common medications reported by the participants not to be safe during pregnancy, which are category X, were: 63.7% for Methotrexate. This drug is contraindicated and category X (FDA). Around half of the participants (54.2%) knew that Warfarin is not safe. Warfarin is contraindicated and category X (FDA). A similar result was found in the Ethiopian study, where 59.2 % chose Warfarin to not be safe (12).

Of the studied participants, 48.8% knew that statins are not safe, which is category X. 64.9% reported that Doxycycline is not safe which is category D and 29.8% didn't know about medication safety of Valporic acid, which is category D (FDA). 35.1% chose Diazepam not to be safe which is category D (FDA), and 31.5% chose Pseudoephedrine hydrochloride to not be safe which is category B (FDA). For Ranitidine which is category B only 44% knew that it is safe, and 56% chose Aspirin to be safe, however it is considered as category D (FDA). The same doubt about Aspirin was revealed from a previous study (12). In comparison to a previous study, of all medicines prescribed, 17% were included in the foetal risk category C and 5% in category D (15). Compared to a study done in Qatar, the majority of the respondents had average knowledge about medication use in pregnancy (16).

Among studied participants, the most common sources of checking pregnancy safety information for a medicine used were secondary resources: websites or applications (e.g Uptodate, BMJ, Epocrates Micromedex) (82.7%), regulatory agencies websites (Food and Drug Administration [FDA] (55.4%) and Product leaflet/insert (44.6%). A previous study done in Qatar found that Micromedex® was the most used source as a reference to check pregnancy information, followed by Lexicomp® and the Drug and Poison Information Centers (16).

The obstacles faced in prescribing medications to pregnant mothers were assessed in this study. The most common obstacles faced were: Lack of time to read (82.6%), limited information about patient and treatment (60%), pregnant women education level (58.3%), lack of education about pregnancy (57.5%) and no knowledge about pregnancy medicines available resources (53%). Similar results were found in a previous study, where lack of clinical time was the most common obstacle when practicing medications prescription to pregnant mothers (17). In a previous study done in Qatar, lack of available resources and unknown pregnancy status were the main barriers to dispensing medication to pregnant women (16).

Limitations
A limitation of the present study is having a cross-sectional design that could reveal the association between variables but not the causal relationships.

Conclusion

This study found that 78.6% of PHC physicians were facing obstacles in prescribing medication for pregnant women. The most common obstacles were Lack of time to read, limited information about patient and treatment, pregnant women education level and lack of education about pregnancy. The most common medications reported by the participants to be safe during pregnancy were: Amoxicillin (86.9%), Levothyroxine (75.6%), Methyldopa (73.8%), Calcium carbonate (71.4%), Nasal fluticasone (57.1%) and Penicillin G (56.5%). And the most the most common medications reported not to be safe were: Doxycycline (64.9%), Methotrexate (63.7%), Warfarin (54.2%) and Statins. Participants with an age ranging from 25-35 years had a significantly higher percentage of facing lack of time to read as an obstacle in prescribing medication for pregnant women, while GPs had a significant higher percentage of facing the level of education of pregnant women, lack of privacy in a PHC and lack of education regarding pregnancy, as obstacles. There is a need to increase PHC physician's awareness about the FDA guidelines and categories of drug prescribing in pregnancy. Emphasis on the importance of double-checking medicine pregnancy safety information is needed to ensure safe use.

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The prevalence of unplanned pregnancy among women attending antenatal primary care clinics in Qatar

Muhammad Tanveer Alam (1)
Shajitha Thekke Veettil (2)
Hanan Khudhadad (3)
Nazmul Islam (4)

(1) Airport Health Center, Consultant Family Medicine, Primary Health Care Corporation, Doha, Qatar
(2) Clinical Research Department, Primary Health Care Corporation, Doha, Qatar Directorate of Clinical Affairs
(3) Clinical Research Department, Primary Health Care Corporation, Doha, Qatar Directorate of Clinical Affairs
(4) Department of Public Health, College of Health Sciences, QU Health, Qatar University, Doha, Qatar

Corresponding author:
Dr. Shajitha Thekke Veettil
Clinical Research Department, Primary Health Care Corporation,
Doha, Qatar
Email: sveettil@phcc.gov.qa

Abstract

Background: Currently, 40% of pregnancies worldwide are unplanned and leading to approximately 42 million induced abortions per year, and 34 million unintended births.

Objectives: This study aims to ascertain the prevalence of unintended pregnancies among antenatal women attending antenatal clinics in Primary Care in Qatar and to establish any demographic differences among antenatal women around the choice of pregnancy.

Methodology: A cross-sectional descriptive study with convenience sampling was used to recruit the participants. A validated questionnaire (the London Measure of Unplanned Pregnancy (LMUP)) was used to look at the prevalence and hence the size of the problem.

Results: Among 107 participants, scores on the LMUP ranged from 0-12 with a median of 10. Most pregnancies 79.4%, (n=85) were categorized as planned, 17.8% (n=19) as ambivalent, and 2.8% (n=3) as unplanned. 71% of women (n=76) described their current pregnancy as 'wanted', and 20.6% (n=22) as 'mixed feelings' and 8.4% of women (n=9)

defined their pregnancy as 'unwanted'. Women who are married for more than 5-years (β:-1.50, 95%CI -2.47 to -0.52, p=0.003) tended to have significantly lower LMUP scores, and hence a higher risk of having a more unplanned pregnancy. However, women who are non-Qatari's (β:6.30, 95%CI 3.30 to 9.30, p<0.001) and have more than 5-years since last delivery (β:2.32, 95%CI 0.95 to 3.68, p=0.001) have significantly higher LMUP scores and hence a lower risk of having a more unplanned pregnancy.

Conclusion: Unplanned pregnancies in this population are rare among women attending antenatal clinics. Less planned pregnancies tended to be more prevalent among Qatari women compared to expatriates. Unplanned pregnancy prevention services need to be included within pregnancy care services in primary care settings to offer preferred contraception on time to effectively maintain the low rate of unplanned pregnancies in the country.

Key words: Prevalence, unplanned pregnancy, antenatal clinics, primary care, Qatar

Introduction

Unplanned pregnancies or unintended pregnancies include unwanted pregnancies where there is no desire for children or childbearing has been completed or has been mistimed that is earlier than anticipated (1). Studies have shown that 40% of pregnancies are unplanned worldwide leading to approximately 42 million induced abortions per year, and 34 million unintended births (2).

It is thought that unintended pregnancies are widespread in the Arab region with unintended consequences for individuals, families (3) and indirectly to the society as well (4). In areas like the Middle East, where the population growth has generally tripled between 1970 and 2010 (5), and in Qatar itself by an average of 10% a year in the decade to 2014 (6), unplanned pregnancies can have an impact on socio economic development as well as health systems (3) and education (6). The contraceptive use in Qatar is reported as 38% in 2012 and this is near similar for both Qatari and non-Qatari women (7). A local survey in Qatar done in 2012 suggested that the demand for contraception had been satisfied with only a small proportion suggesting it was unmet (7).

Although there has been a decrease in the total fertility rate (average number of children a woman would have during her reproductive years) for Qatari women from 3.9 children per woman in 2006 to 3.2 in 2015, it still remains high compared to the world average of 2.5 (8). This decline has been attributed to the preference by Qatari women for higher educational attainment with prioritization of work and career to marriage and childbearing as well as their reluctance to marry early (8).

In this context, the consequences of unintended pregnancy to health can be significant. According to international studies, its effects can be harmful to health (9) with many studies highlighting the risk of unsafe abortions where terminations are carried out by individuals lacking the necessary skills or in an appropriate medical environment(10). There can also be a delay in or inadequate prenatal care affecting both mother and child (11). Higher risk of low birth weight and developmental problems especially when the baby is born soon after a sibling has also been documented (11).

No studies highlighting unplanned pregnancies have been published in Qatar and very few have been documented in the Middle East even though this has been highlighted as widespread in the Arab region (11). Anecdotal evidence through attendance at the antenatal clinics in Qatar suggests that it may be a significant problem in clinical practice. Unplanned pregnancies can have a significant impact on family planning, economic and social well-being among women. Therefore, this study is to investigate the scale of the problem by looking into its prevalence and to establish any demographic differences among antenatal women around the choice of pregnancy. This would be the initial building block towards further research into awareness and the psychosocial impact of the condition.

Materials and Methods

A cross-sectional descriptive study design with convenience sampling was used to recruit the women from the antenatal clinics at various Primary Health Care Centers in the State of Qatar for 6 months. Survey methodology with validated questionnaires was used to look at the prevalence and hence the size of the problem.

Primary Healthcare Corporation (PHCC) is the primary healthcare provider for the people of Qatar. Currently, the PHCC is operating 27 primary health care centers in three health regions namely; Central, Western, and Northern. Thirteen of these health centers are in Doha city (Central Region), whilst the other centers are in the Northern and Western parts of the country. The Health Centers provide appropriate and effective health care services focused on the needs of patients. Services delivered emphasize health promotion, prevention and diagnosis, as well as treatment and provision of long-term and appropriate support to patients and their families.

Every woman irrespective of nationality/ethnicity over the age of 16 years who can speak or read Arabic or English attending either their first or follow up antenatal appointment was invited to participate in the study after providing their informed consent. Once agreed and the consent form signed, the London Measure of Unplanned Pregnancy (LMUP) questionnaire (12) was given to them for completion. Women who did not wish to be included in the study, and where questionnaires were incomplete, were excluded from the study.

LMUP was used to measure the prevalence of unplanned pregnancies. The LMUP does not assume that women have clearly defined pregnancy intentions, allowing them to express ambivalence towards becoming pregnant. The measure contains six items asking about contraceptive use, pre-conceptional preparations, partner influences, personal circumstances and timing of pregnancies, desire for pregnancy and motherhood, and intention to become pregnant. Each item was scored 0 to 2, with a total score ranging from 0 to 12; the higher the score, the more pregnancy is planned and intended. For prevalence estimates, the authors suggested a division of scores into a minimum of three groups, with scores 0–3 categorized as 'unplanned', 4–9 as 'ambivalent', and 10–12 as 'planned'.

The LMUP is a psychometrically validated measure of pregnancy planning/intention developed by Geraldine Barrett and colleagues. Originally developed in the UK, the LMUP has now been validated for use in countries across five continents. LMUP consists of six questions, each scored 0, 1, or 2. These are added to obtain the final scores. Pregnancies with scores of 0-3 are classified as unplanned, 4-9 as ambivalent, and 10-12 as planned. Written responses would be evaluated about why women were not using the contraceptive method they wanted to use. In addition, demographic details around age, marriage date, nationality, gravida, date of last delivery if previously pregnant, miscarriages, type of contraception

normally used, years in Qatar if non-Qatari, education, work status and total household income and about unplanned pregnancy was taken.

Four health centers from different regions in Qatar providing antenatal clinics were chosen for this study. All these four health centers are providing a similar pattern of antenatal services. The study required minimal logistical support as most of the clinics and required patients are booked at the health center through the existing pathways and procedures followed at PHCC. In the clinic the slots range from 14-18 patients per session lasting 20-30 minutes each. Initially patients are seen and counselled by the health counsellor as well as the nurse who does the vital signs. The study was explained by the health counsellor/ lead nurse in charge of the antenatal clinic. Convenience sampling of consecutive women attending their antenatal clinic (ANC) appointment were invited into the study after giving their informed consent. The patients who agreed to participate in the study completed the questionnaire and returned it. After receiving the questionnaire and written informed consent, the lead researcher collected data from the patient's medical records. The collected data were anonymized before being processed.

Totally 107 participants were recruited from June to December 2018. Ethical approval for the study was obtained from the Department of Clinical Research committee of all participating health centers. Due to a paucity of any local studies available regarding unplanned pregnancies, and taking into consideration the prevalence rates in literature, 7 percent was chosen as the estimated number of unplanned pregnancies in Qatar. The sample size for the descriptive epidemiology study was done using the following references (10).

$Z= 1.96, p= 0.07, d= 0.05$
$n=Z^2P(1-P)/ d^2$

Statistical analysis

Descriptive analyses were performed by using frequencies (percentages) for categorical variables and means (ranges) for continuous variables. The LMUP was treated as a continuous instead of a dichotomous variable (J. Hall, personal communication), and thus, the lower the score on LMUP, the less planned a pregnancy was. The LMUP was not normally distributed, therefore, nonparametric tests were used. Spearman rank correlation coefficient was performed to analyze correlations between LMUP scores and continuous demographics and outcomes. Mann–Whitney U tests and Kruskal–Wallis tests were used to compare differences in LMUP across categorical demographics and outcomes. Multiple linear regression analysis was performed using the 'enter method' to obtain the best-fit model predicting more unplanned pregnancies. The model included socio-demographic and antenatal variables found to be significant during simple regression analysis. Before running the regression model few response options were collapsed and fitted in the model. The analysis was done by using The Statistical Package for the Social Sciences (SPSS) version 16 for data analysis (IBM Corporation, Armonk, NY, USA). A value of $P < 0.05$ was considered statistically significant.

Results

Socio-demographic and antenatal characteristics are presented in (Table 1). Due to a paucity of any local studies available regarding unplanned pregnancies, and taking into consideration the prevalence rates in literature, 7 percent was chosen as the estimated number of unplanned pregnancies in Qatar and we calculated 100 participants for this study. We recruited a total of 107 women, and they completed the questionnaire followed by the informed consent form. The mean age of participating women was 30.2 years and a few of them (4.7%) are of Qatari nationality. Approximately half of the participants had been married for 1-5 years and 97.1% were multi-gravid. The majority of the participants were housewives (57.1%), and had no miscarriage (78%), used no contraception (52.5%), had undergraduate education (32%) and had 5000-10000 QR household income (33.3%) (Table 1).

Prevalence of unplanned pregnancy
Scores on the LMUP ranged from 0 to 12 with a median of 10 (interquartile range (IQR): 2). Most pregnancies (79.4%, n =85) were categorized as planned, 17.8% (n = 19) as ambivalent, and 2.8% (n = 3) as unplanned (Fig. 1). 71% of women (n = 76) described their current pregnancy as 'wanted', and 20.6% (n = 22) as 'mixed feelings' and 8.4% of women (n = 9) defined their pregnancy as 'unwanted'.

Associated factors
Estimates from a multiple linear regression suggest that women who were married for more than 5 years (β: -1.50, 95%CI -2.47 to -0.52, p=0.003) tended to have significantly lower LMUP scores, and hence a higher risk of a more unplanned pregnancy. However, women who are non-Qatari's (β: 6.30, 95%CI 3.30 to 9.30, p<0.001) and have had more than 5 years to last delivery (β: 2.32, 95%CI 0.95 to 3.68, p=0.001) have significantly higher LMUP scores and hence a lower risk of an unplanned pregnancy. Nationality and years to the last delivery had significant effect on unplanned pregnancies. Compared to Qataris, non-Qataris have a low risk of having unplanned pregnancies. Regardless of the nationality, the women who were married more than 5 years had a high chance to have more unplanned pregnancies due to the lower LMUP score. Other demographic factors show no significant effect on the LMUP score of unplanned pregnancy (Table 2).

Table-1: Associations between demographic characteristics and LMUP score

Characteristics	Mean(±SD)	Median (IQR)	p-value
Age (years, n=106)	30.2(±4.1)	30(5)	0.037[a]
Characteristics	**n(%)**	**LMUP score[b]**	**p-value**
Nationality (n=107)			0.045[c]
Qatari	5(4.7)	7(7)	
Non-Qatari	102(95.3)	10(2)	
Years of marriage (n=105)			0.413[d]
<1	1(0.9)	11(0)	
1 to 5	48(44.9)	10(2)	
6 to 10	38(35.5)	10(4)	
11 to 15	14(13.1)	10(1)	
>15	4(3.7)	9.5(5)	
Number of Pregnancies (n=105)			0.396[c]
Primi-gravid	3(2.9)	11(2)	
Multi-gravid	102(97.1)	10(2)	
Years since last delivery (n=90)			0.085[d]
<1	31(34.4)	10(2)	
1 to 5	46(51.1)	10(3)	
6 to 10	12(13.3)	10.5(1)	
11 to 15	1(1.1)	12(0)	
>15	0(0.0)	-	
Miscarriage (n=104)			0.479[c]
No	81(77.9)	10(3)	
Yes	23(22.1)	10(2)	
Years in Qatar for non-Q (n=101)			0.409[d]
<1	1(0.9)	11(0)	
1 to 5	36(35.6)	10(2)	
6 to 10	29(28.7)	10(3)	
11 to 15	11.9)	10(1)	
>15	23(22.8)	9(5)	
Contraception (n=99)			0.115[d]
None	52(52.5)	10(2)	
Withdrawal method	16(16.2)	10(4)	
Condoms	18(18.2)	10(1)	
Pill	9(9.1)	8(3)	
Coil	4(4.0)	10(1.5)	
Highest level of formal education (n=99)			0.423[d]
School	9(9.3)	9(2)	
College	27(27.8)	10(3)	
Undergraduate	31(32.0)	10(2)	
Postgraduate without degree	8(8.3)	9.5(3)	
Postgraduate with degree	22(22.7)	10(1)	

Table-1: Associations between demographic characteristics and LMUP score (continued)

Work (n=84)			0.499[d]
Housewife	48(57.1)	10(2)	
Student	3(3.6)	11(2)	
Housemaid	1(1.2)	10(0)	
Nurse	7(8.3)	10(6)	
Receptionist	4(4.8)	9.5(2.5)	
Secretary	6(7.1)	11(1)	
Teacher	6(7.1)	9.5(1)	
Other professional	9(10.7)	11(1)	
Total household income (n=81)			0.485[d]
1000-5000	7(8.6)	9(5)	
5000-10000	27(33.3)	10(2)	
10000-15000	26(32.1)	10(1)	
15000-20000	7(8.6)	9(6)	
20000-30000	9(11.1)	10(2)	
30000-40000	1(1.2)	12(0)	
40000+	4(4.9)	7.5(7.5)	

a Spearman rank correlation coefficient
b Data are presented as median (interquartile range)
c Mann–Whitney U tests
d Kruskal–Wallis tests
SD: Standard deviation
IQR: Interquartile range
LMUP: London Measure of Unplanned Pregnancy

Table 2: Results of multiple linear regression analysis predicting LMUP-Final model

Characteristic	Unadjusted	p-value	95% CI[a]	Adjusted β	p-value	95% CI[a]
Nationality						
Qatari	ref			ref		
Non-Qatari	3.12	0.005	0.94 to 5.30	6.30	<0.001	3.30 to 9.30
Years of marriage						
≤ 5 years	ref			ref		
> 5 years	-0.98	0.04	-1.93 to -0.02	-1.50	0.003	-2.47 to -0.52
Years since last delivery						
≤ 5 years	ref			ref		
> 5 years	1.59	0.031	0.16 to 3.02	2.32	0.001	0.95 to 3.68

a 95% Confidence Interval

Discussion

Our study aimed to assess the prevalence and associated factors of unplanned pregnancies ending in birth. We found that in our population 79.4% of the pregnancies were planned, 17.8% were ambivalent and only 2.8% of the pregnancies were unplanned. Our study results differ from previous studies, which reported higher prevalence of unplanned pregnancies and they are consistent with studies from European countries that were also using the LMUP, which reported a prevalence rate of 2–9% for unplanned pregnancies leading to birth (13-17). All these findings show that the differences in definition and measurements may lead to inconsistent prevalence rates which supports the requirement of a clear definition and a proper measurement tool that takes into account the complexities of the construction (18-20).

In previous studies, another important finding was that women with low socio-economic status and lower education tended to have a higher risk of less planned pregnancies and these pregnancies were more likely to be high-risk pregnancies with no preconception use of folic acid or vitamins, fewer antenatal care visits, smoking during pregnancy, more stress, lower relationship satisfaction, and less social support (21-23). Also, researchers reported there is a possibility that socially disadvantaged women can fail to use contraception correctly and consistently due to knowledge, access, cultural, personal, and relationship factors (24). Ambivalence towards avoiding pregnancy is also more common among women of lower socio-economic status (25, 26). Fedorowicz et al., mentioned that some women who live in a fragile socio-economic environment often see motherhood as an escape from hardship to a better life and an attainable goal that will provide personal satisfaction and achievement (24, 27). Our findings suggest no major differences in pregnancy outcome according to the level of education. We haven't looked at the socio-economic status due to the well-developed economic situation in Qatar. Future studies are required with a large number of populations to define this further.

