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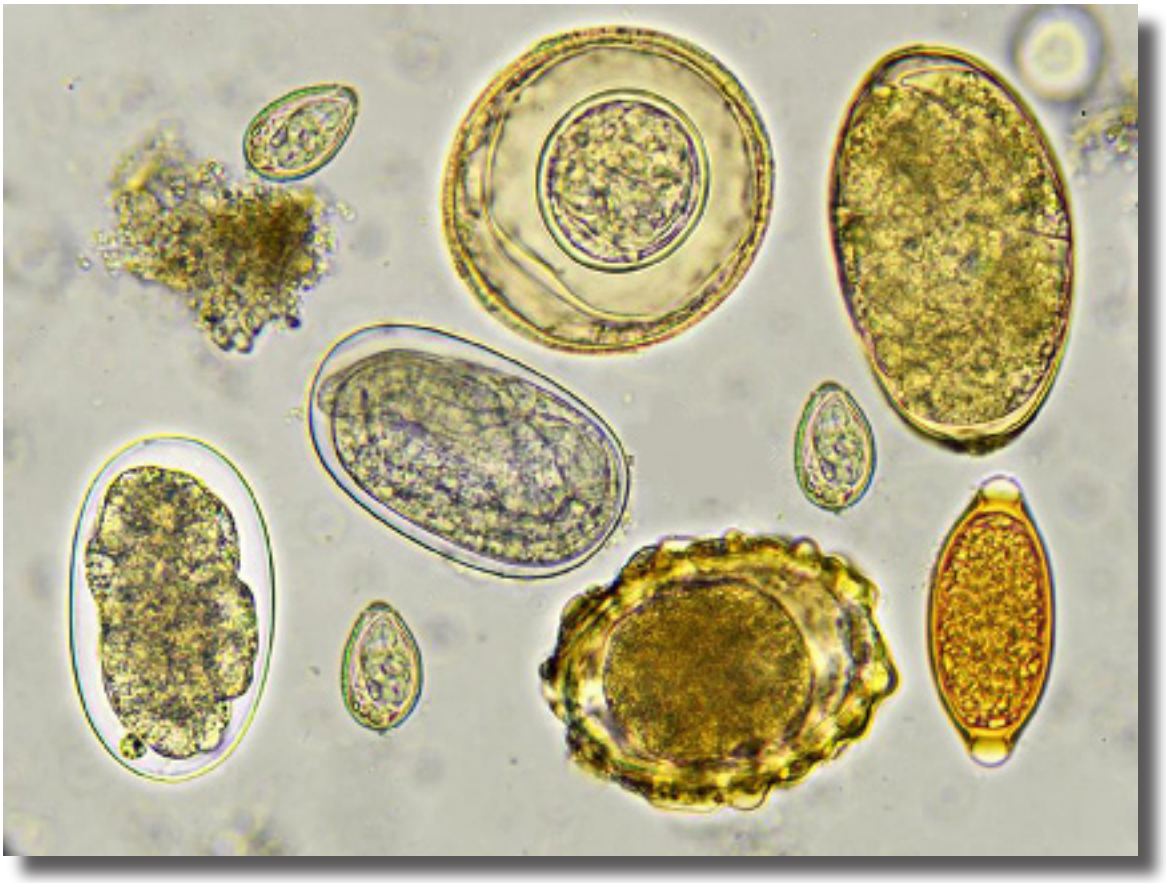

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Workplace Violence against HealthCare workers by Patients and Visitors in King Khalid University Hospital Riyadh Saudi Arabia 2021-2022

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Abstract

Background: Violence against healthcare workers has increased globally. Poor productivity and patient care could result from this aggression against healthcare professionals.

Methods: In this retrospective study, the target population was all healthcare workers who activated the white code (n=242) with a sample size (of n=149). A self-administered questionnaire was used and given to participants. Descriptive statistics were presented, and statistical comparisons were made to evaluate differences by gender, age, experience, and other demographic variables.

Results: The prevalence of white code among all codes announced in King Khalid University Hospital, Riyadh, between the 1st of January 2021 and the 31st of December 2021 is 17%.

Females, younger respondents, nurses, and less experienced personnel were the majority exposed to violent episodes compared to their counterparts. Male patients were the primary sources of workplace violence against healthcare workers (59.1%). Most violent acts are performed by individuals over 40, and approximately (51%) of violent behavior is attributed to chronically ill individuals. Verbal violence was the highest type of violence experienced, and the most common violence incident occurred in the wards (Patient Bedside). The most common reason for the violence was poor communication (26.2%). Respondents believe that the presence of violence in the workplace is part of the risk of their job (47.7%).

Conclusion: Frequently, healthcare workers suffer from violence against them. The majority is verbal. These results highlight the need for a thorough approach to managing and preventing workplace violence in healthcare facilities. Additionally, there is a pressing need to raise public awareness about the critical role that healthcare workers play in ensuring the continuity of healthcare services.

Keywords: healthcare worker;
health care professionals; white code; violence;
workplace violence.

Introduction

Recently, violence against healthcare workers has escalated globally, with more than two-thirds of respondents in a previous study experiencing some form of violence (1). Annually, two million American employees are victims of workplace violence (2). Furthermore, up to 38% of health workers suffer physical violence, threats, and exposure to verbal aggression at some point in their careers (3). This violence against healthcare employees has a detrimental effect on healthcare providers' physical and psychological well-being and job motivation and satisfaction. Eventually, this violence against healthcare providers will lead to poor productivity and patient care (3,4,5).

Workplace violence is defined by Occupational Safety and Health Administration (OSHA) as a threat of violence or violence against workers. It can happen inside or outside the workplace ranging from verbal abuse and threats to lethal physical assaults (2).

A meta-analysis conducted in 2020 showed the pooled prevalence of white code and violence against healthcare workers was estimated at 19.33% based on 65 studies across all healthcare sectors, diverse healthcare professional types, and multiple countries (6). Additionally, in a survey from academic, tertiary care, and urban hospital in the USA, 34.4% of healthcare workers reported verbal or physical violence incidents in the preceding 12 months. Precisely, 13.5% have reported physical assault (7). Furthermore, a study conducted in Turkey stated the most common type of violence was insult plus verbal threat (39.6%), and the most common reason was the waiting-line problem (21.8%). The highest prevalence of violence was in polyclinic rooms (66.5%); The highest in emergency medicine (36.4%) and the lowest in internal medicine (7.3%) (8).

In Saudi Arabia, a cross-sectional survey at 2 public hospitals in Riyadh in 2011 found that 64.3% of healthcare providers reported violent events. Moreover, excessive waiting time, shortage of staff, and unmet patient demands were the most common reasons for violence. Verbal abuse was the most common type encountered. Nurses were more likely to be targeted than physicians (1).

Moreover, in a cross-sectional survey conducted in emergency departments in Riyadh in 2016, nurses found most participants (89.3%) had experienced a violent incident in the past 12 months. Verbal abuse accounted for (74.1%) of those who had experienced violence, while (18.5%) had faced verbal and physical violence during the past year. Patients (82.4%) and their relatives (64.8%) were the most common instigators of violence (9).

In 2018 the Ministry of Health (MOH) in Saudi Arabia confirmed that verbal and physical abuse against health professionals is a crime punished by law, leading to the imprisonment of up to ten years or a fine of up to a million riyals. It's due to interest in the safety of all health staff and professionals, and under no circumstances will prejudice or verbal or physical abuse against any MOH's team be tolerated (10).

There have been few studies in our region, including Saudi Arabia, on the prevalence of white code and the consequences of each established violent incident.

The present study aims to quantify the prevalence of white code among all other codes in King Khalid university hospital Riyadh; furthermore, to determine the characteristics and the consequences of each established white code.

Methodology

White code is announced by healthcare workers for emergency response to a violent person threatening their own safety and the safety of others.

This retrospective study was conducted at King Khalid University Hospital, Riyadh, Saudi Arabia, between 1st January 2021 to 31st December 2021. King Khalid University Hospital is the biggest academic tertiary care hospital in Saudi Arabia, with a bed capacity of 1600, and it provides services to people from all regions of Saudi Arabia. The study's target population included all healthcare workers who activated a white code (n=242). The sample size was (n=149) using Raosoft.com with a 95% confidence level. We selected the participants using a stratified random sampling technique. We acquired input from the participants using a pre-designed questionnaire. To enhance the validity of the questionnaire, we conducted a pilot study targeting experienced health workers (two consultants, two nurses, and two receptionists) to review the questionnaire and give comments. Accordingly, we did some modifications. Our survey tool consisted of three main domains: demographic characteristics such as age, gender, nationality, educational level, years of experience, and occupation. The second consisted of items that addressed sources of violence, their age, and their health condition; the third was a list of items that addressed the consequences of violent incidents. We gained the participants' written consent to participate in the study. Their identity was confidential by assigning each participant with a code number for the purpose of analysis only. We gained approval from the legal authorities at the hospital and the operations engineering department to use the data. The Institutional Review Board Health Sciences Colleges Research on Human Subjects in King Saud University – College of Medicine (IRB) approved the study as Research Project No. E-22-7107.