Unplanned pregnancies are associated with an increased risk of adverse antenatal and birth outcomes. But some later study results propose no major differences in pregnancy outcome according to pregnancy planning. This discrepancy could be attributed to differences in definition and methodology (28).

There are possibilities of having higher risk for poor pregnancy outcomes in unwanted pregnancies rather than mistimed or unplanned pregnancies (29). In this study we haven't looked at the antenatal outcome parameter of unplanned pregnancies and low prevalence in unplanned pregnancy may support the mentioned study results.

Researchers also suggested the opposite cause–effect relationship, namely that pregnancy-related nausea and vomiting, poor social support and unplanned pregnancy are factors that contribute to stress, which harms maternal psychosocial adaptation (30). Further research is required to investigate the relationship between pregnancy planning and hyperemesis gravidarum.

The proportion of women included in this study was based on the following characteristics: age, nationality, years to marriage, number of pregnancies, last delivery date, years to last delivery, miscarriages, years in Qatar for non-Qataris, contraception, education, work and household income, contraception use, time of pregnancy, before becoming pregnant, desire, partner, and health. Our results show that nationality and years since the last delivery have a significant effect on planned pregnancies. Compared to Qataris, non-Qataris have a low risk of having unplanned pregnancies. Regardless the nationality, the women who have been married more than 5 years have a high chance to have more unplanned pregnancies due to the lower LMUP score. Other demographic factors show no significant effect on the LMUP score of unplanned pregnancy. Unplanned pregnancies may have a significant impact on family planning, and economic and social well-being among women. It is required to be explored further in future studies.

Conclusion

In summary, we found that unplanned pregnancies in this population are rare among women attending antenatal clinics. Less planned pregnancies tended to be more prevalent among Qatari women compared to expatriates. More unplanned pregnancies deserve attention as they were more likely to be high-risk pregnancies. This study emphasizes the importance of targeting women through community-based interventions to help reduce unplanned pregnancies. Unplanned pregnancy prevention services need to be included within pregnancy care services in primary care settings to offer preferred contraception promptly to effectively maintain the low rate of unplanned pregnancies in the country.

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Postgraduate Hybrid E-Learning during COVID-19 Pandemic: A Real Experience for Replication

Eman I. Elmeshmeshy
Marwa Mostafa
Rehab M. Sabry
Radwa M. Elsayed

Department of Family Medicine, Faculty of Medicine, Cairo University, Egypt

Corresponding Author:
Rehab Mohamed Sabry
Department of Family Medicine, Faculty of Medicine, Cairo University,
Egypt
Email: rehab.yassen@kasralainy.edu.eg

Abstract

Introduction: The current COVID 19 pandemic has led to abrupt changes in medical education with an imperative need to shift to e-learning for continuity of the education. This shift was challenging especially for developing countries with limited resources and time required for preparation of this shift. Also, there are many queries on the effectiveness and quality of education following this shift.

The study aimed to review a hybrid e-learning experience and the participants' early perceptions.

Method: This was an interventional study. A shortly planned hybrid e-learning system was conducted in the family medicine department programs of MD and MSc. Then, the enrolled 30 postgraduates were invited to participate in a web-based anonymous survey to assess their perception of e-learning after a 2- month experience.

Results: Twenty-six participants were recruited in the survey. The most perceived e-learning advantages were feasibility, saving costs, and motivation to learn. While the perceived challenges were lack of technical skills and internet connection strength. This hybrid learning experience encouraged interaction, motivation, cognitive and problem-solving skills, independent working, and effective time management.

Conclusion: The implementation of hybrid e-learning is a significant step forwards and easily conducted, but it requires work to be improved.

Keywords: E-learning, Hybrid, Postgraduate

Introduction

The spread of COVID-19 has forced many countries into a complete lock-down to apply social distancing. The responses to the COVID-19 pandemic by medical schools globally have varied, from total study cessation to a switch to e-learning (1). But in this pandemic, the need for e-learning is felt more than ever in our living memory as Continuity of medical education is obligatory to meet the imperative need for the generation of future doctors (2).

E-course design requires time for adjusting instructional design, learning assessment, communication, and accessibility of technical support (3). The sudden transition to e-learning approaches is challenging for both faculty and students and has required much planning over a short period and with no clear guidelines. Also, many queries have been raised on the effectiveness, quality of education following this shift and how the awareness and adaptation of new methods may impact medical education (1, 4, 5).

Although teaching is a teacher's activity, the result of learning depends on the student. Effective education is based on participation and cooperation. Therefore, the assessment of its effectiveness depends greatly on the viewpoints of the students (6).

This study aims to review a hybrid e-learning experience and the participants' early perception.

Method

This was an interventional study. In July 2020, the family medicine department, Cairo University stepped towards hybrid e-learning for postgraduates using Blackboard learning management system (LMS) with:

Establishment of an E-scientific committee:
It was formed of 4 family medicine faculty members and 3 medical education experts. It was to set the plan and monitor the implementation.

Digitalization of the curriculum:
There are 2 postgraduate programs, Master (MSc) and Doctorate (MD) Degrees. Digital transformation of the course content was done by weighting the content as documented in the course specification (intended learning outcomes: knowledge, skills, and attitude) distributed on the duration of the course. Each course content was divided into modules according to the weight of topics in the course specification.

Curriculum delivery:
A content map for the curriculum of each program was designed and a module map with the strategy of flipped classroom was set. Each module included pre-class materials (including narrated PowerPoint, videos, guidelines, assignments, and case discussion forms) and synchronous in-class learning (including e-lectures and webinars). The webinar was held for discussion of cases and addressing candidate inquiries, followed by presenting the updates on the discussed topics. All activities were recorded and uploaded to Blackboard. Kahoot was delivered at the module end.

Orientation:
Nine faculty members were trained on the applications, methods of curriculum delivery, and assessments. A team of 2 faculty members, 2 MD and 4MSc degree candidates was assigned for each module. Several meetings were held with the thirty candidates to elucidate the main objectives of this transition, course syllabus, instructions, and ways of curriculum delivery.

The used technological tools:
The blackboard platform was used for communicating timetables and study plans, uploading the learning resources, case discussion forms, assignments, assessments, virtual meetings, and office hours. Also, Microsoft teams, Zoom Applications were used for virtual meetings. Google forms were used to create the program and module evaluation forms. Kahoot was used as a method of game-based learning. What's App groups were used for faculty-student communication.

Students Assessment:
It was designed to include formative and final summative assessments. The formative assessment included assignments, Case discussions, and 4 simulation exams scheduled every 4-5 modules. The latter were comprised of applied knowledge tests and Clinical Structured Assessments.

Student reflection:
To assess the perception of e-learning, a web-based anonymous survey using Google Forms was delivered to 30 recruited candidates.

Voluntary participation and informed consent were included in the first section of the Google form. The questionnaire covered socio-demographic information, the general perception of E-learning, and Family medicine curriculum evaluation (blackboard system, content, and learning tactics). Each item of the domains was rated on a 5-point Likert Scale. The learning tactic domain was rated on 1 to 5 regarding usefulness. Statistical analysis was performed using SPSS Statistics Software. No statistical test was used due to the descriptive nature of the study.

Results

The total number of engaged candidates at the time of this study, December 2020, was 30. The response rate was 86% (26 respondents). They spent 6.26±3.74 hours per week in the course (Table I).

Characteristics of the studied Group
Table I: Basic characteristics of the studied group (N°=26).

Items	(N°=26) %
Gender:	
Male	(3) 11.5%
Female	(23) 88.5%
Degree:	
MSc 1st part	(11) 42.3%
MD	(12) 46.2%
MSc 2nd part	(3) 11.5%
Institution:	
Kasr Al Ainy Hospital	(19) 73.1%
The Ministry of health	(2) 7.7 %
Others	(5) 19.2%
Participation in The Family Medicine E-course through:	
Data package	(4) 15.4%
Wi-Fi	(4) 15.4%
Both	(18) 69.2%
Number of hours spent in the course per week:	
Mean± SD	6.26±3.74
(minimum-maximum)	(1-15)
Age (years):	
Mean± SD	31.57±5.45
(minimum-maximum)	(26-50)

SD: Standard deviation

Although the majority agreed on all mentioned advantages, the highest perceived advantages were feasibility of e-learning in any place (84.6%), saving costs (84.6%), and its effect in motivating them to search for more relevant learning materials (76.9%).

Lack of technical skills and computer knowledge were perceived as important challenges in more than one-third of the participants, but the most perceived challenge was internet connection strength and its effect on the quality of their learning (Table II).

General perception of E- learning
Table II: General Perception of E- Learning

Items	(N°=26) %				
Previous experience of E- learning	Yes		No		
1. Are you comfortable with technology?	(23) 88.5%		(3) 11.5%		
2. Did you enroll in online courses before this course?	(18) 69.2%		(8) 30.8%		
3. Have you previously used an online platform?	(10) 38.5%		(16) 61.5%		
Perception of advantages of E-learning:	SD	D	N	A	SA
1. I can learn on my own	(1) 3.8%	(1) 3.8%	(5) 19.2%	(6) 23.1%	(13) 50%
2. I can learn in any place (home, work.....)	(2) 7.7%	(0)%	(2) 7.7%	(8) 30.8%	(14) 53.8%
3. My circumstances hinder participation in traditional courses	(2) 7.7%	(3) 11.5%	(4) 15.4%	(10) 38.5%	(7) 26.9%
4. I find e-learning more interesting than traditional	(2) 7.7%	(3) 11.5%	(3) 11.5%	(8) 30.8%	(10) 38.5%
5. E-learning motivates me to search for more relevant learning materials	(0)%	(1) 3.8%	(5) 19.2%	(11) 42.3%	(9) 34.6 %
6. E-learning can save costs and transport	(1) 3.8%	(0)%	(3) 11.5%	(8) 30.8%	(14) 53.8%
Perception of E-learning challenges	SD	D	N	A	SA
1. Lack of computer and technology skills is a challenge	(5) 19.2%	(3) 11.5%	(8) 30.8%	(6) 23.1%	(4) 15.4%
2. Internet connection strength determines our effective learning opportunity	(3) 11.5%	(1) 3.8%	(4) 15.4%	(4) 15.4%	(14) 53.8 %
3. I feel charges to connect to the internet are expensive	(5) 19.2%	(3) 11.5%	(9) 34.6%	(5) 19.2%	(4) 15.4%
4. E-learning is only advisable to people with computer knowledge	(3) 11.5%	(5) 19.2%	(7) 26.9%	(9) 34.6%	(2) 7.7%
5. I find difficulty in finding online relevant learning materials	(4) 15.4%	(5) 19.2%	(9) 34.6%	(5) 19.2%	(3) 11.5%

SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, and SA: Strongly Agree.

Most of them agreed on the appropriateness of Blackboard as a learning platform. The majority agreed that faculty and peer communication and interaction, motivation, creativity, cognitive and problem-solving skills, independent working, effective time management were encouraged in the course. But unfortunately, over two-thirds felt stressed and overwhelmed (Table III).

About 58% of the participants found game-based learning (using Kahoot) useful or very useful. The online classes were perceived by 50% of the participants as a very useful learning tactic.

Family Medicine Curriculum Evaluation
Table III: Blackboard Platform and Content Evaluation

No	(N°=26) %				
Blackboard Platform Evaluation	SD	D	N	A	SA
1. Overall framework and operation levels of the system are clear and smooth	(1) 3.8%	(1) 3.8%	(3) 11.5%	(10) 38.5%	(11) 42.3%
2. Overall configuration colour and background are normally harmonious for the system	(2) 7.7%	(1) 3.8%	(3) 11.5%	(11) 42.3%	(9) 34.6%
3. Overall screen layout and window design of the system is appropriate	(2) 7.7%	(0)%	(4) 15.4%	(11) 42.3%	(9) 34.6%
4. Overall interface operation method is easy and appropriate	(1) 3.8%	(0)%	(4) 15.4%	(11) 42.3%	(10) 38.5%
5. Log-in interface is clear and easy to operate	(1) 3.8%	(0)%	(8) 30.8%	(9) 34.6%	(8) 30.8%
6. Register in the course is clear and easy to operate	(1) 3.8%	(1) 3.8%	(3) 11.5%	(11) 42.3%	(10) 38.5%
7. I am Satisfied with system orientation sessions	(2) 7.7%	(1) 3.8%	(3) 11.5%	(9) 34.6%	(11) 42.3%
8. I am Confident and enjoy using the online platform	(1) 3.8%	(1) 3.8%	(3) 11.5%	(13) 50%	(8) 30.8%
Content Evaluation	SD	D	N	A	SA
1. The course meets my personal and professional goals	(2) 7.7%	(1) 3.8%	(5) 19.2%	(9) 34.6%	(9) 34.6%
2. The course content is clear from the start	(1) 3.8%	(2) 7.7%	(4) 15.4%	(10) 38.5%	(9) 34.6%
3. The learning materials are clear, and understandable, and well organized	(1) 3.8%	(1) 3.8%	(5) 19.2%	(9) 34.6%	(10) 38.5%
4. The course objectives, content and assessment are consistent	(1) 3.8%	(2) 7.7%	(2) 7.7%	(11) 42.3%	(10) 38.5%
5. Webinars and e-lectures are effective in bridging the gap (missed academic information and inquiries)	(0)%	(2) 7.7%	(5) 19.2%	(8) 30.8%	(11) 42.3%
6. It allows great communication and interaction between the teachers and other peers	(2) 7.7%	(1) 3.8%	(5) 19.2%	(7) 26.9%	(11) 42.3%
7. It makes me work independently	(1) 3.8%	(0) %	(5) 19.2%	(7) 26.9%	(13) 50%
8. It enhances my motivation, creativity, cognitive skills and problem solving skills	(2) 7.7%	(0) %	(5) 19.2%	(10) 38.5%	(9) 34.6%
9. I can manage my time effectively	(2) 7.7%	(1) 3.8%	(5) 19.2%	(5) 19.2%	(13) 50%
10. It imparts psychological stress for me	(4) 15.4%	(2) 7.7%	(3) 11.5%	(8) 30.8%	(9) 34.6%
11. I am overwhelmed due to the course	(3) 11.5%	(3) 11.5%	(2) 7.7%	(9) 34.6%	(9) 34.6%

Discussion

Due to the COVID-19 pandemic, the family medicine department adopted e-learning for postgraduates. It conducted adult learning principles, self-directed learning, and constructivism with the active involvement of the learner. Also, giving flexibility to the students decreases stress and stimulates higher levels of cognition.

Hybrid e-learning with the strategy of flipped classroom was the main modality and included both synchronous and asynchronous modalities. The experience depended on the use of e-case based learning in assignments, case scenarios in discussion forms, interactive e-lectures, and webinars. The webinar aimed to enhance the candidate's communication and presentation skills (near-peer or peer teaching).

Also, the study focused on "learners' voices" to identify perceived advantages, needs, and obstacles, and evaluate learners' experience. So, innovative pedagogical advancement can be promoted to support students' effective lifelong e-learning.

The advantages perceived by the majority of students regarding e-learning, in general, comes in concordance with Al-Balas et al., 2020 (7) in which timesaving, flexibility, improved interaction with instructors and classmates were considered e-learning benefits in 55.9% of the participants, while internet streaming quality was the main challenge in 69.1%.

But despite these perceived challenges, e-learning reported a high satisfaction rate (93.4%) among Egyptian students in a study conducted by Seada and Mostafa, 2017 (8).

Eighty percent of the participants in this study found that it was easy to register in their courses and were feeling confident and enjoyed using the platform. They found that course content was clear from the start. This reflects the appropriateness of Blackboard as LMS especially after the orientation sessions with which 76.9% of participants were satisfied. Moreover, about two-thirds of participants showed that family medicine e-course allowed faculty-peer communication and interaction (table III).

This goes in hand with Alturise, 2020 (9), who studied the evaluation of the blackboard for full online courses in Western Branch Colleges of Qassim University. He reported that 68.85% of students could easily access e-course content and about 86% of students agreed that the course guide and description were clear in the newly developed e-course with a total e-course satisfaction rate of 66.35%. Also, improvement of teamwork skills was perceived in more than half of students.

Most of the candidates reported that the recorded videos, discussion forms, and Kahoot were useful or very useful. These recorded videos and lectures may help the candidates to prepare these topics before any e-lectures and webinars. They somewhat agree with most of the students in Azlan et al, 2020 (10) study. More than half of the later students perceived the pre-recorded videos/lectures well and Kahoot as fun, helping their understanding but more than half of them felt that the online discussions did not help them understand their lessons better. This difference may be due to the involvement of the case discussion in the webinars.

Limitations and recommendations for future practice: This research revealed a practical way to implement hybrid e-learning, but it did not assess the faculty perception of e-learning and their student engagement. It provided insights for stakeholders to collaborate with telecommunication service providers for the provision of high-speed data services and unlimited time for the synchronous meetings. Also, the students and instructors should develop their technical skills.

Further research to assess the e-learning impact on student's mental health and educational outcome and performance are needed.

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Resilience and Coping Self-Efficacy among Family Medicine Residents in times of COVID-19 pandemic: Interplay and contribution of sociodemographic, professional, lifestyle and health-related factors

Najwa F. Aljehani (1)
Sara Kayal (2)
Abdulrahman M. Albeshry (3)
Majdy M. Qutub (4)

(1) Training completion certificate of famiy medicine. Family medicine specialist. King Abdulaziz university,Jeddah,Saudi Arabia
(2) Family Medicine specialist
(3) Department of Family and Community Medicine, Faculty of Medicine, University of Jeddah, Jeddah, Saudi Arabia
(4) Assistant professor and consultant, King Abdulaziz University Hospital, Jeddah, Saudi Arabia.

Corresponding author:
Dr. Najwa F. Aljehani
King Abdulaziz University Hospital, Jeddah,
Saudi Arabia.
Email: najwa25@windowslive.com

Abstract

Background: Family Medicine Residents face stressors related to their professional responsibilities, ethics, and relationships with patients, supervisors, and society. These stressors were found to increase during the COVID-19 crisis and can lead to maladaptive coping and affect their resilience.

Objectives: to assess family medicine residents' level of resilience coping self-efficacy during COVID-19 crisis.

Method: A cross-sectional study was conducted among 208 family medicine residents in the Western region of Saudi Arabia. Resilience and coping self-efficacy were assessed using the Connor-Davidson Resilience Scale-25 items (CD-RISC-25) and coping self-efficacy scale (CSES), respectively. Professional stressors including work environment satisfaction (WES) were assessed.

Results: The mean (SD) CD-RISC-25 and CSEC score was 54.53 (19.69) out of 100 and 136.81 (63.67) out of 260, respectively. Suboptimal resilience was independently associated with shorter (<10 min.) consultation time (OR=3.83, p=0.023) and lower CSES score (OR=0.98, p<0.001), with 32.5% variance. CSES score was independently explained by WES score (B=16.06, p<0.001), spiritual fulfillment (B=11.71, p=0.011), and home-job travel time (B=9.12, p=0.032) in a positive relationship; whereas it was negatively associated with history of significant disease (B= -28.66, p=0.002).

Conclusion: Family medicine residents are at high-risk for psychological distress during the COVID-19 crisis, indicated by low resilience and coping self-efficacy levels. The model suggests high impact of WES and spiritual fulfillment in coping self-efficacy indicating relevance in resilience-promoting interventions.

Keywords: Resilience, CD-RISC-25, coping, medical residents, COVID-19, stressors

Introduction

There is a major interest in assessing resilience and coping during disastrous events, notably among frontline professionals. During the time of the COVID-19 pandemic, healthcare workers (HCWs) are facing continuous stress that challenges their sustainability and outstrips their coping abilities and sources of resilience, which may have long-term impact on their psychological and social well-being (1,2).

While resilience and coping are described to be distinct entities, they are strongly interrelated and their constructs may be confused with one another in the literature (3). Resilience is featured by a set of mental, emotional, and behavioral processes that help an individual ensure basic life tasks, such as work and social interactions, during significant crisis. It also helps to protect the individual from adverse impacts of stressors and to return to the pre-crisis state promptly (4,5.6.7). However, resilience changes over time and life experience, and is differentially defined across cultures, while being influenced by a number of internal and external factors (8,9,10,11,12). Coping stands for the person's conscious effort to overcome personal and social challenges, with the aptitude to control, reduce or tolerate stress and conflicts (13.14). Although, the term coping generally refers to adaptive or constructive coping strategies that result in effective stress reduction and control (15), the type of coping is defined based on its outcome. Thus, coping strategies that result in increased stress are considered maladaptive or non-coping (16). On the other hand, proactive coping is defined by a coping response that anticipates an upcoming stressor. Furthermore, as coping is specifically a conscious process, subconscious or unconscious stress-reducing strategies are not considered as coping strategies (17).

Glennie EJ (18) stated that "although coping and resilience are related constructs, they are distinct, in that coping refers to a wide set of skills and purposeful responses to stress, whereas resilience refers to positive adaptation in response to serious adversity". From this start point, resilience may be considered as the outcome level of adaptation to a hardship, while coping may be considered as the conscious tools to achieve such outcome. Several studies highlighted the relevance of resilience and coping abilities in predicting psychiatric disorders including burnout, depression, and post-traumatic stress syndrome. The relevance of such investigations among HCWs stands also in determining job-related factors that may influence resilience and coping, besides the supportive interventions that may be implemented at the individual or organizational levels (19,20,21,22,23,24).

In addition to stressors related to the healthcare profession, medical residents experience further uncertainties and inconsistences with regards to their roles and attitudes towards their professional responsibilities, ethics, and relationships with patients, supervisors, and society (25,26,27). These combined with the ongoing COVID-19 crisis, may result in an odd vulnerability to stress among residents, which may expose to high risk of maladaptive coping and affect their resilience.

This study aimed to assess the levels of resilience during the COVID-19 crisis among family medicine residents, and analyzed the interplay between resilience and coping self-efficacy, in addition to the professional and extra-professional factors.

Subjects amd Methods

Design and participants: A descriptive and analytical cross-sectional study was conducted between 1/6/2021 and 2/10/2021 in medical residents training at any of the Family Medicine residency programs of the Western Region of Saudi Arabia for at least 6 weeks. These included the Ministry of Health (MoH) Program, the MoH Joint Program, the National Guard Hospital Program, and King Abdulaziz University Program in Holy Mecca, Jeddah, Taif, and Al Madinah, as appropriate. The study was ethically approved by The Ministry of Higher Education, King Abdulaziz University, Faculty of Medicine, Research Ethics Committee.

Sampling: The sample size (N=179) was calculated to detect a mean (SD) resilience level of 66.35 (17.03) out of 100 using the Connor-Davidson Resilience Scale-25 items (CD-RISC-25) (28), with ±2.5 precision at 95% confidence interval (95% CI), 80% statistical power and 0.05 margin error. The target sample size (N=215) was increased by 20% to compensate for eventual incomplete participation. Since there was no comparative approach in the target population, a convenience sampling method was used to include all eligible and consenting residents until the targeted sample size was reached.

Study instrument: A structured questionnaire comprising the following dimensions was utilised :
1) Sociodemographic factors including gender, age, marital status, number of children and schooled children, income, etc.
2) Job-related factors including residency year, sector of affiliation (MoH, University, Guard, etc.), average daily patient flow and consultation time, home-job travel time, etc., in addition to work environment satisfaction (WES) using a 10-level satisfaction scale (0 = not satisfied at all, 10 = extremely satisfied) comprising nine relevant items such as physical work environment, relationships with colleagues, patients, and superiors, and levels of stress at work.
3) Lifestyle and health-related factors such as eating habits, exercise, smoking, sleep quality, religious and spiritual fulfillment, chronic diseases, COVID-19 status, etc.
4) Resilience level, using the CD-RISC-25, which consists of 25 positive statements related to resilience that are rated using a five-point Likert-type scale (0 = not true at all, 4 = true nearly all the time). The ratings are added up to compute a score with a range 0-100, where a higher score indicates higher resilience (29). The scale demonstrated good psychometric properties and constructs validity (30)

and has been plentifully used in the context of healthcare professionals and trainees (31).

5) Coping was indicated by measuring coping self-efficacy, defined as the individual's perception of own ability to deploy effective stress management strategies in various situations (32). Chesney et al. developed and validated the coping self-efficacy scale (CSES), which consists of a 26-item construct; each item rates, from 0 = "cannot do at all" to 10 = "certainly can do", regarding self-confidence in performing a specific coping strategy. In addition, the scale explores three coping styles represented by the following subscales: use problem-focused coping (6 items); stop unpleasant emotions and thoughts (4 items); and get support from friends and family (33). The principal author was contacted via email and provided her agreement to use the scale aswell as the scoring system. The CSES score consists of the sum of the item score, i.e. range = 0, 260, where higher scores indicate higher levels of coping self-efficacy.

Questionnaire validation and data collection procedure: The study questionnaire was reviewed by two family physicians and a methodologist. After reviewing, adjusting experts' comments and testing questionnaire clarity, applicability, and reliability, the final version of the questionnaire was edited online and disseminated via professional social media platforms. The online version included a brief presentation of the study objectives and importance, with statements regarding confidentiality and free choice for participation.

Statistical analysis: Data was extracted from an online platform as Excel datasheet, which was coded and edited in the Statistical Package for Social Sciences version 21.0 for Windows (SPSS Inc., Chicago, IL, USA) for data analysis. Descriptive statistics were carried out to present the summary of the study variables and scales. Cronbach's alpha was calculated to indicate the reliability of different scales. The correlation between CD-RISC-25 and CSES scores was analyzed using linear regression. The CD-RISC-25 was tested for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests, and the median value was used as cutoff to divide the resilience level into suboptimal and optimal. Independent t-test, chi-square or Fisher's exact tests were used to analyze the factors associated with resilience level, as appropriate. Multivariate logistic regression was used to analyze independent factors associated with resilience. A stepwise linear regression model was used to analyze independent factors associated with CSES score. The model of resilience as explained by coping self-efficacy and sociodemographic, professional, lifestyle and health-related factors was summarized in a flowchart, with the corresponding levels of significance. A p value of <0.05 was considered to reject the null hypothesis.

Results

Of the 210 participations, 208 were eligible while two others were not residents. Demographic features showed a relatively young population with a mean (SD) age of 27.60 (2.82) years, and the majority were females (55.3%), single marital status (54.3%), and without children (69.7%). Professional characteristics showed predominance of the MoH sector (53.8%), with consultation of <20 (41.8%) or 20-40 (56.3%) patients per day for an average 10-20 minutes per consultation (57.2%). The mean work environment satisfaction scores ranged between 4.82 out of 10 for physical work environment to 5.51 out of 10 for relationship with patients (Table 1).

Lifestyle and health-related data
Lifestyle indicators were poor in approximately one-third of the participants including poor eating habits (32.2%), absence of physical activity (36.1%), overweight or obesity (44.7%), and active smoking (26.9%). A suboptimal satisfaction with sleep quality and religious fulfillment was reported by 40.4% and 18.3% of the participants, respectively. Chronic diseases and chronic medication were reported by 16.8% and 15.9%, respectively. COVID-19 status was positive for 33.6%, and 14.9% reported other significant health issues during the past year. Of note, only 24.5% of the participants declared having received training in stress management and coping strategies (Table 2). Internal consistency of the study scales

All three scores used in the study showed high levels of internal consistency with Cronbach's alpha of 0.972, 0.992, and 0.964 for CD-RISC-25, CSES, and WES, respectively. Statistics of the respective scales' scores are depicted in Table 3.

Levels of resilience
By focusing on the primary outcome, CD-RISC-25, the mean (SD) score was 54.53 (19.69) out of 100, with a median 55.50. The normality testing showed Kolmogorov-Smirnov (statistics 0.073, p=0.009) and Shapiro-Wilk (statistics=0.978, p=0.003), concluding to non-normal distribution. Thus, the outcome was analyzed as categorical variable using the median as a cutoff to define two levels of resilience, namely suboptimal (CD-RISC-25<55.5) and optimal (CD-RISC-25≥55.5).

Levels of coping self-efficacy
The mean (SD) CSEC score was 136.81 (63.67) out of 260. The mean scores within the three subscales were comparable (5.21 – 5.37) (Table 3) and strongly correlated with one another (R = 9.18 – 9.39; p<0.001) (results not presented in tables). Furthermore, CSES score and CD-RISC score were positively correlated as demonstrated in linear regression (B=0.23; 95%CI=0.20-0.25; p<0.001), with a correlation coefficient R squared = 0.531 (results not presented

Demographic and professional factors associated with resilience

There was no association of resilience level with any of the investigated demographic factors. However, suboptimal resilience (CD-RISC-25<55.5) was associated with high academic degree (88.9% vs. 48.2%, p=0.035) and shorter consultation time (62.7% for ≤10 min. versus 49.6% for 10-20 min. versus 26.7% for >20 min., p=0.006). Additionally, the mean (SD) WES score was significantly lower among participants with suboptimal resilience level (4.16 [2.36] out of 10) compared with optimal resilience level (6.05 [2.10]), p<0.001 (Table 4).

Lifestyle and health-related data factors associated with resilience

Among all lifestyle and health-related factors, suboptimal resilience was associated with poorer sleep quality (p=0.017), low spiritual fulfillment (p=0.049), and lower overall health satisfaction score (p<0.001) (Table 5).

Independent factors associated with coping self-efficacy

A stepwise linear model showed that CSES score was independently explained by WES score (B=16.06, p<0.001), spiritual fulfillment (B=11.71, p=0.011), and home-job travel time (B=9.12, p=0.032) in a positive relationship; whereas it was negatively associated with history of significant disease in the past year past (B=-28.66, p=0.002). The latter model explained 50.0% of the variance of CSES score. It is to note that WES score alone explained 44% of the variance of resilience level (Table 6).

Independent factors associated with suboptimal resilience and the overall study model

Suboptimal resilience was independently associated with shorter (<10 min.) consultation time (OR=3.83, p=0.023) and lower CSES score (OR=0.98, p<0.001), and the multivariate model explained 32.5% of the outcome variance (Table 7). The final model of resilience as a function of coping self-efficacy and demographic, professional, lifestyle and health-related factors is depicted in Figure 1.

Table 1. Participants' demographic and professional characteristics (N=208)

Parameter	Category	Frequency	Percentage
Gender	Male	93	44.7
	Female	115	55.3
Age	Mean, SD (range =19-50)	27.60	2.82
Marital status	Single	113	54.3
	Married	89	42.8
	Divorced	6	2.9
Spouse profession	Not Applicable	106	51.0
	Student	9	4.3
	Housewife	28	13.5
	Self-employed	4	1.9
	Employed	61	29.3
Have children	None	145	69.7
	Yes	63	30.3
Schooled children	None	182	87.5
	Yes	26	12.5
Household income	<15k	15	7.2
	15-20k	145	69.7
	20-30k	34	16.3
	>30k	14	6.7
Residence mode	Alone	28	13.5
	With spouse	86	41.3
	With parents	83	39.9
	Other	11	5.3
Residency year	R1	46	22.1
	R2	56	26.9
	R3	77	37.0
	R4	29	13.9
Sector	MoH	112	53.8
	University	50	24.0
	Military	39	18.8
	Private	4	1.9
	Other	3	1.4
Academic degree	Bachelor	199	95.7
	Master	5	2.4
	PhD	4	1.9
Average daily patient flow	<20	87	41.8
	20-40	117	56.3
	>40	4	1.9
Average consultation time	<=10 min	59	28.4
	10-20 min	119	57.2
	>20 min	30	14.4
Home-job travel time	<=15 min	38	18.3
	15-30 min	119	57.2
	30-60 min.	39	18.8
	>1 hour	12	5.8
Transport mean	I drive	132	63.5
	I have a driver	68	32.7
	Taxi/cab	8	3.8

(continued)

Table 1. Participants' demographic and professional characteristics (N=208) (continued)

Satisfaction			
Physical work environment	Mean, SD (range =0-10)	4.82	2.63
Relationship with colleagues	Mean, SD (range =0-10)	5.31	2.90
Relationship with superiors	Mean, SD (range =0-10)	5.16	2.74
Relationship with patients	Mean, SD (range =0-10)	5.51	2.85
Competency in managing life threatening cases	Mean, SD (range =0-10)	4.91	2.36
Overall clinical skills	Mean, SD (range =0-10)	5.17	2.61
Level of stress at work	Mean, SD (range =0-10)	4.86	2.58

Values are frequency and percentage, except if otherwise specified.

Table 2. Lifestyle and health-related data (N=208)

Parameter	Category	n	%
Eating Habits	Not watchful	67	32.2
	Somewhat watchful	115	55.3
	Very watchful	26	12.5
Exercise	None or rarely	75	36.1
	Irregular	86	41.3
	Regular	47	22.6
BMI	Underweight	9	4.3
	Normal	106	51.0
	Overweight	68	32.7
	Obese	25	12.0
Smoking status	Nonsmoker	139	66.8
	Past smoker	13	6.3
	Current smoker	56	26.9
No. of chronic diseases	None	173	83.2
	One disease	30	14.4
	2+	5	2.4
No. of chronic medication	None	175	84.1
	One	18	8.7
	2+	15	7.2
Infection with COVID-19	No	138	66.3
	Yes, moderately	66	31.7
	Yes, severely	4	1.9
Other significant health issues during past year	No	177	85.1
	Yes, moderately	25	12.0
	Yes, severely	6	2.9
Hospitalization during the past year	No	194	93.3
	Yes	14	6.7
Surgery during the past year	No	199	95.7
	Yes	9	4.3
Sleep quality	Poor	23	11.1
	Unsatisfactory	61	29.3
	Acceptable	99	47.6
	Good	25	12.0
Spiritual and religious life	Poor	7	3.4
	Unsatisfactory	31	14.9
	Acceptable	124	59.6
	Good	46	22.1
Overall health satisfaction	Mean, SD (range =1-10)	6.99	1.71
Previous education or training in stress management and coping strategies	No	157	75.5
	Yes	51	24.5

Table 3. Internal consistency and score statistics for resilience and coping self-efficacy scales

Scale	No. items	Cronbach's alpha	Score				
			Mean	SD	Median	Q1, Q3	Range
Resilience (CD-RISC-25)	25	0.972	54.53	19.69	55.50	25, 69	0-100
Coping self-efficacy score (CSES)	26	0.992	136.81	63.67	139.5	44.9, 194.5	0-260
Use problem-focused coping	6	0.974	5.37	2.46	5.50	3.54, 7.5	0-10
Stop unpleasant emotions and thoughts	4	0.964	5.21	2.54	5.50	3.25, 7.25	0-10
Get support from friends and family	3	0.932	5.25	2.54	5.33	3.33, 7.33	0-10
WES	9	0.964	5.11	2.43	5.14	1.4, 7.0	0-9.71

WES: Work environment satisfaction

Table 4. Demographic and professional factors associated with resilience (CD-RISC-25 score <median)

Parameter	Category	Optimal (>55.5) N	Optimal (>55.5) %	Suboptimal (≤55.5) N	Suboptimal (≤55.5) %	p-value
Gender	Male	43	46.2	50	53.8	
	Female	61	53.2	54	47.0	0.329
Age	Mean, SD					
Marital status	Single	52	46.0	61	54.0	
	Married	51	57.3	38	42.7	
	Divorced	1	16.7	5	83.3	0.071
Spouse profession	Not Applicable	50	47.2	56	52.8	
	Student	6	66.7	3	33.3	
	Housewife	13	46.4	15	53.6	
	Self-employed	3	75.0	1	25.0	
	Employed	32	52.5	29	47.5	0.622
Have children	None	71	49.0	74	51.0	
	Yes	33	52.4	30	47.6	0.651
Schooled children	None	88	48.4	94	51.6	
	Yes	16	61.5	10	38.5	0.208
Household income	<15k	8	53.3	7	46.7	
	15-20k	66	45.5	79	54.5	
	20-30k	20	58.8	14	41.2	
	>30k	10	71.4	4	28.6	0.182
Residence mode	Alone	11	39.3	17	60.7	
	With spouse	48	55.8	38	44.2	
	With parents	39	47.0	44	53.0	
	Other	6	54.5	5	45.5	0.417
Residency year	R1	23	50.0	23	50.0	
	R2	22	39.3	34	60.7	
	R3	42	54.5	35	45.5	
	R4	17	58.6	12	41.4	0.254
Sector	MoH	56	50.0	56	50.0	
	University	28	56.0	22	44.0	
	Military	17	53.6	22	56.4	
	Private	1	25.0	3	75.0	
	Other	2	66.7	1	33.3	0.610
Academic degree	Bachelor	103	51.8	96	48.2	
	Master or PhD	1	11.1	8	88.9	0.035*F
Average daily patient flow	<20	50	57.5	37	42.5	
	20+	54	44.6	67	55.4	0.068
Average consultation time	≤10 min	22	37.3	37	62.7	
	10-20 min	60	50.4	59	49.6	
	>20 min	22	73.3	8	26.7	0.006*
Home-job travel time	<=15 min	13	34.2	25	65.8	
	15-30 min	64	53.8	55	46.2	
	30-60 min.	21	53.8	18	46.2	
	>1 hour	6	50.0	6	50.0	0.195
Transport mean	I drive	66	50.0	66	50.0	
	I have a driver	36	52.9	32	47.1	
	Taxi/cab	2	25.0	6	75.0	0.327
Overall WES score	Mean, SD (range = 0-10)	6.05	2.10	4.16	2.36	<0.001*

Values are frequency and percentage, except if otherwise specified.

Table 5. Lifestyle and health-related data factors associated with resilience

Parameter	Category	Resilience level				p-value
		High (>55.5)		Low (≤55.5)		
		N	%	N	%	
Eating Habits	Not watchful	36	53.7	31	46.3	
	Somewhat watchful	54	47.0	61	53.0	
	Very watchful	14	53.8	12	46.2	0.621
Exercise	None or rarely	42	56.0	33	44.0	
	Irregular	38	44.2	48	55.8	
	Regular	24	51.1	23	48.9	0.322
BMI	Underweight	3	33.3	6	66.7	
	Normal	57	53.8	49	46.2	
	Overweight	31	45.6	37	54.4	
	Obese	13	52.0	12	48.0	0.537
Smoking status	Nonsmoker	76	54.7	63	45.3	
	Past smoker	5	38.5	8	61.5	
	Current smoker	23	41.1	33	58.9	0.158
Chronic diseases	None	90	52.0	83	48.0	
	One or more	14	40.0	21	60.0	0.194
Chronic medication	None	89	50.9	86	49.1	
	One or more	15	45.5	18	54.5	0.569
Infection with COVID-19	No	72	52.2	66	47.8	
	Yes	32	45.7	38	54.3	0.379
Other health issues during past year	No	89	50.3	88	49.7	
	Yes	15	48.4	16	51.6	0.846
Hospitalization during the past year	No	99	51.0	95	49.0	
	Yes	5	35.7	9	64.3	0.407F
Surgery during the past year	No	100	50.3	99	49.7	
	Yes	4	44.4	5	55.6	1.000F
Sleep quality	Poor	6	26.1	17	73.9	
	Unsatisfactory	26	42.6	35	57.4	
	Acceptable	56	56.6	43	43.4	
	Good	16	64.0	9	36.0	0.017*
Spiritual and religious life	Poor	0	0.0	7	100.0	
	Unsatisfactory	15	48.4	16	51.6	
	Acceptable	63	50.8	61	49.2	
	Good	26	56.5	20	43.5	0.049*
Overall health satisfaction	Mean, SD (range=1-10)	7.44	1.75	6.54	1.54	<0.001*
Previous education in stress management and coping strategies	No	76	48.4	81	51.6	
	Yes	28	54.9	23	45.1	0.420

Table 6. Independent factors associated with coping self-efficacy (stepwise linear regression)

Model	Predictor	B	p-value	95% CI for B		R²
1	(Constant)	47.57	<0.001	32.35	62.78	
	WES score	17.48	<0.001	14.78	20.17	0.44
2	(Constant)	53.70	<0.001	38.45	68.95	
	WES score	17.18	<0.001	14.55	19.81	
	Disease past year*	-31.00	0.001	-48.87	-13.13	0.47
3	(Constant)	32.29	0.005	9.97	54.62	
	WES score	16.67	<0.001	14.05	19.30	
	Disease past year*	-27.61	0.003	-45.43	-9.78	
	Spiritual and religious life	11.72	0.011	2.69	20.74	0.49
4	(Constant)	16.25	0.228	-10.27	42.77	
	WES score	16.06	<0.001	13.40	18.72	
	Disease past year*	-28.66	0.002	-46.35	-10.97	
	Spiritual and religious life	11.71	0.011	2.76	20.66	
	Home-job travel time	9.12	0.032	0.82	17.42	0.50

Stepwise linear regression
WES: Work environment satisfaction
* Other than COVID-19

Table 7. Independent factors associated with suboptimal resilience (binary logistic regression)

Predictor	Level	OR	95% CI		p-value
Academic degree	Bachelor	Ref			
	Master or PhD	7.24	0.66	79.71	0.106
Average consultation time	<10 min	3.83	1.20	12.18	0.023*
	10-20 min	1.44	0.47	4.43	0.521
	>20 min	Ref	-	-	0.018*
WES score	(score)	0.94	0.76	1.16	0.545
Sleep quality	Poor	2.00	0.44	9.19	0.373
	Unsatisfactory	0.84	0.24	2.87	0.778
	Acceptable	0.50	0.15	1.60	0.241
	Good	Ref	-	-	0.129
Religious life	Unsatisfactory	0.69	0.26	1.82	0.451
	Satisfactory	Ref			
Overall health satisfaction	(score)	0.97	0.76	1.24	0.826
Coping self-efficacy	(CSES score)	0.98	0.97	0.99	<0.001*

WES: Work environment satisfaction

Discussion

Levels and factors of resilience during and before COVID-19 crisis

There is a strong relationship between resilience and psychological wellbeing, self-esteem and quality of life among HCWs including medical students (34.35). We evidenced low levels of resilience among family residents with mean and median CD-RISC-25 scores less than 56 out of 100. These levels are significantly lower than those reported in most of the studies using CD-RISC-25 in various populations, during and before COVID-19 crisis.