Data analysis was done via SPSS 24.0 version statistical software. The chi-square test was used to determine the significance of variations in the prevalence of white code among healthcare workers depending on demographic factors. The p-value was considered significant at <0.05 with a 95% confidence interval.

Results

The codes announced at King Khalid University Hospital in 2021-2022 were 1,422 codes including (White code, Blue code, Brown code, Orange code, Pink code, Purple code, Red code, Yellow code, Trauma code, MP code, RRT code). The prevalence of white code among all codes announced in King Khalid University Hospital was (17%). Table 1. Most healthcare workers who experienced violence were female (61.1%) and younger than 30 (55.7%). The majority of respondents were non-physicians (71.8%), and nurses (61.1%), in addition to receptionists (10%), and security officers (0.7%). Most healthcare workers who were victims of violence had a bachelor's degree or less (70.5%). Most healthcare workers had less than ten years of experience (68.5%). Further division of this group illustrates that individuals with less than 5 years of experience were (36.2%) and more than 5 years of experience were (32.2%). Figure 1 shows that most types of violence encountered by healthcare workers was verbal violence only (58.4%). Physical and verbal violence represented (33.6%), while physical assault only accounted for (8.1%) of incidents.

Table 2 shows the distribution of type of violence among healthcare workers by their demographic characteristics. The chi-square test showed significant differences in violence between male and female healthcare workers ($p = 0.016$). Male (72.4%) dominated and female (49.5%) healthcare workers as a source of violence. Even though the common type of violence was verbal violence only, a greater percentage of (verbal and physical) violence was found in female healthcare workers (39.6%). The nurses (42.9%) had a significantly higher risk of (verbal and physical) violence than other healthcare workers ($p = 0.012$). This study did not find any differences in types of violence among healthcare workers based on their age ($p = 0.055$), education level ($p = 0.616$), and duration of the experience ($p = 0.443$).

Table 3 shows that male patients were the primary source of workplace violence against healthcare workers (59.1%). The results revealed that most violent acts are performed by individuals over the age of 40 (44.3%). Approximately (51%)of violent behavior was attributed to chronically ill individuals.

Figure 2 shows the most common violence incidents occurred in wards (Patient Bedside) (63.1%).

In Table 4, the respondents were asked to identify the reasons for violent incidents, given a list of potential reasons, and asked to choose those that applied. Overall (26.2%) of respondents reported that poor communication is the main reason for violent incidents. Opposing Doctor's orders was the second main reason reported (20.8%). The third most common reason was the long waiting time (16.8%). Healthcare workers reported other reasons for violent incidents, including psychological problems, patient health conditions, visitor problems, staff workload/ Under staffing, inadequate security, and patient without an appointment.

Nonetheless, most healthcare workers believe that the presence of violence in the workplace is part of the risk of their job (47.7%). Moreover (84.6%) of respondents reported that they received training on how to deal with violence against healthcare workers. Most respondents (91.3%) knew that violence against healthcare workers is incriminated.

Table1. Frequency distribution of healthcare worker's Demographic Characteristics

Demographic Characteristics	Sub-Group	n	%
Gender	Male	58	38.9
	Female	91	61.1
Age	<=30 Years	83	55.7
	> 30 Years	66	44.3
Occupation	Non-Physician	107	71.8
	Physician	42	28.2
Education Level	<= Bachelor's degree	105	70.5
	> Bachelor's degree	44	29.5
Experience Time	< 10 Years	102	68.5
	=> 10 Years	47	31.5

Figure.1 Types of violence experienced by healthcare workers in King Khalid University Hospital, Riyadh, Saudi Arabia between 1st January 2021 to 31st of December 2021