An Indonesian study explored resilience and anxiety levels among 227 HCWs during the COVID-19 crisis, and found a mean CD-RISC-25 out of 69 (SD=15.8), which was inversely correlated with state and trait anxiety (36). A French study used the CD-RISC-25 among 422 physicians caring for COVID-19 patients in six hospitals. The questionnaire was implemented during curfew and results showed a median resilience score of 69 out of 100, which was independently associated with professional factors including anesthesiology specialty and high caseload level, besides other extraprofessional factors such as having children and high anxiety profile (37). In the pre-COVID-19 era, a study involving 740 US medical interns, in 2010, showed a mean CD-RISC-25 out of 75.3 (SD=11.9), and further data showed marked and gradual increase in the risk of depression during the internship (38). Another Korean study (2010) used the CD-RISC-25 among a sample of 576 medical students, nurses and firefighters, and found a mean score of 61.2 (13.0) (39). A study from Iran, in 2011, reported a mean CD-RISC-25 of 62.11 (SD=11.93) among 414 medical students (34).

These comparative figures raise concern about the levels of resilience among family medicine residents in Saudi Arabia and the probable higher impact of COVID-19 crisis with reference to other HCWs. This may be related to specific stressors faced by residents, which would require further exploration and supportive interventions, not only in family medicine residents but also from all other specialties (40).

In line with these conclusions, a bi-national study by Aljehani et al., demonstrated high impact of the COVID-19 crisis on the psychological resilience among Saudi and Bahraini surgery residents. Authors reported exacerbated frequency and severity of anxiety disorders over minor life stressors indicating reduced resilience, and incriminated exposure to moral challenges imposed by the COVID-19 crisis as one of the determinants of such effect on resilience. Additionally, the study reported the conscious use of stress relieving strategies among 23.5% of the residents, among which were exercise, psychotherapy and medications (41). However, authors did not use any validated scale to measure resilience or coping.

Factors associated with resilience

Low resilience levels and maladaptive coping are strong predictors for burnout among physicians (42). The significance of the COVID-19 crisis in impacting resilience probably results from the permanence and or recurrence of negative emotions that increase the state of anxiety and disrupt the coping strategies (43). On the other hand, when viewing resilience as an intermediate outcome to the individual's final response to professional stressors, it becomes judicious to design and implement resilience-promoting interventions in high-stress work settings such as the healthcare sector, notably during major healthcare crises (44,45).

Characteristics of coping among residents during COVID-19

Stressors facing HCWs include exposure to higher risk of infection, fear of spreading the virus among relatives, and the increased work load (46). Other stressors are more specific to the medical residents, notably those related to the academic aspects and requirements of the residency program. Some of these specific stressors may be shared with undergraduate students (47). Abrupt modifications of the practical training plans shift to online theoretical learning and uncertainty regarding academic promotion, and evaluation have been reported to be major sources of anxiety and distress among Saudi neurosurgery residents (48). Another qualitative study among hematology, oncology, and pharmacy residents highlighted the odd pressure due to over demanding care needs and inadequate preparation for the residency exams to be among the major concerns during the COVID-19 crisis. Authors suggested several proactive measures to improve residents' coping while maintaining adequate and safe practice (49). Another national study involving 240 residents and fellow trainees in medical and surgical specialties highlighted a substantial reduction in training opportunities, along with high rates of perceived lack of support and uncertainty regarding own role during the COVID-19 crisis. Furthermore, the majority of the trainees reported frequent anxiety (72.1%), low mood (64.6%), and feeling of loneliness (54.6%), with no remarkable differences between juniors and seniors (50).

Park and Folkman further argued that self-efficacy influences the appraisal of a given situation, which determines the individual's coping response to that situation (51). In the present study approach, coping self-efficacy was analyzed as a predictor for resilience, and coping levels were shown to be relatively low among the family medicine residents with a mean CSES score of 136.81. This is significantly lower than the mean score (159.62) reported in a community-based sample of adults from the United Kingdom, of whom 29.1% had a medical condition (52). Furthermore, the three coping styles were relatively low and highly correlated with Pearson's correlation coefficient R >0.9, compared with R 0.54 – 0.67 reported in the original study of the CSEC scale validation, which was conducted among HIV-seropositive men in the USA (53).

The low levels of coping self-efficacy may indicate vulnerability of the residents to stress and anxiety, with no significant effect of the COVID-19 status (53,54). Among the strategies to enhance resilience and prevent emotional exhaustion among residents are mindfulness and self-compassion (55).

Professional predictors of coping self-efficacy

This study showed WES to be a strong predictor of coping self-efficacy. A review article including 10 studies on Iranian nurses showed the association of job satisfaction with the levels of job stress and stress coping strategies, and highlighted the effect of cognitive and behavioral stress management training (56). A study from the US involving 7288 physicians showed increased risk of burnout compared with other workers, and family medicine was among the high-risk specialties while being associated with below average satisfaction with work-life balance (57). Beyond the healthcare sector, a study involving 23 organizations from the service and production sectors demonstrated the positive relationship between coping strategies, work environment, and job satisfaction (58). COVID-19 crisis has caused a significant disruption of the work environment in the healthcare sector globally, which impacted severely the work satisfaction among HCWs (59,60).

Extra-professional predictors of coping self-efficacy

Among the extra-professional predictors that were highlighted in this study is the spiritual and religious fulfillment. Findings showed that higher satisfaction regarding spiritual and religious fulfillment was positively associated with higher coping self-efficacy. Besides, it showed to be significantly associated with resilience level in the univariate analysis. A systematic review involving 31 international studies showed the significance of religious coping mechanisms to combat psychological distress among HCWs during COVID-19 crisis, notably in high prevalence settings (61). Spirituality and reliance on God constitute a source of hope, optimism, and internal peace for the believers, besides the religious teaching that promotes both physical and psychological health. This results in a highly positive effect of spirituality on coping and resilience, which reduces the risk of anxiety and depression during the times of crisis such as COVID-19 (62,63). Such observations suggest the relevance of implementing religious support of HCWs during major health crises, notably in conservative societies such as Saudi Arabia.

Study limitations

The major limitations of this study are the sampling method and data collection procedure, which do not enable reliable inter-group comparisons and affect the generalizability of the findings.

Conclusion

Family medicine residents are at high-risk of psychological distress during the COVID-19 crisis indicated by low resilience and coping self-efficacy levels. The model developed in this study highlighted major contribution of satisfaction with multiple work environment dimensions in determining the levels of coping. Furthermore, religious and spiritual fulfillment strongly predicted coping self-efficacy in this population of Islamic faith. Both predictors should be considered at the organizational level to promote coping and resilience among medical trainees in the times of major health crises. Further studies are warranted to explore specific stressors among medical residents and their implication in resilience and psychological well-being.

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Knowledge, attitude and practice among mothers toward home head trauma management in Riyadh, 2020-2021: A cross sectional study

Deema Ibrahim Altamimi
Afnan Saleh Bamajboor
Ashwaq Ali Asiri
Yasmeen Majid Almustafa

Family Medicine, King Saud Medical City, Riyadh, Kingdom of Saudi Arabia

Corresponding author:
Dr.Deema Ibrahim Altamimi
Family Medicine
Riyadh, Saudi Arabia
Email: DeemaIAltamimi@gmail.com

Abstract

Background: Head trauma is one of the major home accidents among children worldwide and could lead to long-life disabilities or death in severe cases. The worldwide incidence of pediatric traumatic brain injury ranges between 47 and 280 per 100,000 children. To the best of our knowledge, few studies have investigated the knowledge, attitude, and practice toward head trauma among mothers in Riyadh, Saudi Arabia. This study aims to assess the mother's knowledge, reaction, and immediate action toward head trauma of children under five years in Riyadh city, 2020-2021.

Methodology: A cross-sectional study using an online questionnaire was developed locally in Cluster one in Riyadh, Saudi Arabia. The study included 390 mothers who met the inclusion criteria. Data was collected by MS Excel and analyzed using SPSS version 26.

Results: In this study, we collected data from 390 mothers of children under five years old who responded to our distributed questionnaire. Most of the participants were between 31-40 years old (40 %), while 31.5 % were between 20-30 years old. Considering the source of knowledge of mothers toward home accidents, we found that 6 % did not know about home accidents, while 45 % took their knowledge from social media, and 14.9 % from school books. Furthermore, we found that 71.28 % of the mothers strongly agreed about the importance of attending courses on head trauma.

Conclusion: We found that the level of knowledge among mothers in Al Riyadh region toward managing head trauma and preventing home injuries among children is sub-adequate. Many factors affect this knowledge, including maternal education, monthly income and occupation, and attending first aid training.

Key words: head trauma, knowledge, attitude and practice, mothers Saudi Arabia

Introduction

Home is the most common place for accidents concerning the children because they spend a long time at home with their parents, particularly with their mother [1]. A head injury is defined as any trauma to the scalp, skull, or brain [2]. There are many reasons behind child home accidents, for example: falling from bed or sofa, tripping over furniture, high window, choking, toxic substances, swimming pools, and slip due to water in the bathrooms [3]. These injuries negatively impact children through affecting them physically, socially, and psychologically [4]. The incidence of pediatric traumatic brain injury worldwide ranges between 47 and 280 per 100,000 children. After the age of 3, male children suffer higher rates of traumatic brain injury than females [5].

Head trauma is one of the major home accidents among children worldwide and could lead to life-long disabilities and death in severe cases. The number of child home accidents exceeds the number of occupational and traffic accidents [6,7]. Approximately 90% of unintentional injuries among children are responsible for 950,000 death cases per year worldwide [8]. Children at home are always interested in discovering new things, especially those under five years, which exposes them to the risk of unintentional injuries and might lead to death [9]. Approximately 830,000 children worldwide die every year due to home injuries. Therefore millions of children require intensive hospital care to avoid lifelong disabilities [8]. In Saudi Arabia, the number of child home injuries have significantly increased in the hospitals' emergency departments. However, poor knowledge about the risk and the outcomes of home accidents was found among the populations [10].

In a review of previous studies, Al-Johani et al. [9] reported that most parents in Madinah City, Saudi Arabia had improper knowledge regarding first-aid management of epistaxis due to trauma, while almost one-third had proper knowledge. Almass et al. [11] reported that approximately 16.5% of the parents in Riyadh had a high level of awareness regarding the appropriate action after head trauma by keeping the child in a sitting position with the head slightly backward due to epistaxis. Nour et al. [12] carried out a study in Makkah, Saudi Arabia, to assess mothers' knowledge, attitude, and practice (KAP) regarding home accidents among children. The study results showed that approximately 36% of the mothers had poor knowledge, while 38% had a positive attitude, and one-third recorded appropriate practice toward child home accidents. Mothers with a high educational level, a higher income, those who attended first aid training about home accidents and who had a previous child home injury experience, showed a significantly high KAP level. Aktürk [13] conducted a study to assess mothers' knowledge, attitudes, and behaviors towards the associated factors with home accidents and theirprevention among children under five years. Most mothers had poor knowledge and attitude regarding home accidents and their prevention. Educational level, number of children and family persons,

maternal age, economic status, and residence level were the most common factors affecting a mother's knowledge regarding home accident prevention. Megahed et al. [14] reported that mothers' educational and economic levels were significantly associated with a high score of mothers' knowledge and attitude regarding home accidents. These results agreed with previous studies by Eldosoky [15] and Halawa et al. [16], who indicated that mothers with university educational levels had a high score of KAP toward home child accidents. Mothers with high educational levels could attend first aid training and read texts regarding home child accident prevention. Kim et al. [17] reported a limited awareness regarding traumatic head injury (THI) among the public in Korea. Mothers above 18-years-old, living in Riyadh, with children below 5-years-old participated in this study through a questionnaire. By conducting this study, Mothers' knowledge regarding head trauma increase the chance of proper and rapid intervention, limit and prevent injury, increase the survival rate, and improve the outcome [9]. Therefore, the current study aims to assess the knowledge, attitude, and practice toward head trauma among mothers in Riyadh, Saudi Arabia.

Methodology

This is an observational cross-sectional study that was conducted on mothers with or without experience of head injury. A questionnaire was developed locally which is divided into four sections; the first section is demographic data including the age of the mothers, occupation, level of education, family income, and number of children, in addition to previous mother training in first aid, previous child with a head injury and the source of knowledge. The second section assessed the knowledge including; What mothers would do in case of head trauma, whether mothers will call for help, do ice packing, carefully watch for alarming signs such as unconsciousness or falling asleep or vomiting. The third section assessed the attitude including, safety measures like covering sharp edges, availability of first aid kit, using helmet while playing, and using anti-slipping mat, and lastly knowing the alarming signs of head trauma. The fourth section assessed the practice including calling an ambulance after head trauma, keeping a child away from wet floors, attending first aid courses, and sharing information with others. The same questionnaire was distributed online through social media and personal interviews for 3 months to reach a sample size of 384.

Inclusion criteria:
o All Mothers living in Riyadh city.
o Mothers aged above 18 years.
o Mothers of children below 5 years of age.

Exclusion criteria:
o Mothers not living in Riyadh city
o Mothers aged below 18 years.
o Mothers of children older than 5 years.
o Mothers who didn't complete the questionnaire.

Sample size:
o Population size: (We divided by neighborhoods in the questionnaire).
o Sample size: Total population of cluster one in Riyadh is 1,600,000, 20% of them are women of childbearing age, that is 320,000 women, and 60% of the childbearing age women are married, that is 192,000 women. By using a computerized auto-calculator with a CI level of 95% and 5% margin of error, the sample size is: 384
o Sampling technique: Random sampling technique.

Ethical consideration:
After IRB approval, confidentiality was assured to all participants who agreed to participate in the study. The privacy and confidentiality of the data and study results were secured by restricting unauthorized access. A brief description of the study and its objectives were explained to all participants.

Statistical Consideration:
Data were collected using Excel sheets and were analyzed using SPSS, version 26. Frequency and percentages were used to present all categorical variables. with main variables demographic data, mother's Knowledge, mother's Attitude, and mother's practice. Chi-square was used to assess the differences within the categorical variables. A P-value lower than 0.05 was considered to be significant.

Results

In this study, we were able to collect data from 390 mothers of children under five years old who responded to our distributed questionnaire. Most of the participants were aged between 31-40 years old (40 %) while 31.5 % were aged between 20-30 years old. More than half of the sample were working at a public job other than a healthcare-related job while 37.95 % of them reported not working. Moreover, 53.3 % of mothers reported having university degree while 43.5 % had a high school education or lower. Considering family income, we found that 48 % of the participants had a monthly income between 5000 and 10000 SR and 40 % had lower than 5000 SR income. Moreover, 36.4 % of the participants reported having two children and 34.9 % had more than two while 12 % of them had indicated having previous first aid training. Considering the prevalence of head injuries among children, the mothers reported a prevalence of 7.2 %. We found that the prevalence of head injuries among children under 5 years was significantly related to the mother's age, occupation, education, family income, and the number of children in the family. In general, a higher prevalence of head injuries was reported in older mothers (30.4 % in mothers over 50 years old compared with 4.1 % in 20-30 years old), in working mothers especially those who work at a healthcare institution (15.6 %), in lower educated mothers (11.7 %), lower maternal income and higher number of children (11.8 % in families with more than two children compared with 3.6 % in families with one child). Table 1.

Considering the source of knowledge of mothers toward home accidents, we found that 6 % did not know about home accidents, while 45 % took their knowledge from social media, 14.9 % from school books, 14 % from books and newspapers while physicians and nurses were the main source of knowledge only for 13 % of mothers (Figure 1).

Considering the level of knowledge of mothers toward management of head injuries among children under the age of five, mothers were divided into having an adequate and an inadequate level of knowledge. Adequate knowledge is considered when answering 7 of 10 questions correctly. We found that 35.13 % of mothers had adequate knowledge about the management of children with head injuries. In this review, we did not find a significant relationship between the age of the mothers and their level of knowledge (P=0.125) while the occupation of the mothers had a significant impact on their knowledge (P=0.000). Mothers working at a healthcare institution had the highest level of knowledge where 87.5 % of them had adequate knowledge compared with 30.48 % and 30.41 % of mothers working at other jobs and non-working mothers respectively. Moreover, we found that the higher the level of education of the mothers, the significantly higher the adequacy of knowledge about head injuries in their children (P=0.000). Furthermore, we found that the level of knowledge was significantly higher in mothers with better monthly income (p=0.00) however number of children did not significantly affect the knowledge. Finally, we found that the participants who reported having previous first aid training had a significantly higher level of knowledge (74.47 % was adequate compared with 29.74 %, P=0.000).

Considering the attitude of mothers toward protective measures to reduce the incidence of head trauma and its relation with their knowledge, we found that 70.26 % of mothers would cover furniture edges while 3.1 % would leave their children alone at home. Moreover, 48.46 % thought first aid kits should be available at their homes, and 45.64 % reported using personal protective equipment. Furthermore, 51.54 % of the mothers reported using anti-slipping mats, and 40 % thought that children could go to sleep after head trauma and 60.51 % of the mothers thought they could act properly in the time of injury. Considering the impact of knowledge on attitude, we found that mothers' knowledge toward management of head trauma had a significant impact on their attitude where adequate knowledge was significantly related to the positive attitude of mothers (Table 3).

Moreover, we found that 38.46 % of the mothers would call an ambulance or emergency services in case of child having head trauma, while 32.82 % strongly disagreed with that while only 20.51 % of the mother would keep children away from wet floors. Furthermore, we found that 71.28 % of the mothers strongly agreed about the importance of attending courses on head trauma. Moreover, 67.1 % and 49.23 % of the participants would agree to transfer experience in dealing with head trauma to others and teach family members and friends about head trauma in children (Table 4).

Table 1: Demographic factors of the participants (n=390) and their relation to the incidence of head inju reported by the participants

		Total sample		Has your child ever had head inju home			
				Yes		No	
		N	N %	N	N %	N	N %
Total				28	7.2%	362	92.8%
Mother's age	20-30	123	31.50%	5	4.1%	118	95.9%
	31-40	156	40.00%	4	2.6%	152	97.4%
	41-50	88	22.60%	12	13.7%	76	86.3%
	> 50	23	5.90%	7	30.4%	16	69.6%
Occupation	Not working	148	37.95%	3	2.1%	145	97.9%
	Working at a healthcare institution	32	8.21%	5	15.6%	27	84.4%
	Not working at a healthcare institution	210	53.85%	20	9.5%	190	90.5%
Mother's education	Below/in high school	170	43.50%	20	11.7%	150	88.3%
	University	208	53.30%	7	3.4%	201	96.6%
	Higher education	12	3.00%	1	8.3%	11	91.7%
Family income/month (Riyal)	< 5000 SR	156	40.00%	22	14.1%	134	85.9%
	5000-10,000 SR	187	48%	5	2.7%	182	97.3%
	> 10,000 SR	47	12.10%	1	2.1%	46	97.9%
No. of children	One child	112	28.70%	4	3.6%	108	96.4%
	Two children	142	36.40%	8	5.6%	134	94.4%
	More than two children	136	34.90%	16	11.8%	120	88.2%
Previous first aid training	Yes	47	12%	1	2.1%	46	97.9%
	No	343	88%	27	7.9%	316	92.1%

Figure 1: Source of knowledge toward home accidents
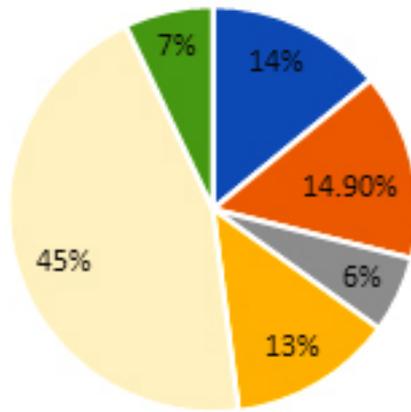
Table 2: The level of knowledge of mothers toward management of head injuries among children under 5 years and its relation with maternal demographic factors

| | | Knowledge about head injuries among children under 5 years | | | | |
| | | Adequate | | Inadequate | | |
		N	N%	N	N%	P-value
Total		137	35.13%	253	64.87%	
Mother's age	20-30	45	36.59%	78	63.41%	0.125
	31-40	54	34.62%	102	65.38%	
	41-50	30	34.09%	58	65.91%	
	> 50	8	34.78%	15	65.22%	
Occupation	Not working	45	30.41%	103	69.59%	0.000*
	Working at healthcare institution	28	87.50%	4	12.50%	
	Not working at healthcare institution	64	30.48%	146	69.52%	
Mother's education	Below/ in high school	38	22.35%	132	77.65%	0.015*
	University	91	43.75%	117	56.25%	
	Higher education	8	66.67%	4	33.33%	
Family income/month (Riyal)	< 5000 SR	45	28.85%	111	71.15%	0.001*
	5000-10,000 SR	70	37.43%	117	62.57%	
	> 10,000 SR	22	46.81%	25	53.19%	
No. of children	One child	38	33.93%	74	66.07%	0.15
	Two children	51	35.92%	91	64.08%	
	More than two children	48	35.29%	88	64.71%	
Previous first aid training	Yes	35	74.47%	12	25.53%	0.000*
	No	102	29.74%	241	70.26%	

Table 3: Attitude of mothers toward protective measures to reduce the incidence of head trauma and its relation with their knowledge

| | Total sample | | | | | | Knowledge | | |
| | Yes | | Sometimes | | No | | Adequate | Inadequate | |
	N	N%	N	N%	N	N%	Yes %	Yes %	P-value
Furniture edges are covered.	274	70.26%	53	13.6%	63	16.2%	88.3%	60.5%	0.00*
Leave children alone at home.	12	3.08%	18	4.6%	360	92.3%	1.5%	4.0%	0.00*
First aid kit is necessary in my home.	189	48.46%	58	14.9%	143	36.7%	62.8%	40.7%	0.00*
Using Personal Protective equipment.	178	45.64%	95	24.4%	117	30.0%	59.9%	37.9%	0.00*
Use Anti-slipping mat.	201	51.54%	48	12.3%	141	36.2%	61.3%	46.3%	0.00*
Child got sleepy after head trauma	156	40.00%	48	12.3%	186	47.7%	52.6%	33.2%	0.00*
Ability to act properly.	236	60.51%	98	25.1%	56	14.5%	88.3%	45.5%	0.00*

Table 4: Maternal practice toward head injuries among children under 5 years old

| | Strongly disagreed (0-4) | | Neutral (5) | | Strongly agreed (6-10) | |
	N	N %	N	N %	N	N %
Call ambulance/emergency services if had head trauma.	128	32.82%	112	28.72%	150	38.46%
Keep children away from wet floors.	196	50.26%	114	29.23%	80	20.51%
Attend courses on head trauma.	14	3.59%	98	25.13%	278	71.28%
Transfer experience in dealing with head trauma to others.	11	2.82%	117	30.00%	262	67.18%
Teach Family and friends about head trauma.	36	9.23%	162	41.54%	192	49.23%

Discussion

Unexpected injuries continue to be a leading cause of death, disease, and long-term disability in childhood, but they can often be prevented with appropriate information and safe practices [18]. Young children are especially vulnerable because of their inner desire to explore the world and their inability to understand the dangers of their actions [14]. When children learn by experience, minor injuries are bound to occur, but providing a safe environment can reduce close observation risks and safety margins [2]. Most accidents affecting children at home can be prevented or reduced if parents, especially mothers, know what to do right away [15]. Recent publications indicate that domestic accidents, accidents, and injuries can be successfully avoided or are at least a concern [15,18–20].

According to our knowledge, this is the first study that has focused on maternal knowledge considering head trauma in children under the age of five. In our study, the prevalence of head injuries among children reported by mothers was 7.2 %. Higher prevalence was noticed in older mothers, working mothers, especially those who work at healthcare institutions, lower educated mothers, lower maternal income, and a higher number of children. In a study conducted by Trefan L et.al., the authors reported that the prevalence of head injuries in children under 15 years old who were admitted to the hospital was 11.2 % [21]. However, the prevalence was significantly lower in another study conducted by Krupa J et al. in the USA; the authors reported that the lifetime estimate of parent-reported traumatic brain injuries among children was 2.5% [22]. According to the national center for health statistics report, based on parental reports, the prevalence of head trauma among children was 8.3 % among boys and 5.6 % among girls [23]. According to the study of Akturk U, the author confirmed our results that the prevalence of head injuries in children was significantly higher among older mothers, mothers with a higher number of children, less educated mothers, and housewives [13].

Considering maternal knowledge toward managing head injuries of children less than five years, we found that 35.13 % of mothers had an adequate level of knowledge. Generally, knowledge of managing head injuries was not affected by the mothers' age or the number of children, but rather by occupation, educational level, family income, and previous first aid training. In a study conducted by Megahed M et al., the authors found that only 25.1 % of mothers had adequate knowledge of home injuries among children less than five years. The authors confirmed our results that the level of knowledge was not affected by the mother's age but by the mother's education, job, and socioeconomic level [24]. Some previous studies found that the level of knowledge among mothers toward managing head trauma and preventing home injuries among children is sub-adequate [9,11]. The low percentage of mothers who reported having adequate knowledge could be explained by our analysis, which shows that only 13 % of mothers had knowledge of head injuries from healthcare professions. Instead, most of them took their knowledge from social media, friends, books, and newspapers. This result was also reported in many previous studies that were conducted in a similar environment as our study [9,11,15,18]. Having knowledge from the profession could increase the correct awareness about head trauma in children and improve maternal knowledge. Our results and the results of other studies confirmed that mothers who had previous training about first aid would have a higher level of knowledge than those who did not [13,25–27]. This indicates that there is a necessary need to encourage mothers to attend first aid training, which could increase their level of knowledge and provide them with the knowledge that enables them to deal with these injuries and reduce the negative consequences.

Fortunately, we found that 70.26 % of the mothers in this study covered furniture edges, 92.3 % would never leave children home alone, 51.54 % would use anti-slipping mats, and 48.46 % would always keep a first aid kit at home. This positive attitude to reduce head injuries at home is significantly related to mothers' level of knowledge. Many previous studies reported the relation between attitude and knowledge of mothers considering accidental injuries at home [13,23,27]. Furthermore, we found that 71.28 % of the mothers strongly agreed about the importance of attending courses on head trauma. These results were similar to other studies conducted in Riyadh, Egypt, and India, where most mothers agreed that they should know about first aid and were all willing to undergo training on first aid [7,11,15]. These are valuable findings that should encourage authorities to organize and implement effective programs in first aid for mothers in Riyadh region.

This study had some limitations, including the dependence on a self-reported questionnaire for collecting the data. Using a self-reported questionnaire could lead to some personal bias. For example, some mothers may not be able to diagnose head trauma, thus lowering the actual prevalence of head trauma. Moreover, the online distribution of the questionnaire may lead to some sampling bias toward younger participants and those who use social media, which may affect their attitude in choosing social media as the primary source of information.

In order to reduce the prevalence of home injuries generally and head trauma specifically, we recommend increasing the awareness level of the parents and the whole community using educational programs that aim to prevent home injuries of children. Moreover, these programs would increase mothers' awareness toward safety measures that should be applied at home and increase their awareness of first aid, leading to decreased mortality and morbidity of these injuries.

In conclusion, we found that the level of knowledge among mothers in Al Riyadh region toward managing head trauma and preventing home injuries among children is sub-adequate. Many factors affect this knowledge, including maternal education, monthly income, occupation, and first aid training. Moreover, we found that the attitude of mothers toward head injuries is significantly associated with their knowledge. Therefore, we recommended increasing mothers' awareness in Al-Riyadh region toward head injury management.

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Total hip replacement in active elderly patients with femur neck fracture, Aden, Yemen

Abdul Fatah Abbas Mansoor Haidarah

Correspondence:
Abdul Fatah Abbas Mansoor Haidarah
Assistant Professor of Orthopedic Surgery,
Department of Special Surgery Faculty of Medicine, Aden University.
Yemen
Email: alsaeedifattah@gmail.com

Abstract

Objective: To evaluate the results of total hip replacement for patients with femoral neck fractures in Aden, Yemen

Materials and method: Patients were retrospectively sought who suffered a femoral neck fracture and who were all operated on by the author and a senior surgeon in the period from January 2018 to April 2020. The study was conducted at the department of orthopedic surgery, in Alnaqeeb private hospital in Almansoora, Aden, Yemen.

Statistical analyses were performed using the statistical program SPSS, version 17.

We expressed distribution of variables using means and standard deviation (SD). Fisher test was used and p-value ≤ 0.05 was considered as statistically significant.

Results: The study patients were 70. All patients suffered from femoral neck fracture and were operated on for total hip replacement. They were (50%) females and (50%) males with a ratio female to male 1:1. The mean age of all patients was 68.9 ± 7.8 years (range, 60 to 87 years). The patients of the age group 60 – 70 were predominant with (72.9%). There was statistical significant difference between the age groups and sex of patients (p=0.05).

Causes of fractures were fall down (50%) patients, degenerative (25.7%) patients, inflammatory 7 (10%), and road traffic accident in (10%) patients. Neck femur fractures with severe displacement were predominant with (60%).

Intraoperative periprosthetic fracture was found in 3 (4.3%) patients, post-operative periprosthetic fracture was also found in 5 (7.1%) patients. Also, we found implant failure or breakage in (1.4%), dislocations in (12.9%) patients and wound infections in (5.7%). Lower limbs discrepancy was found in (1.4%) patients.

Conclusion: Our study and previous published studies have shown that the complication rates are significantly lower.

Key words: Femur neck fracture, elderly patients, total hip replacement, Aden

Introduction

Femoral neck fractures (FNF) account for about 3.6% of adult fractures, which is one of the more common fractures in the body. FNF is more common in elderly patients, and generally refers to the fracture in the part of the femoral head down to the base of the femoral neck [1,2,3].

Femoral neck is the weakest zone of proximal femur. Fracture of femoral neck is a type of fracture between femoral head and trochanteric, almost intracapsular and is quite common in elderly people, closely related to bone quality [4].

Femoral neck fracture can be treated by preservative treatment, osteosynthesis or hip replacement surgery. However, the risk of bone loss and the need for patient care make the methods of preservation or osteosynthesis less commonly used in reality. Total hip arthroplasty surgery can help patients move early, avoid long-term complications and be able to resume movement ability quickly, so it is considered an ideal method to treat femoral neck fracture. In recent years, with the advancement of anesthesia, the ability to intervene in the elderly is no longer a problem. In addition, surgical advances with minimally invasive surgery reduce the discomfort and pain of surgical wounds, so the rehabilitation of patients after surgery is earlier and better [5,6,7].

Several authors reported that total hip arthroplasty (THA) in elderly patients is advantagoues in that it leads to superior functional outcomes and lower reoperation rates compared to hemiarthroplasty (HA). With increased activity and an independent elderly population, the use of THA for managing femoral neck fracture is likely to increase [8].

Objective

To evaluate the results of total hip replacement for patients with femoral neck fractures in Aden, Yemen.

Materials and Method

Patients were retrospectively sought who suffered a femoral neck fracture and were all operated on by the author and a senior surgeon in the period from January 2018 to April 2020. The study was conducted at the Department of orthopedic surgery, in Alnaqeeb private hospital in Almansoora, Aden, Yemen.

In this study, patient charts, surgery reports and pre- and post-operative reports were reviewed.

The collected data were demographic characteristics, side of fracture, causes of fractures, diagnosed comorbidities, diagnosis and pre- and post-operative mobility.

Additionally, the postoperative complications were reviewed and put into groups (intraoperative periprosthetic fracture, post-operative periprosthetic fracture, implant failure or breakage, dislocations, wound infections and lower limbs discrepancy). We identify the occurring of complications with no and yes.

We collected also, the following data: previous hip surgery, early results of total hip replacement, and previous hip joint infection before 1 year.

Statistical analyses were performed using the Statistical program SPSS, version 22.

We expressed distribution of variables using means and standard deviation (SD). Fisher test was used and p-value ≤ 0.05 was considered as statistically significant.

Results

We enrolled 70 patients who suffered femoral neck fracture and who were operated on for total hip replacement, into our study. The study patients included 35 (50%) females and 35 (50%) males with a ratio female to male 1:1.

The mean age of all patients was 68.9 ± 7.8 years (range, 60 to 87 years). The mean age of male patients was 71.9 ± 8.4 years (range 60 – 87 years) and the mean age of female patients was 66.0 ± 5.9 (range 66 – 85 years). The difference between means related to sex was statistically significant (p = 0.001).

The patients of the age group 60 – 70 were predominant with 51 (72.9%) followed by the age group 71 – 80 years old with 12 (17.1%) and the age group more than 80 years old with 7 (10%), as shown in Table 1 and Figure 1.

Table 2 illustrates the distribution of age groups, sides, causes and diagnosis related to sex of the study patients. We found 30 (42.9%) female patients of the age group 60 – 70 years old, while female patients of the age 71 – 80 years old were 4 (5.7%) and females aged more than 80 years was 1 (1.4%). The male patients of the age group 60 – 70 years represented 21 (30%) and patients of the age 71 – 80 years old were 8 (11.4%) and males aged more than 80 years were 6 (8.6%). There was a statistically significant difference between the age groups and sex of patients (p=0.05), as shown in Table 2.

Side of fractures were predominant 43 (61.4%) in the left side and distributed as 24 (34.3%) females and 19 (27.1%) males. There was no statistical significance between values of sides related to sex (p>0.05) as shown in Table 2.

In this study, causes of fractures were fall 35 (50%) patients, degenerative 18 (25.7%) patients, inflammatory 7 (10%), Road Traffic Accident (RTA) in 7 (10%) patients and post neck femur fractures in 3 (4.3%) patients. There was no statistical relation between causes of fractures and sex (p > 0.05), (Table 2 and Figure 2).

Neck femur fractures with severe displacement were predominant with 42 (60%) followed by osteoarthrosis with

18 (25.7%), end stage inflammatory necrosis 7 (10.0%) and avascular necrosis in 3 (4.3%) patients. There was no statistically relation between diagnosis of fractures and sex (p > 0.05), (Table 2).

Table 3 illustrates the distribution of comorbidities and complications of total hip replacement in the study patients with femur neck fracture.

Twenty-two (31.4%) patients were found with comorbidities.

We used cemented prosthesis in 63 (92%) and uncemented prostheses in 7 (10%) in total hip arthroplasty

Intraoperative periprosthetic fracture was found in 3 (4.3%) patients, post-operative periprosthetic fracture was also found in 5 (7.1%) patients. Also in Table 3 we found implant failure or breakage in 1 (1.4%), dislocations in 9 (12.9%) patients and wound infections in 4 (5.7%). Previous hip surgeries were found in 15 (21.4%) patients and lower limbs discrepancy found in 1 (1.4%) patient. The Table illustrates also, the early results of total hip replacement after femur neck fracture in 2 (2.9%) cases and previous hip joint infection before 1 year was found in 3 (4.3%) cases.

Table 1: Distribution of demographic characteristics of the study patients (n = 70)

Variable	Ratio	Range	Mean	No	%	
Sex: Males Females Male to Female	 1 :1			 35 35	 50.0 50.0	
Age range (years): All patients Male patients Female patients		 60 − 87 60 − 87 66 − 85				
Mean age ± SD* (years): All patients Male patients Female patients			 68.9 ±7.8 71.9 ±8.4 66.0 ±5.9			 P = 0.001
Age groups (years): 60 − 70 71 − 80 > 80				 51 12 7	 72.9 17.1 10.0	

SD*: Standard deviation;

Figure 1: Distribution of patients related to age groups (n=70)
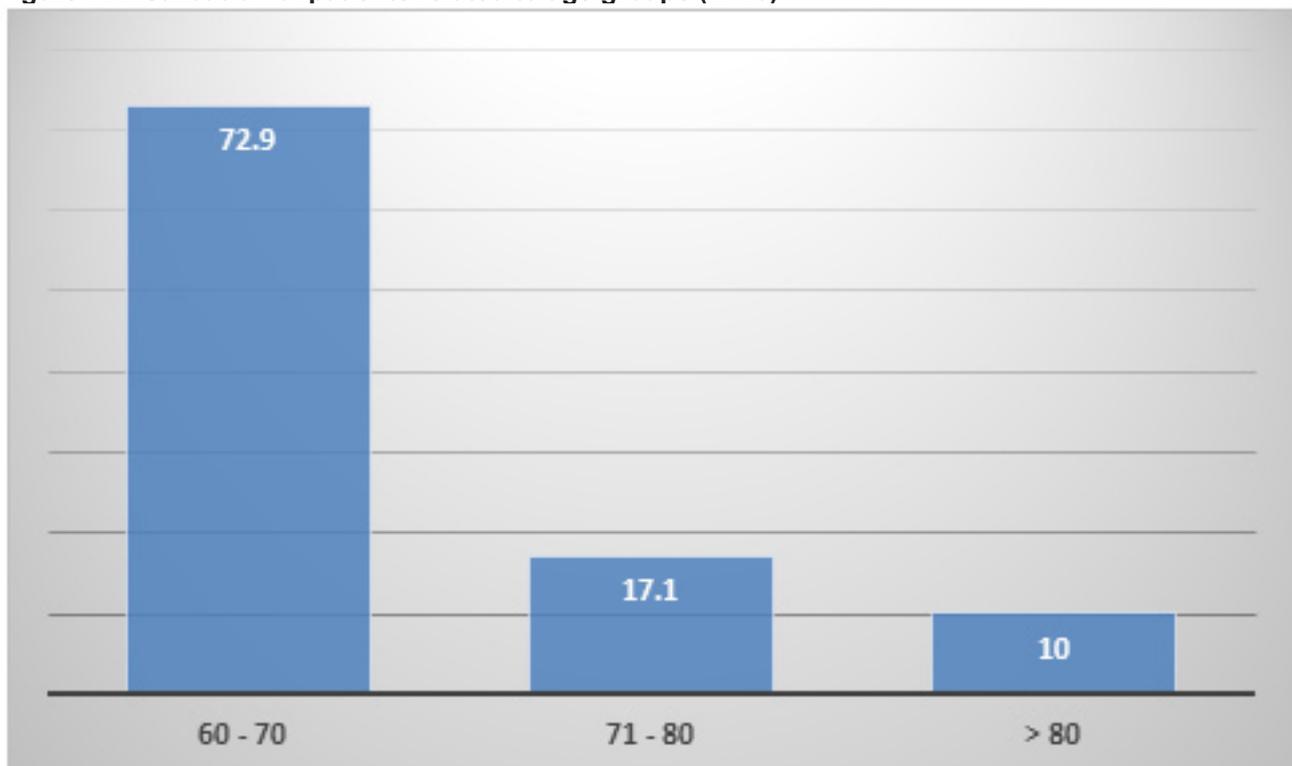
Table 2: Distribution of age groups, sides, causes and diagnosis related to sex of the study patients (n=70)