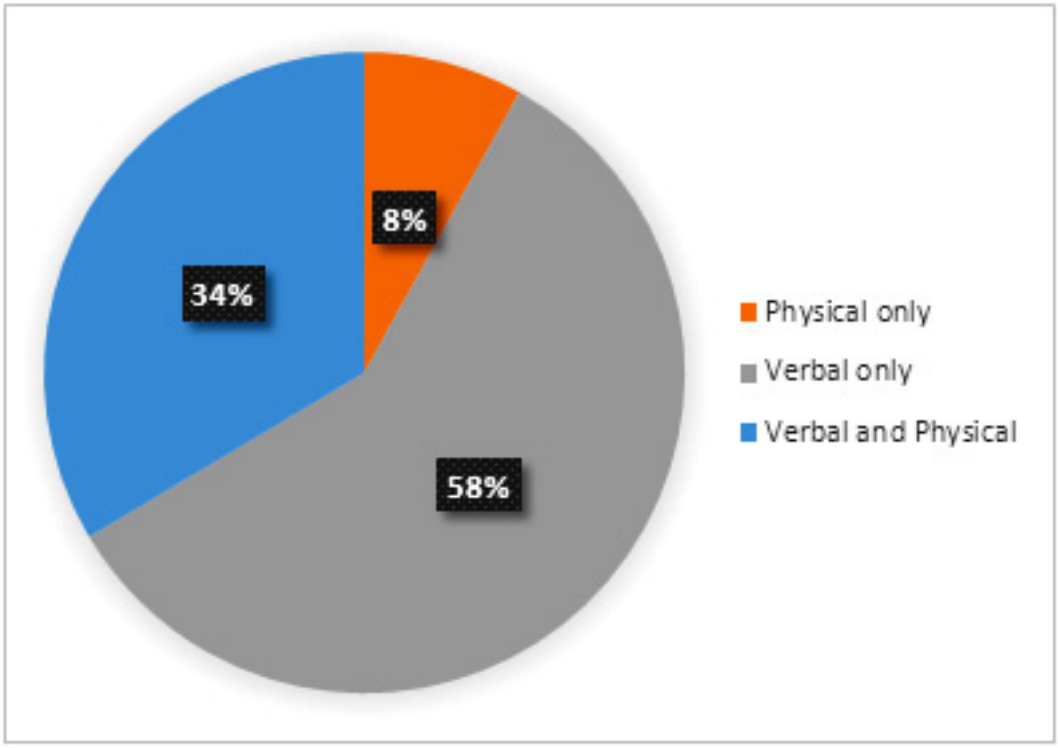

Table 2. The type of Violence against Healthcare Workers by their Demographic Characteristics

Demographic Characteristics	Sub-group	Verbal		Physical		Verbal + Physical		p-value
		n	%	n	%	n	%	
Gender	Male	42	72.4	2	3.4	14	24.1	0.016
	Female	45	49.5	10	11.0	36	39.6	
Age	<= 30 Years	54	65.1	8	9.6	21	25.3	0.055
	> 30 Years	33	50.0	4	6.1	29	43.9	
Occupation	Security	0	0.0	0	0.0	1	100.0	0.012
	Receptionist	14	93.3	0	0.0	1	6.7	
	Nurse	44	48.4	8	8.8	39	42.9	
	Doctor	29	69.0	4	9.5	9	21.4	
Education Level	Diploma degree	4	66.7	0	0.0	2	33.3	0.616
	Bachelor's degree	53	53.5	8	8.1	38	38.4	
	Master's degree	3	75.0	0	0.0	1	25.0	
	Board/ Phd	27	67.5	4	10.0	9	22.5	
Experience Time	< 5 Years	36	66.7	5	9.3	13	24.1	0.443
	5 - 10 Years	27	56.3	3	6.3	18	37.5	
	> 10 Years	24	51.1	4	8.5	19	40.4	

Table 3. Frequency of violent incidents by the Source, age and the health condition.

Variable	Sub-group	n	%
Source of violence	Co-Worker	2	1.3
	Men patient	88	59.1
	Visitors/relatives of patients	32	21.5
	Woman patient	27	18.1
Age of Violence	<20	6	4.0
	20-30	37	24.8
	30-40	40	26.8
	More than 40	66	44.3
if the patient was the source of violence what was the health condition	Acute case	28	18.8
	Chronic case	76	51.0
	Emergency case	25	16.8
	Psychological case	18	12.1
	Bad experience in meeting health workers	2	1.3

Figure 2: the location of the violent event in King Khalid University Hospital, Riyadh, Saudi Arabia between 1st January 2021 to 31st of December 2021