Variables	Sex				Total		P-value
	Females		Males				
	No	(%)	No	(%)	No	(%)	
Age groups (years):							
60 - 70	30	(42.9)	21	(30.0)	51	(72.9)	
71 – 80	4	(5.7)	8	(11.4)	12	(17.1)	P = 0.05
> 80	1	(1.4)	6	(8.6)	7	(10.0)	
Side:							
Left	24	(34.3)	19	(27.1)	43	(61.4)	P > 0.05
Right	11	(15.7)	16	(22.9)	27	(38.6)	
Cause:							
Fall	14	(20.0)	21	(30.0)	35	(50.0)	
Degenerative	11	(15.7)	7	(10.0)	18	(25.7)	P > 0.05
Inflammatory	5	(7.1)	2	(2.9)	7	(10.0)	
Road traffic accidents	4	(5.7)	3	(4.3)	7	(10.0)	
Post neck femur fractures	1	(1.4)	2	(2.9)	3	(4.3)	
Diagnose:							
NFF with severe displacement	18	(25.7)	24	(34.3)	42	(60.0)	P > 0.05
OA	11	(15.7)	7	(10.0)	18	(25.7)	
End stage inflammatory necrosis	5	(7.1)	2	(2.9)	7	(10.0)	
Avascular necrosis	1	(1.4)	2	(2.9)	3	(4.3)	

NFF with severe displacement = Neck Femur Fracture with severe displacement
OA = Osteoarthrosis

Figure 2: Distribution of causes of fractures related to sex
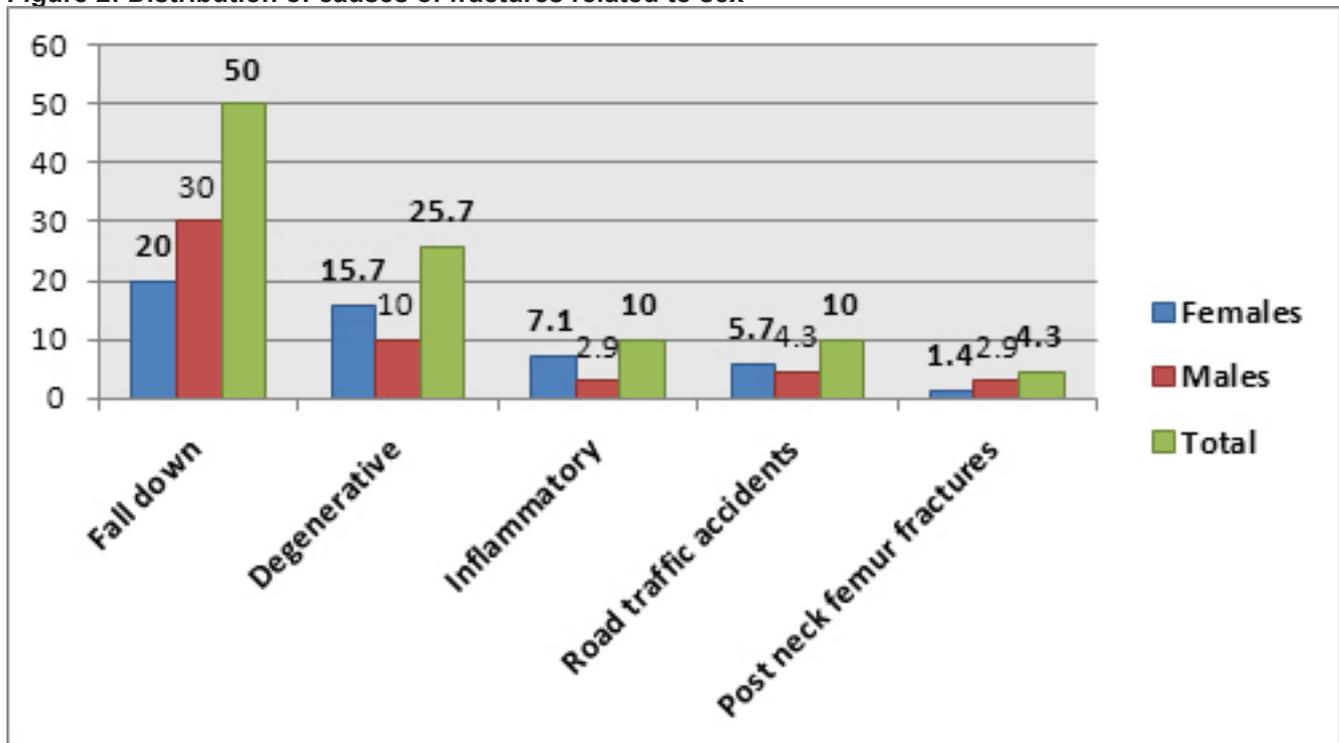
Table 3: Distribution of comorbidities and complications of total hip replacement in patients with femur neck fracture (n = 70)

Variables	No	%
Comorbidities:		
No	48	68.6
Yes	22	31.4
Cementation:		
Cemented	63	90
Uncemented	7	10
Intraoperative periprosthetic fracture:		
No	67	95.7
Yes	3	4.3
Post-operative periprosthetic fracture:		
No	65	92.9
Yes	5	7.1
Implant failure or breakage		
No	69	98.6
Yes	1	1.4
Dislocations:		
No	61	87.1
Yes	9	12.9
Wound infection:		
No	66	94.3
Yes	4	5.7
Previous hips surgery:		
No	55	78.6
Yes	15	21.4
Lower limbs discrepancy:		
No	69	98.6
Yes	1	1.4
EARTHREPL:*		
No	68	97.1
Yes	2	2.9
Previous hip joint infection before 1 year:		
No	67	95.7
Yes	3	4.3

EARTHREPL* = Early results of total hip replacement after femur neck fracture in active elderly patients

Discussion

Femoral neck fractures (FNFs) will bring baneful consequences to patients due to their high morbidity, disability rate, economic burden, and mortality, and the rate is rapidly growing because of the increasing number of the elderly [9]. Arthroplasty is commonly recommended for displaced femoral neck fractures (67% of all types FNFs) in the elderly (age > 65 years) and can be categorized as total hip arthroplasty (THA) [10].

In our study females were 35 (50%) and males were 35 (50%) with a ratio female to male 1:1.

Kebaetse et al [11] in their study in Botswana reported that hip fractures were nearly as frequent in men as in women. Also, this feature has been seen in other countries [12,13].

In our present study we found also, the mean age of all patients was 68.9 ± 7.8 years (range, 60 to 87 years). The mean age of male patients was 71.9 ± 8.4 years (range 60 – 87 years) and the mean age of female patients was 66.0 ± 5.9 (range 66 – 85 years).

Johnell et al [14] reported that more women than men sustain FNFs and females were older than men when the fracture occurs. Most of the men were in the age group ≤ 60 years, for which high-energy trauma is more common. Previous studies [15,16] reported that the incidence of FNFs increases gradually with age, with a marked increase after age 75 years.

A study by Trung et al [17] from Vietnam reported that the mean age of patients in their study was 65.7 ± 8.3 years old, with the age group under 75 years accounting for 90% and 40% of the patients were under 65 years.

We found in the present study (42.9%) female patients of the age group 60 – 70 years old, while female patients of the age 71 – 80 years old were (5.7%) and females aged more than 80 years were (1.4%). The male patients of the age group 60 – 70 years represented (30%) and patients of the age 71 – 80 years old were (11.4%) and males aged more than 80 years were (8.6%). There was a statistically significant difference between the age groups and sex of patients (p=0.05).

Wolfovitch et al [18] reported similar findings to our results from Salvador in which they mentioned the mean age of their study patients was 66.77 years ± SD 15.73 years. Patients were predominantly aged between 71 – 80 years (31.3%).

In this study, causes of fractures were fall down (50%) patients, degenerative (25.7%) patients, inflammatory (10%), Road Traffic Accident (RTA) in (10%) patients and post neck femur fractures in (4.3%) of patients. There is no statistically significant relation between causes of fractures and sex (p > 0.05).

Femoral neck fractures are associated with low energy falls in the elderly. In younger patients sustaining a femoral neck fracture, the cause is usually secondary to high-energy trauma such as a fall from a substantial height or motor vehicle accidents [19].

Koaban et al [20] reported in their study that the most common cause of FNFs in their studied population was secondary to a fall injury, which was documented in (53.6%) patients, followed by RTA in (23.2%) patients.

We found in our current study (31.4%) patients injured by femoral neck fractures complained of comorbidities.

Edelmuth et al [21] reported in their study from Brazil the following: regarding comorbidities, 11.9% of the patients had no associated disease, 37.3% had one comorbidity, 17.9% had two comorbidities, and 22.3% had three. In 10.4% of the study population, more than four comorbidities were observed, and the main comorbidities found in this population were systemic arterial hypertension, diabetes mellitus, and heart diseases.

In the current study the cemented prosthesis were used in 63 (92%) and uncemented prostheses in 7 (10%) in total hip arthroplasty.

Cemented or uncemented total hip replacement remains a widely accepted method for hip replacement after fracture [22]. Promising results have been described for patients with FNFs treated with a cemented or uncemented total hip replacement [23].

In the present study, intraoperative periprosthetic fracture was found in (4.3%) cases, and post-operative periprosthetic fracture found in (7.1%) cases.

Intraoperative periprosthetic fracture is an often-overlooked category of patients who can end up with poor results and early loosening if fracture is not identified intraoperatively and managed correctly. Such results affect both femoral and acetabular fixation and are often under recognized and under reported [24]. As one might expect, reported rates of Intraoperative periprosthetic fracture are significantly higher in uncemented prostheses. Two studies suggest the rate in cemented arthroplasty is around 0.3% to 1.2%, [25,26] and several studies of uncemented implants suggest rates of 2.95% to 27.8% depending on a multitude of variables [25,26,27].

Suenghwan et al [8] reported that in their study of 83 hips, perioperative complications occurred in nine hips (10.8%). One patient (1.2%) experienced an intraoperative periprosthetic fracture around the trochanteric region, which was treated by cerclage wiring. Two patients (2.4%) had superficial wound infections that required debridement and treatment with antibiotics without significant revision surgery. One patient (1.2%) had a single dislocation due to delirium in the early postoperative period, which was managed with closed reduction; no further dislocations were noted during the study period. One pulmonary

thromboembolism (1.2%) was identified postoperatively and treated with seven months of warfarin. There was no ceramic breakage during the follow-up period.

In our present study we found implant failure or breakage in 1 (1.4%), dislocations in 9 (12.9%) patients and wound infections in 4 (5.7%).

Nosa et al [28] mentioned that previous hip surgeries were found in 15 (21.4%) patients and lower limbs discrepancy found in 1 (1.4%) patient.

In the present study we found implant failure or breakage in 1 (1.4%), dislocations in 9 (12.9%) patients and wound infections in 4 (5.7%).

Prosthetic dislocation is one of the most common causes of implant failure after total hip arthroplasty [29]. The reported dislocation rate after primary total hip arthroplasty is 0.3-10% [30] and is much higher after revision total hip arthroplasty (5-30%) [31]. The cause of a dislocated prosthesis can be multifactorial, including both surgeon and patient related factors [32].

Liu et al [33] reported in their published study that among the 1240 patients, a total of 94 surgical site infections were observed, demonstrating an overall incidence rate of 7.58%. These 94 patients were specifically classified as superficial incision infection in 76 cases and deep infection in 18 patients, giving the incidence of 6.13% and 1.45% for superficial and deep surgical site infection respectively.

Conclusion

Our findings confirm the opinion that a total hip replacement is the preferred treatment for a relatively healthy, active elderly patient with a displaced femoral neck fracture. Our study and previous published studies have shown that the complication rates are significantly lower. Further studies are needed to find out the incidence and prevalence rates of femur neck fracture and their treatment procedures in Aden Governorate.

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Assessment of Patient Safety Culture in Abu Arish General Hospital, Jazan, Saudi Arabia

Ali Essa Tawhari (1)
Maged El-Setouhy (2,3)
Abdullah Ibrahim Sabai (4)
Ahmed Yahia Abdaly (5)
Abdullah Abdo Holal (6)
Abdulaziz Mohamed Humedi (7)
Ahmad Alhassan Mokli (8)
Abdulmajeed Ahmed Dayili (9)
Abdulrahman Beshi Hakami (10)

(1) Family Medicine Resident, Joint Program of Family Medicine, Jazan, Saudi Arabia
(2) Department of Family & Community Medicine, Faculty of Medicine, Jazan University, Jazan, Saudi Arabia
(3) Department of Community, Environmental & Occupational Medicine, Faculty of Medicine, Ain Shams University, Cairo. Egypt
(4) Preventive Medicine & Public Health Consultant, Ministry of Health, Jazan, Saudi Arabia
(5) Family Medicine Consultant, Ministry of Health, Jazan, Saudi Arabia
(6) General Practitioner, Ministry of health, Jazan, Saudi Arabia
(7) Family Medicine Resident, Security Forces Hospital, Riyadh, Saudi Arabia
(8) Dermatology Resident, Ministry of health, Jazan, Saudi Arabia
(9).Urology Resident, Ministry of health, Jazan, Saudi Arabia
(10) Orthopedics Resident, Ministry of health, Jazan, Saudi Arabia

Corresponding author:
Dr. Ali Essa Tawhari
Email: al_tohary@hotmail.com

Abstract

Background: The concept of patient's safety culture refers to the work and the joint actions of the members of an institution or organization with respect to their ability to detect errors and address and avoid them in the future and learn from them.

Objectives: To assess safety culture in "Abu Arish" General Hospital to provide a starting point from which action planning begins and patient safety changes emerge.

Methodology: The methodology of this study was based on the guidelines provided by the Agency for Healthcare Research and Quality (AHRQ). Data were collected using the Hospital Survey on Patient Safety Culture Form. Analysis of data was by Microsoft Excel and the Statistical Package for Social Sciences (SPSS) programs. A survey questionnaire was distributed in "Abu Arish" General Hospital to 207 health care providers, including nurses, technicians, managers and medical staff.

Results: The patient safety composites with the highest positive scores were teamwork within units (72%), organizational learning and continuous improvement (70%) and the composites with the lowest scores were non-punitive response to error (22%), staffing (32%), Handoffs & Transitions (38%), frequency of events reported (40%), communication openness (43%), hospital management support for patient safety (43%) and Teamwork Across Units (43%).

Conclusions: This study provides an overall assessment of perceptions of safety among hospital staff in a general hospital. There are areas of strengths and weakness in the patient safety culture dimensions. There are several areas for improvement, including non-punitive response to errors, staffing, hospital handoffs & transitions and error reporting.

Keywords: Patient safety, Saudi Arabia.

Introduction

The concept of patient's safety culture refers to the work and the joint actions of the members of an institution or organization with respect to their ability to detect errors and address and avoid them in the future and learn from them. The Agency for Healthcare Research and Quality (AHRQ) in the USA supports the development of patient safety culture assessment tools for hospitals, nursing homes, and ambulatory outpatient medical offices. In 2004, the AHRQ released the Hospital Survey on Patient Safety Culture, a staff survey designed to help hospitals assess the culture of safety in their institutions (1).

Patient safety is a critical component of health care quality. As health care organizations continually strive to improve, there is a growing recognition of the importance of establishing a culture of safety. Hence, patient safety culture has been applied by several countries, such as in Belgian acute hospitals (2), China (3), Taiwan (4), Italy (5), Germany (6), Iran (7), Palestine (8) (9), Lebanon (10), and Egypt (11). However, there are limited studies in Saudi Arabia, that assessed patient safety culture in Riyadh's Hospitals (12)(13). Another study assessed nurses' perceptions and attitudes of patient safety culture (14).

Methods and research designs applied to study patients' safety culture vary from one study to another, according to resources of times, persons and cost. The commonest study design is the cross-sectional, while the most effective are randomized control trials. They measure the effects of a team-based assessment and intervention on patient safety culture in general practice (2).

Language, work area, and profession were identified as important safety culture predictors. Years of experience in the hospital were shown to have a small effect on safety culture perceptions (2). Patient safety grade deteriorated and the number of events reported increased with long working hours, which had an impact on 'staffing' and 'teamwork within units' in Japan, the US and Taiwan (4).

Attitude surveys provide a method for assessing safety culture in surgery, for evaluating the effectiveness of training initiatives, and for collecting data for a hospital's quality assurance program (5). Intervention practices showed better reporting of patient safety incidents, reflected in a higher number of incident reports and incident reports of higher quality (6).

To achieve a safety culture, we should understand the beliefs, values and principles around it, and we also need to regulate the behaviors related to patient safety. The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures (1).

Moreover, the team Strategies and Tools to Enhance Performance and Patient Safety (STEPPS), acts as a training program that has been developed and disseminated by the Department of Defense and the Agency for Healthcare Research and Quality. It focuses on importance of teamwork and team training in the prevention of medical errors through communication and other teamwork skills and that teamwork is essential to achieving high reliability in healthcare organizations improving patient safety (15).

Methodology

The present study was conducted in "Abu Arish" General Hospital on 207 health care providers, following a cross-sectional study design. The study hospital has a total of 130 beds and 19 clinics. The validated English and Arabic versions of the Patient Safety Culture Questionnaire (1; 16) were used for data collection.

The inclusion criteria were hospital staff who have direct contact or interaction with patients (e.g., nurses), or nonclinical staff (e.g., unit clerks); hospital staff who may not have direct contact or interaction with patients but whose work directly affects patient care (e.g., staff in the pharmacy, or laboratory/pathology units); hospital-employed physicians who spend most of their work hours in the hospital (e.g., emergency department physicians, pathologists); in addition to hospital supervisors, managers, and administrators. Physicians who have privileges at the hospital, but are not hospital employees but may spend the majority of their work time in non-hospital, outpatient settings were excluded.

The survey measured the following unit-level aspects of safety culture:

• Supervisor/Manager Expectations & Actions Promoting Safety: Organizational learning—continuous improvement, teamwork within units, communication openness feedback and communication about error, non-punitive response to error and staffing.
• Hospital-level aspects of safety culture: hospital management support for patient safety (3 items), teamwork across hospital units (4 items), and hospital handoffs and transitions (4 items).
• Four outcome variables: Overall perceptions of safety; frequency of event reporting; patient safety grade (of the hospital unit); and number of events reports.

Collected data were analyzed using a specially design Microsoft Excel file that was developed by AHRQ.

Ethical considerations:
The ethical approval was obtained from the regional ethical committee at "Abu Arish" General Hospital authority and written informed consent was obtained from all participants.

Results

Table (1) shows that the highest participations were for healthcare providers at Medicine, Surgery and Obstetrics departments (10.6%, 9.7% and 9.7%, respectively). The majority of participants (88.9%) interact with patients. Participants' experience in the current units, the study hospital, and experience in their current specialty were mainly short (i.e., less than one year or 1-5 years). Most participants (61.8%) had 40-59 hours' work per week.

Table (2) shows that participants' responses regarding patients' safety culture component ranged from 22% to 72%. The main points of strengths for the hospital were teamwork within units (72%), organizational learning/continuous improvement (70%), feedback and communication about errors (60%) and supervisor, manager expectations and actions promoting patient safety. The main points which needed improvement were non-punitive response to errors (22%), staffing (32%), hospital handoffs & transitions (38%) and frequency of events reported (40%).

Table (3) shows that the overall perception of patient safety culture assessed by four questionnaire items was rated as excellent or very good by 72%, acceptable by 22% and failing or poor by 7%. The respondents generally thought that patient safety is never sacrificed to get more work done (18%) and their procedures and systems are good at preventing errors from happening (16%). On other side, about (29%) of respondents thought that it is just by chance that more serious mistakes do not happen in their hospital. In addition, (39%) of respondents indicate that they have patient safety problems in their unit.

Figure (1) shows that the number of events reported in the study hospitals were generally higher than those in the AHRQ database.

Table 1: Background characteristics of the study participants (n = 207)

| Items	No.	%
Work Area/Unit		
• Medicine (non-surgical)	22	10.6
• Surgery	20	9.7
• Obstetrics	20	9.7
• Laboratory	17	8.2
• Intensive care unit (any type)	16	7.7
• Emergency department	15	7.2
• No specific unit	14	6.8
• Radiology	12	5.8
• Pediatrics	11	5.3
• Rehabilitation	9	4.3
• Pharmacy	7	3.4
• Anesthesiology	3	1.4
• Others	41	19.8
Interaction with patients		
• Yes	184	88.9
• No	19	9.2
Time worked in their current hospital work area/unit		
• <1 year	84	40.6
• 1-5 years	64	30.9
• 6-10 years	28	13.5
• 11-15 years	11	5.3
• 16-20 years	10	4.8
• ≥21 years	10	4.8
Years of experience in the hospital		
• <1 year	94	45.4
• 1-5 years	72	34.8
• 6-10 years	16	7.7
• 11-15 years	11	5.3
• 16-20 years	6	2.9
• ≥21 years	8	3.9
Experience in their current specialty or profession		
• <1 year	65	31.4
• 1-5 years	65	31.4
• 6-10 years	40	19.3
• 11-15 years	17	8.2
• 16-20 years	8	3.9
• ≥21 years	12	5.8
Typical hours worked per week		
• <20 hours per week	14	6.8
• 20-39 hours per week	25	12.1
• 40-59 hours per week	128	61.8
• 60-79 hours per week	29	14.0
• 80-99 hours per week	4	1.9
• ≥100 hours per week	7	3.4

Table 2: Composite scores (mean% positive) for dimensions of patient safety culture for all participants (n =207)

Patient safety culture composite	Average % positive response
Teamwork within units	72
Organizational learning/continuous improvement	70
Supervisor, manager expectations and actions promoting patient safety	60
Feedback and communication about errors	60
Overall perceptions of safety	53
Teamwork across hospital units	43
Communication openness	43
Hospital management support to patient safety	43
Frequency of events reported	40
Hospital handoffs & transitions	38
Staffing	32
Non-punitive response to errors	22

Table 3: Percentages of overall safety perception, frequency of event reporting and patient safety grades

Overall Perceptions of Safety	Positive	Neutral	Negative
• It is just by chance that more serious mistakes don't happen around here	44	27	29
• Patient safety is never sacrificed to get more work done	69	13	18
• We have patient safety problems in this unit	40	29	31
• Our procedures and systems are good at preventing errors from happening	60	23	13
Frequency of Event Reporting			
• How frequently a mistake is made, caught and corrected before affecting the patient?	39	29	32
• When a mistake is made, but has no potential to harm the patient, how often is this reported?	35	34	30
• When a mistake is made that could harm the patient, but does not, how often is this reported?	47	25	29
Patient safety grade (of the hospital unit)	72	22	7

Number of events reported in the study hospital during the last 12 months compared with the AHRQ database
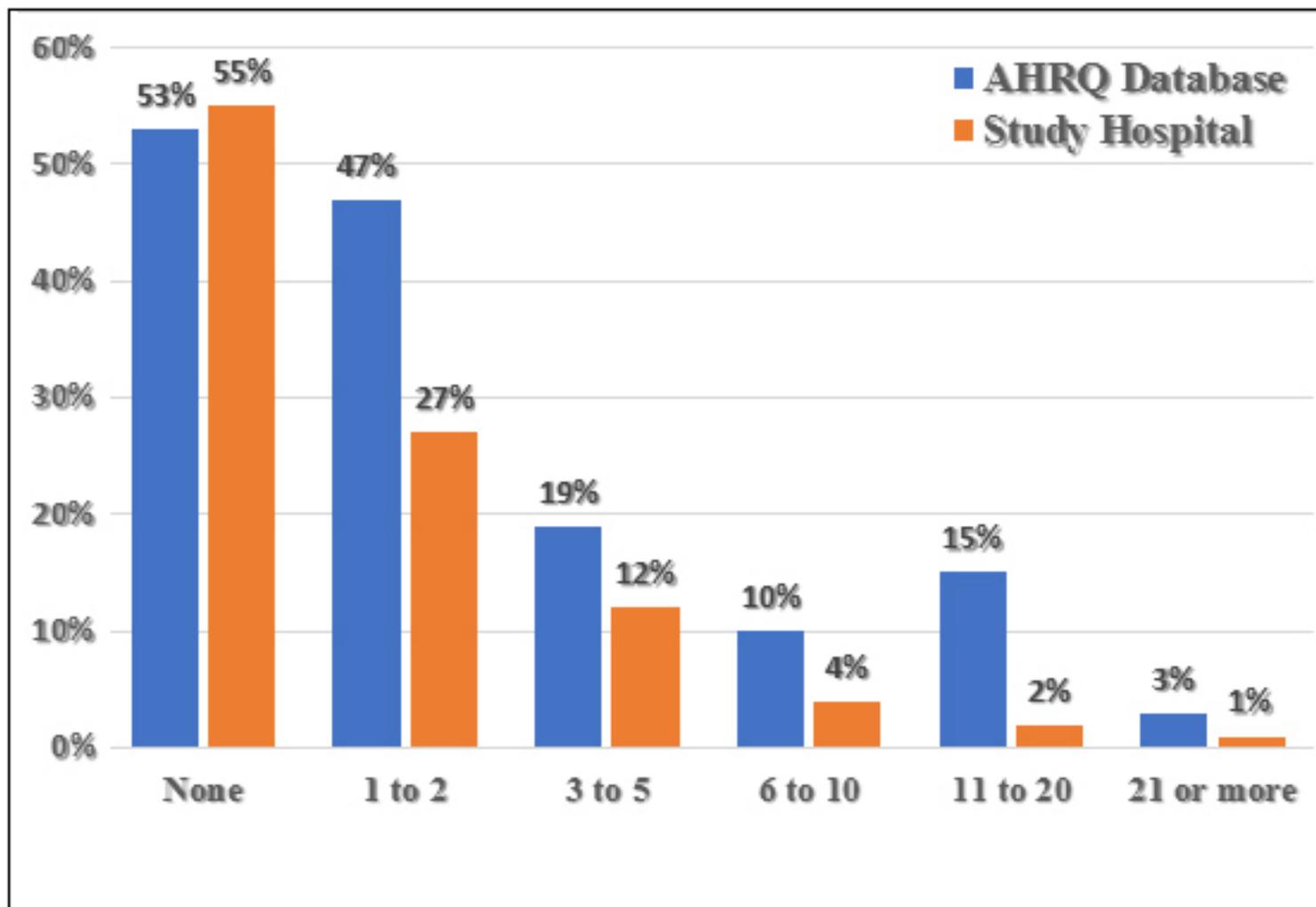
Introduction

Results of our study showed that patient safety composites with the highest positive scores were teamwork within units, organizational learning/continuous improvement, feedback and communication about errors, in addition to supervisor, manager expectations and actions promoting patient safety. However, a few points needed improvement such as non-punitive response to errors, staffing, hospital handoffs & transitions and frequency of reported events.

Similarly, in Saudi Arabia, Alahmadi reported that the highest mean composite positive score of patient safety culture was for the organizational learning for continuous improvement, followed by teamwork; the lowest mean score of patient safety culture was for the dimension of non-punitive response to error. Response to errors is an important determinant of safety culture in healthcare organizations. In order for healthcare organizations to create a culture of safety and improvement, they must eliminate fear of blame and create a climate of open communication and continuous learning (12).

In Lebanon, El-Jardali noted that the dimensions with the highest positive ratings of patient safety culture were teamwork within units, hospital management support for patient safety, and organizational learning and continuous

improvement, while those with lowest ratings included staffing and non-punitive response to error (10).

In comparison to the systematic review of Albalawi et al., there were similarities in points of weakness like ineffective leadership, a blame culture, workload/inadequate staffing and poor communication between units and positive points of teamwork within units and Organizational Learning Continuous Improvement. Conversely, 'strength' points of patient safety culture were supportive organizational attitudes to learning/continuous improvement, good teamwork within units and support from hospital management for patient safety (17).

According to the AHRQ database, the composite of safety culture with positive score more than 70% is considered as a point of strength and the composite with scores less than 50% as a point of weakness (1).

Our findings about teamwork within units was less than that reported by Alahmadi in Saudi Arabia in 16 hospitals (84%) (12), that reported by El-Jardali et al. in Lebanon (82.3%) (10), and that of the AHRQ database (80%) (1). However, it was higher than that reported by Al-Ahmadi in Saudi Arabia (69.9%) (13) and that reported in Palestine by Hamdan (71%) (9).

The composite score of "Abu Arish" General hospital in Organizational Learning-Continuous Improvement domain was less than those of previous studies reported by Alahmadi (87%) (12), Al-Ahmadi (75.9%) (13), that reported by El-Jardali et al. in Lebanon (78.3%) (10) and also that of AHRQ database (72%) (1). However, it was higher than that reported in Palestine by Hamdan (62%) (9).

The Supervisor/Manager Expectations & Actions Promoting Patient Safety domain score in our study was (60%) and it was less than that reported by Alahmadi (70%) (12), Al-Ahmadi (64%) (13), in Lebanon by El-Jardali et al. (66.4%) (10) and database of AHRQ (75%) (1). However, it was more than that reported by the study conducted in Palestine by Hamdan (56%) (9).

The composite score of Abu Arish General hospital regarding Feedback & Communication about Error domain was (60%). This was less than that reported by Alahmadi study (77%) (12), Al-Ahmadi study (63.3%) (13), El-Jardali et al. (68.1%) (10) and the AHRQ database (64%) (1).

The Overall Perceptions of Patient Safety domain score was (53%). This was less than that that reported by Alahmadi (59%) (12), El-Jardali et al. (72%) (10) and the database of AHRQ (66%) (1). However, it was more than that reported by the study of Al-Ahmadi (51.4%) (13).

The composite score of "Abu Arish" General hospital in Communication Openness domain was (43%) and this was less than that in H A Alahmadi study (60%) (12), Talal A. Al-Ahmadi study (44.2%) (13), Lebanon by El-Jardali et al. (57.3%) (10), and the AHRQ database (62%) (1). But it was more than the study conducted in Palestine by Hamdan (36%) (9).

Our percent score about Teamwork Across Units was (43%). This was less than that reported by Alahmadi (66%) (12), Al-Ahmadi (56.3%) (13), El-Jardali et al. (56%) (10) and the database of AHRQ (58%) (1).

The composite score of "Abu Arish" General hospital in Management Support for patient safety domain was (43%). This was less than the that reported by Alahmadi (74%) (12), Al-Ahmadi (65.4%) (13), El-Jardali et al. (78.4%) (10), and the database of AHRQ (72%) (1). However, it was higher than that reported by the study of Palestine hospitals by Hamdan (37%) (9).

Our findings about Frequency of Events Reported was (40%). This was less than that reported by Alahmadi (63%) (12), Al-Ahmadi (56.2%) (13), El-Jardali et al. (68.2%) (10), and the database of AHRQ (63%) (1). However, it was more than that reported by the study of Palestine hospitals by Hamdan (35%) (9).

The Handoffs & Transitions domain score was (38%). This was less than that reported by Alahmadi (61%) (12), Al-Ahmadi (47.6%) (13), El-Jardali et al. (49.7%) (10) and the database of AHRQ (45%) (1).

Our results about Staffing was (32%). This was less than that reported by the studies conducted in Lebanon by El-Jardali et al. (36.8%) (10), Palestine by Hamdan (38%) (9), and also of the AHRQ database (56%) (1). However, it was more than those reported by studies conducted by Alahmadi (27%) (12), Talal A. Al-Ahmadi (31.2%) (13).

The composite score of "Abu Arish" General hospital in Non-punitive Response to Error domain was (22%) and this was similar to a study conducted by Alahmadi (12) and less than the studies conducted in Lebanon by El-Jardali et al. (24.3%) (10), and that of the AHRQ database (44%) (1). However, it was more than the study conducted by Al-Ahmadi (21.1%) (13) and that in Palestine by Hamdan (17%) (9).

Ismail et al. stressed that patient safety culture still has many areas for improvement that need continuous evaluation and monitoring to attain a safe environment both for patients and health-care providers (11).

In conclusion, this study provides an overall assessment of perceptions of safety culture among hospital staff in a general hospital in Saudi Arabia. There are points of strengths of safety culture dimension, such as the teamwork within units and organizational learning/continuous improvement. Staff support each other in the units, work together as a team to get the work done and make changes to improve patient safety. All of these lead to this observed strength. The points of weakness were related to punitive response to error that most participants worry that mistakes they make are kept in their personal files leading to under-reporting of errors. Problems often occur in cooperation and exchange of information across hospital units. Generally, there exists a punitive and blame culture, under-reporting of events, under-staffing, handoffs & transitions, lack of communication openness and inadequate management support.

Therefore, it is to be noted that the first step toward elimination of harm and improvement of patient safety and learning from mistakes is error reporting. Hospital organization must reduce the fear of blame culture and create a climate of open communication and continuous learning improving non-blaming "just culture" in the hospital to facilitate the reporting of errors and learning from them, and it must provide effective strategies to facilitate exchange of information across units. Moreover, hospitals need more manpower to face overload. It is recommended to use team Strategies and Tools to Enhance Performance and Patient Safety (STEPPS).

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A case of ectopic pregnancy

Ban Alobaidi
Russal Waseem Mohamad
Mohammed Al-Allak

Primary Health Care Corporation, Qatar

Corresponding author:
Ban Alobaidi
Primary health care corporation, Qatar
Email: banalobaidi@yahoo.com

Abstract

Background: Ectopic pregnancy is a condition where pregnancy occurs outside the uterine cavity. It is a life-threatening condition and needs to be acted on urgently when suspected. Ectopic pregnancy should be suspected in any woman in childbearing age presenting with irregular vaginal bleeding like this case.

Case: 36 years old female presented with history of irregular vaginal bleeding and lower abdominal pain and was found to be pregnant on assessment. She was referred to the emergency department with possible miscarriage however on assessment and imaging she was found to have disturbed ectopic pregnancy in fallopian tube.

Conclusion: This case highlights the importance of careful history taking and assessment in women presenting with vaginal bleeding and taking the appropriate steps in arranging urgent management for this life-threatening condition. It is also a reminder that not all cases have a typical presentation and ectopic pregnancy should be suspected in women of childbearing age presenting with vaginal bleeding or abdominal pain. In fact ectopic pregnancy should be suspected until proven otherwise.

Key words: ectopic pregnancy, vaginal bleeding.

Background

Ectopic pregnancy happens as a result of the implantation of fertilized egg outside of the uterine cavity. Prevalence of ectopic pregnancy is 1%, while ruptured ectopic pregnancy accounts for 2.7% of pregnancy related deaths (1). It is considered as one of the main, if not the leading cause of mortality in early pregnancy, hence timely management plans are very important in patient safety (2).

There are many theories involved in the etiology of ectopic pregnancy such as previous abdominal surgery, previous ectopic pregnancy and most importantly history of infertility (3).

Case Report

We present a 36-year-old female patient of Bangladeshi origin who presented to her family physician with vaginal spotting for 4 weeks. Her only medical concern was that bleeding didn't stop and she was hoping to have a medical treatment to stop her bleeding. The bleeding was mild to moderate, and she had lower abdominal pain described as period pain, but was not significant enough to take any pain relief medication and was not affecting her daily activity. She had no vomiting or fever. She had previous history of irregular periods and told her doctor that she has had no periods for over 12 months prior to review. She was sexually active, and she was not on contraception and not breast feeding. She had two previous normal vaginal deliveries with no complications. She was not on any regular medications, was a non-smoker and didn't drink alcohol. She had no family history of significance.

She described abdominal pain and irregular vaginal bleeding varying in intensity from mild spotting to a normal period like bleeding. She did not feel the need to take analgesia. She thought she was on her period but when the bleeding continued she asked if she could have a hormonal tablet to stop her bleeding. She never thought she could be pregnant, and she initially declined a pregnancy test thinking it was unnecessary. On examination she appeared well with normal vital signs, her abdomen was soft non tender with no guarding or rigidity. She had normal bowel sounds on auscultation. Pregnancy was confirmed on urine test. She was referred immediately to women's hospital emergency department with suspected miscarriage / threatened miscarriage.

Her white cell count and neutrophils were raised on admission with raised beta hCG levels.

On speculum examination, cervix was closed with slight vaginal bleeding seen.

Ultrasound scan showed a left adnexal sac like structure containing yolk sac and non-viable fetal pole at six weeks. There was pelvic hematoma, mild unclear pelvic free fluid and mild hepatorenal free fluid suggestive of a picture of disturbed ectopic pregnancy.

She was taken to theatre and underwent left fallopian tube salpingectomy. She was monitored postoperatively in the ward and was discharged after two days with follow up in the gynecology clinic in two weeks' time.

Discussion

There is no doubt that ectopic pregnancy is a medical emergency and careful assessment, and examination is very important. The initial assessment in history taking should include review of the present complaint and gynecological history including last menstrual period, sexual history and contraception history.

The estimated rate of ectopic pregnancy is 1-2% in the population, and the rate is higher in those who use assisted reproduction techniques, up to 5% (4). Around 95% of ectopic pregnancies occur in the fallopian tube while less than 5% occur in the interstitial segment of the fallopian tube, cervix, cesarean section scar, ovary, or peritoneal cavity (5).

The typical symptoms of ectopic pregnancy occur around six to nine weeks of pregnancy. The presentation can vary from asymptomatic to clinically unstable with signs of shock. The classic triad of symptoms include history of missed period, vaginal spotting or bleeding and pelvic pain. Other symptoms include abdominal pain radiating to shoulder, acute abdomen, and syncope (12).

Traditional risk factors for ectopic pregnancy include previous ectopic pregnancy, previous chlamydia trachomitis, history of infertility, previous abdominal or adnexal surgery, previous use of IUD.

While the absolute risk of ectopic pregnancy in women using IUC is lower than those not on any contraception (rate for LNG-IUS is 0.02 per 100 women and for the Cu-IUD a rate of 0.08 per 100 women), the likelihood of pregnancy being ectopic with intrauterine contraception is higher than that if it occurred without the use of intrauterine contraception (7). The reason for that is because intrauterine contraception is a very effective method overall. If a woman is found to be pregnant while using intrauterine contraception then ectopic pregnancy should be ruled out as there is a 50% chance of it being ectopic (11). Furthermore, intrauterine contraception is not contraindicated in women with history of previous ectopic pregnancy (UKMEC1) (8).

Diagnosis
The mainstay in diagnosis of ectopic pregnancy is ultrasound scan to confirm the site of embryo or yolk sac. In some cases, referred to as pregnancy of unknown location where imaging cannot confirm the site of pregnancy but there is positive pregnancy tests, a serial b-hcg and ultrasound scan should be done to confirm the diagnosis. Once a diagnosis is confirmed treatment can be medical with methotrexate injection or surgical with salpingotomy / salpingectomy (9).

Figure 1 Diagram shows the locations and incidence rates of uncommon ectopic pregnancies (photo courtesy of RSNA publications online / radiographics) (6)
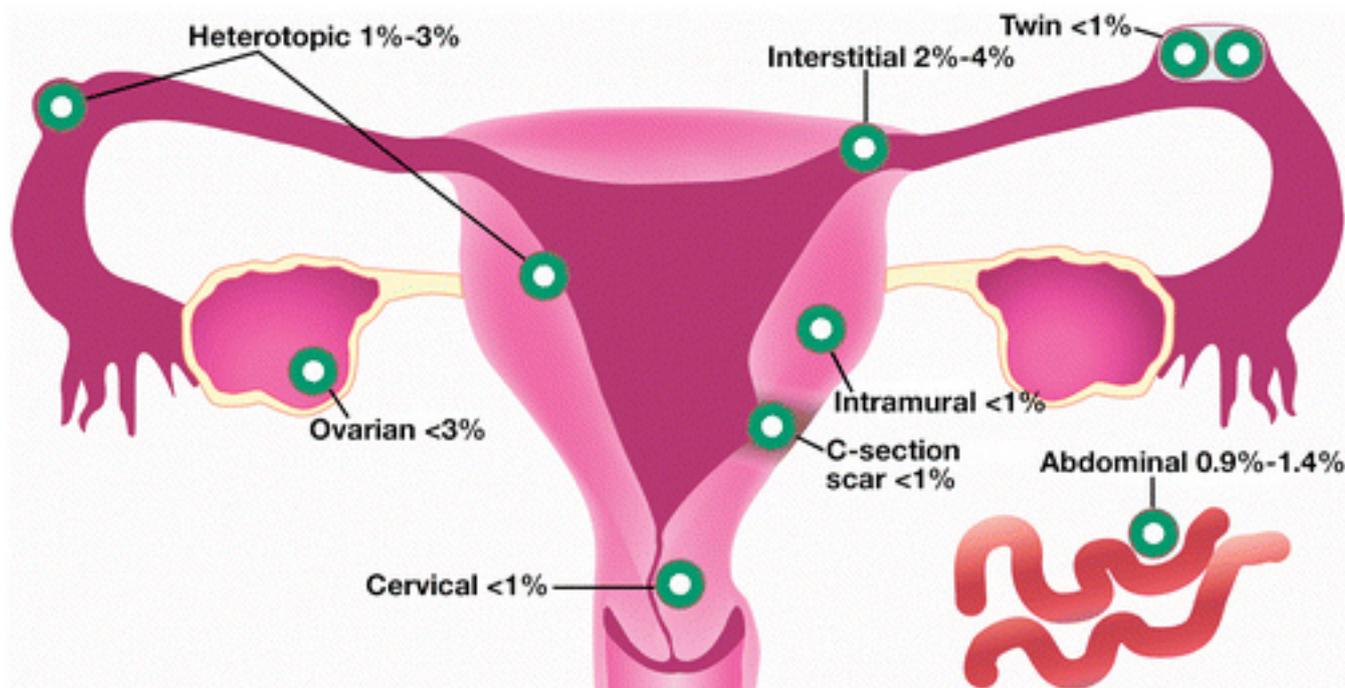

Figure 2 Simplified algorithm to ectopic pregnancy work- up (10)
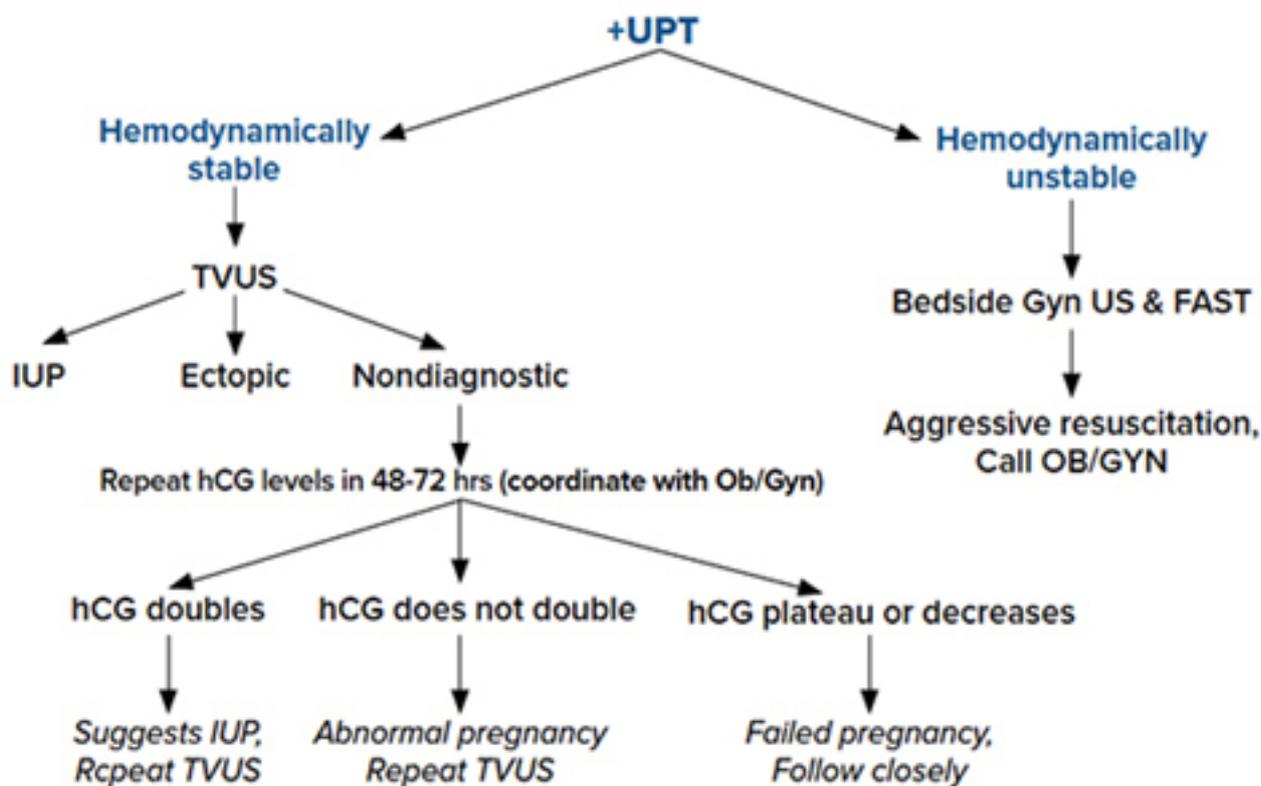
Conclusion and take home messages

Ectopic pregnancy is a medical emergency and should be suspected in any woman in childbearing age especially those who are clinically hemodynamically unstable with a positive urine pregnancy test. Primary care clinicians should have a low threshold for ordering a pregnancy test even if the chief complaint is not genitourinary related and consider emergency referral to secondary care and women's health unit for monitoring and treatment.

We should also bear in mind that a single transvaginal ultrasound is not necessarily diagnostic in a stable patient because pregnancy can be too early to be seen on imaging.

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Evaluation and assessment of male infertility in Primary care; A review

Russal Waseem Mohamad
Ban Alobaidi
Sinan Jabbar

Primary Health Care Corporation, Qatar

Corresponding author:
Dr Russal Waseem Mohamad
Primary health care corporation,
Qatar
Email: dr_russal_waseem@yahoo.com

Abstract

Infertility is a common condition seen in primary care practices. The World Health Organization estimates that 9% of couples worldwide struggle with fertility issues and that the male factor contributes to 20-30% of all infertility cases. The diagnosis of infertility in men is primarily based on semen analysis. The main parameters of semen include concentration, appearance, and motility of sperm. Recently, the demand for infertility services has increased, and infertile couples are seen frequently by primary care physicians. A flexible, patient-centred approach is indicated. This article outlines the Family Physician`s evaluation of male infertility and indications for referral to a male infertility specialist.

Key words: Male infertility, primary care, spermatogenesis, azoospermia.

Definitions and Epidemiology

Couple infertility has been recently defined per NICE as the "inability to achieve conception despite one year or more of frequent, unprotected intercourse" (NICE, 2013). Infertility affects about 15% of couples worldwide, totaling 48.5 million couples. Males are determined to be solely responsible for 20-30% of infertility cases (Jarow, 2007), and they contribute to 50% of all instances (Winters and Walsh, 2014). 'Normal' male fertility hinges on the production and transport of sperm, a highly complex process that involves the endocrine, immune and neural systems. Evaluating the fertility potential of the male partner represents an important part of the assessment of a couple who has failed to achieve pregnancy. The most important test for men is a semen analysis. Male infertility is often defined as abnormal semen parameters however may be seen with normal semen analysis (WHO 2010).

The diagnostic workup of men presenting with suspected infertility includes performing an in-depth history and focused physical examination. The male fertility history is one of the most comprehensive histories performed in the field of urology, focusing on the many identified risk factors (Kumar, 2015). This article reviews the Primary care evaluation of male infertility and indications for referral to a male infertility specialist.

Clinical Case Scenario

A 35-year-old male presented with inability to conceive for 18 months. His partner is 29 years old. She has regular cycles, and no previous obstetric history. All previous investigations were normal. The male partner had no significant past medical or surgical history apart from mumps as a child. Initial sperm analysis has shown oligospermia of 5 million per milliliter (normal 20 million per milliliter). His physical examination was unremarkable. However, mild skin pigmentation on the flanks was noted. The repeat semen analysis demonstrated oligoasthenoteratospermia at 5.5 million per milliliter, motility at 15% (normal, 40%), and morphology of 1% (normal, 4%). Scrotal ultrasound revealed homogenous parenchyma bilaterally, a mild bilateral hydrocele, a 9-mm left epididymal cyst and subclinical left varicocele. Initial blood test carried out by the GP was normal. The patient was subsequently referred to the infertility services. Assessment revealed markedly elevated ACTH. An endocrinology referral was done for further workup of adrenal insufficiency. The patient was diagnosed with Addison's disease and hyperthyroidism. A few months later he was seen in the infertility clinic, his sperm count improved, and the couple were offered In vitro fertilization (IVF) treatment.

Aetiology

The causes of infertility include abnormalities of any portion of the male or female reproductive system. The causes of male infertility can be stratified per mechanism into three main categories:

1. Pre-testicular causes: This results from decreased production of FSH and LH secondary to hypothalamic or pituitary dysfunction, which leads to failure of spermatogenesis and testosterone secretion by the testes. Such as:

> **• Hypogonadotropic hypogonadism (Kallmann Syndrome)** - is rare and accounts for <1% of male factor fertility problems (Jarow, 1989). It is characterized by reduced hypothalamic or pituitary activity resulting in abnormally low serum FSH and LH levels. Any hypothalamic or pituitary disease can cause gonadotropin-releasing hormone (GnRH) or gonadotropin deficiency (hypogonadotropic hypogonadism) and, therefore, infertility (Jarow etal., 1989). Although uncommon, these conditions should be diagnosed, as thei treatment is straightforward and can restore fertility in most of the cases.

> **• Pituitary related conditions:** such as Pituitary insufficiency (tumours, radiation, surgery, Hyperprolactinaemia or Exogenous hormones (anabolic steroids, glucocorticoid excess, hyper- or hypothyroidism).

> **• Medications:** Infertility may result from the use of various drugs. This phenomenon may be the result of an effect on the hypothalamic-pituitary- gonadal axis or a direct toxic effect on the gonads. Some of the drugs are antineoplastic agents (cyclophosphamide, chlorambucil, busulphan, and methotrexate), glucocorticosteroids, hormonal steroids (diethylstilbestrol, medroxyprogesterone acetate, estrogen, and the constituents of oral contraceptives), antibiotics (sulfasalazine and cotrimoxazole), thyroid supplements, spironolactone, cimetidine, colchicine, marijuana, opiates, and neuroleptic agents.

2. Testicular causes: This is the most common cause of infertility in men. Primary testicular failure is major cause of non-obstructive azoospermia and oligospermia. It is classified as genetic or acquired.

> • Genetic causes are Kleinfelter syndrome 47, XXY, Noonan syndrome, or Y chromosome microdeletions.
> • Acquired:
>> o Varicocele: this is the dilatation of the scrotal veins. The impact of varicocele on male fertility remains controversial. It has a detrimental effect on semen quality and sperm function (Jensen et al., 2017).
>> o Injury (orchitis, torsion, trauma)
>> o Cryptorchidism especially if left uncorrected until puberty.
>> o Infections such as Mumps orchitis and severe epididymo-orchitis Can contribute to spermatogenesis failure.
>> o Systemic disease (renal failure, liver failure)
>> o Exposure to chemotherapy or radiotherapy
>> o Testicular tumours
>> o Idiopathic: This is defined as infertile man with a normal semen analysis and no apparent cause for infertility. It can be seen in 10-20% of cases (Balen, 2008).

3. Post-testicular causes (obstruction):

> • Congenital:
>> o cystic fibrosis, congenital absence of the vas deferens (CAVD)
>> o Young's syndrome
> • Acquired
>> o Vasectomy
>> o Iatrogenic vasal injury
>> o Infection (chlamydia, gonorrhoea)
>> o Disorders of sperm function or motility (Immotile cilia syndrome)
>> o Immunological infertility
>> o Sexual dysfunction (reduced libido, timing and frequency of intercourse)
>> o Erectile/ ejaculatory dysfunction. (Wilcox et al., 1995) also may be contributing factors to male infertility.
>> o Environmental factors: The rise in environmental pollution causes a significant increase in disease burden and costs in treating infertility disorders. Exposure to heat, chemicals and ionizing irradiation can damage sperm production (Grandjean and Bellanger, 2017).

Diagnostic strategy

Initial evaluation of the infertile couple should focus on the nature of the problem and identification of possible risk factors for infertility. Both partners should be involved in the management of infertility (RCOG, 1998 and Jenkins et al 2003). The main goals of evaluating the subfertile men are to identify correctable causes of infertility and to help to conceive by the most natural, least invasive means possible. In addition, the evaluation may uncover significant underlying medical or genetic pathology.

1. History:
A careful history can offer clues to the underlying cause of infertility and provide an assessment of the man's fertility potential. The evaluation of an infertile man should begin with a detailed history that focuses on potential causes of infertility. The clinician needs to take a full medical, sexual and reproductive development history. Enquire about number of children (from the same partner or different partner), length of time to conceive or any difficulty of sexual intercourse.

The clinician should also review for history suggestive of previous testicular problems such as trauma, testicular cancer, history of infections like mumps, sexual transmitted infections or previous corrected congenital abnormalities; also, looking for any systemic illness such as thyroid disorders, uncontrolled diabetes, cardiac failure, chronic renal failure, and neoplasia.

Check for any ejaculatory or erectile dysfunction. Postcoital micturition that is cloudy might indicate retrograde ejaculation. Risk factors for ejaculatory problems include diabetes, multiple sclerosis and some medications like antidepressants. Obtain a detailed drug and occupational history. Evidence shows that rise in testicular temperature may decrease sperm quality (Wang C et al.1997).

It is vital to assess the sensitivity of this issue and psychological impact on couples with fertility problem (NICE 2013). It is important to assess the anxiety-related sexual dysfunction and other marital conflict that might contribute to the main issue. A list of information relevant to the infertility history is summarised in Table 3.

2. Physical examination:
The physical examination is useful for increasing or decreasing the probability of certain causes of male infertility. The aim of the physical examination is to look for evidence of systemic disease, genetic abnormalities, or androgen dysfunction. Height, weight, body mass index, and waist-hip ratio will diagnose obesity that might contribute to subfertility. Systemic examination to check for any goiter, secondary sexual characteristics, lumps or skin changes.

External genitalia examination: Scrotal examination looking for lumps, varicocele or hernia. A small soft testis may indicate hypogonadism or undescended testis. The penis should be examined for any structural abnormalities.

3. Semen analysis:
Semen analysis is the key laboratory assessment of the male partner of an infertile couple. Due to the marked inherent variability of sperm concentrations in semen samples, minimum 2 samples are needed and one week apart between each sample (Gnoth et al., 2005). Recently, WHO has published lower reference limits for semen analyses (Jenkins, 2003) . (See Table 1)

Semen sample should be obtained following abstinence for 2-3 days. Condom or lubricant jelly should not be used. Collection to be collected in a wide-mouthed sterile bottle, labeled carefully and delivered to the laboratory as soon as possible. The sample should be protected from extremes of temperature. Ideally, if the results were "abnormal"; the sample should be repeated in 3 months. However, in case of azoospermia (absence of sperm) or severe oligozoospermia (very few sperm number or more abnormal forms or more of reduced motility) the repeat test should be undertaken as soon as possible (NICE, 2004).

4. Endocrine evaluation:
More specialized testing may be required based on the outcome of this initial evaluation. Some of these tests would require a referral to secondary care. Whenever suspecting hypogonadism (clinically or in the presence of azoospermia or severe oligospermia on semen analysis) evaluation of the HPG axis can provide valuable information regarding sperm production. FSH, LH, testosterone and prolactin should be measured (Sigman, 1997). Raised prolactin can be seen in prolactinoma or with some medications (e.g. antipyschotics) (Haddad and Wieck, 2004).

5. Other tests:
Checking for chlamydia and other STI can be arranged for full workup. A first-catch urine specimen is as accurate as a urethral swab for males. Postcoital testing and antisperm antibody testing are no longer considered useful (Kamel, 2010) and (NICE, 2004).

Furthermore, other testing may be needed based on circumstances, including testicular biopsy, genetic testing, and imaging.

Scrotal ultrasound can be performed if an abnormality detected on physical examination such as a testicular tumour. Ultrasound can also be useful in the clinical diagnosis of varicocele.

Management

1. Initial review:

Involving both partners in all aspect of investigation and counselling is needed. Discussion and offer information regarding all aspects is essential. Male fertility can be affected by several lifestyle and environmental factors. General advice about modifiable factors that may affect fertility should be considered and discussed at the initial consultation. (see Table 2)

Men should be advised to wear loose underwear, avoid hot baths, and hot occupational environment to avoid increased scrotal temperature (NICE, 2004). Men who have a BMI of 30 or over should be informed that they are likely to have reduced fertility. They should be warned against recreational drugs usage to maintain good sperm quality. Men who smoke should be informed that there is an association between smoking and reduced semen quality (although the impact of this on male fertility is uncertain), and that stopping smoking will improve their general health (Jenkins, 2003). Men with infertility should be informed that alcohol consumption within the Department of Health's recommendations of 3 to 4 units per day for men is unlikely to affect their semen quality (NICE, 2004).

Family Physicians should be able to provide information and explain to couples about every stage of infertility management. Couples should have the opportunity to make informed decisions regarding their care and treatment via access to evidence-based information. These choices should be recognized as an integral part of the decision-making process. Verbal information should be supplemented with written information or audio-visual media (NICE, 2004).

2. Psychosocial review:

During this management process a few issues might emerge. Stress can be seen in many couples. Hence, GPs should inform the couples that stress in male and female partners can affect the relationship and lead to reduced libido and frequency of sexual intercourse (Bagshawe and Taylor, 2003). This can be avoided through good communication and adequate provision of information and services access. GPs can play a crucial role in supporting couples and direct them towards several infertility support groups and agencies. NICE guidelines advise to provide counselling for couples through referral to specialist counselling service in secondary care.

3. Management and referral to secondary care:

Underlying etiology determines the management, although male infertility is unexplained in 40% to 50% of cases (Jungwirth et al., 2012). When the semen analysis is abnormal, referral to a male fertility specialist or reproductive endocrinologist is necessary. When anatomic variance or obstruction is suspected, referral for surgical evaluation and treatment is appropriate. Men who are known to have obstructive azoospermia may benefit from treatment of epididymal blockage. If an endocrinopathy, such as hyperprolactinemia, is diagnosed, the underlying cause should be treated. Dopamine agonists such as Cabergoline can be used to manage hyperprolactinaemia. In patients with varicocele, there is insufficient evidence to suggest corrective surgery will increase live birth rates, despite improvement in semen analysis results (Chehval, 1992).

Two commonly used assisted reproductive techniques (ART) are invitro fertilization (IVF) and intrauterine insemination (IUI). IUI involves passing sperms through a plastic catheter into the women's uterus. This is recommended in some mild forms of oligozoospemia. NICE guidelines suggest that IUI should not be routinely offered unless where it is very difficult to have vaginal intercourse due to physical disability or psychosexual problem or those who are using partner or donor sperm and in people of same sex relationships. The second technique is IVF. This involves the retrieval of multiple oocytes, which are subsequently combined with sperm in vitro and incubated. Then the blastocyst is transferred into the uterus. It is recommended in couples with unexplained infertility, mild endometriosis or mild male factor infertility.

Table 1: Normal values of semen variables (WHO 2010)

Volume	>2ml
PH	7-8
Sperm concentration	>15 million spermatozoa/mL (95% CI 12-16)
Total sperm number	>39 million spermatozoa per ejaculate
Motility	40% total and >32% progressive motility
Morphology	4% of normal forms
Vitality	58 % or more live spermatozoa
WBC (leucocytes)	<1 million / ml
Mixed antiglobulin reaction	< 50% spermatozoa with adherent articles

Table 2: Summary of general advice given to patients in primary care

Summary of general advice given to patients in primary care	
Alcohol	Both couples to limit their alcohol intake. Consumption of 3-4 U per day is unlikely to affect sperm quality.
Smoking	All couples should be counseled to abstain from tobacco use
BMI	High BMI > 30 is known to reduce fertility
Medication	Certain medication (including OTC and recreational medication) can interfere with fertility
Occupation	Counselling for occupational risk of exposure to certain factors such as heat, toxins, ionizing radiation and vibration that might affect fertility
Frequency of intercourse	Discussion regarding implantation window and frequency
Temperature	Advise men to wear loose fitting underwear and trousers and avoid conditions that could elevate scrotal temperature.

Table 3

Components of infertility history in the male	
Medical history	Recent illness History of systemic illness such as diabetes or Multiple sclerosis Genetic disorders – cystic fibrosis, Klinefelter syndrome Psychological evaluation
Surgical history	Undescended testes correction surgery Hernia repair Previous testicular tumour or trauma Pelvic, bladder or retroperitoneal surgery
Fertility history	Previous pregnancies – with current and previous partners Duration of infertility Previous infertility treatment
Sexual history	Erection or ejaculation problems Frequency of intercourse
Medication	Nitrofurantoin, cimetidine, sulfasalazine, spironolactone, α-blockers, methotrexate, colchicine, amiodarone, antidepressants, phenothiazines, chemotherapy
Social history	Alcohol, smoking, anabolic steroids, recreational drugs Exposure to ionising radiation Chronic heat exposure Aniline dyes Pesticides Lead exposure