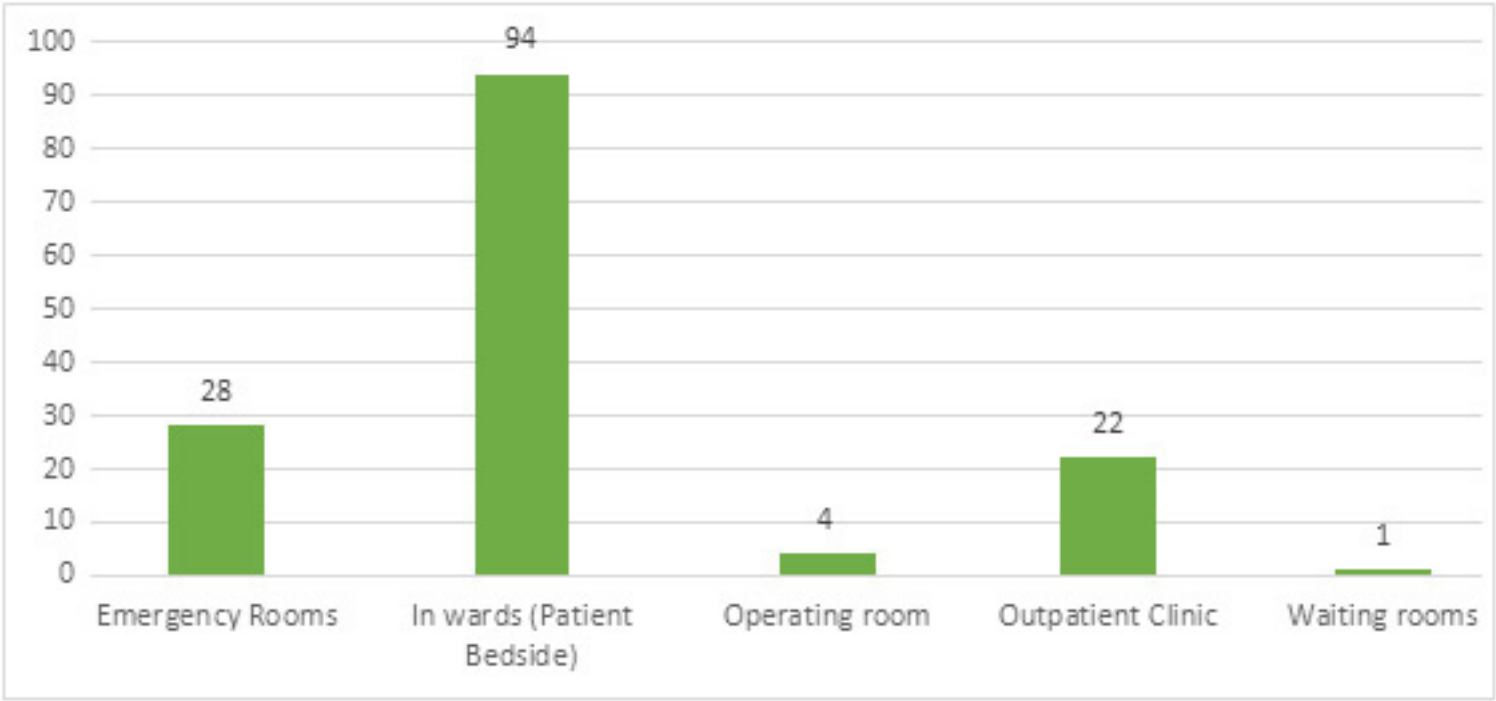

Table 4. shows the reasons for violence, Attitude toward the violence against health workers, training on how to deal with violence against healthcare workers and awareness of health workers of law in such situation

Variable	Sub-group	n	%
The reasons for violence	Communication problems	39	26.2
	Inadequate security	6	4
	Long Waiting-time problem	25	16.8
	Opposing Doctor's orders	31	20.8
	Patient without appointment	4	2.7
	Patient's health condition	10	6.7
	Psychological problems	17	11.4
	Staff workload/Under staffing	8	5.4
	Visitor problems	9	6
Attitude toward the violence **against health workers**	Feel it as part of job	71	47.7
	Ignore the person.	7	4.7
	Patient can be sometimes excused for aggressive behavior	12	8.1
	Reported it	5	3.4
	Told a colleague/ Family member to intervene.	1	0.7
	Told the person to stop	20	13.4
	Tried to defend myself.	22	14.8
	We should not allow violence against us	11	7.4
Receive training on how to **deal with violence against healthcare workers**	No	23	15.4
	Yes	126	84.6
Know that violence against **health workers is incriminated**	No	13	8.7
	Yes	136	91.3

Discussion

In this study, violence announced (white code) among other codes was 17% compared to a systematic review that demonstrated higher prevalence in other regions, such as European and American regions were 26.38% and 23.61%, respectively (6). This could be due to the high variety of people's ethnicity, educational level, and healthcare workers' adaptation. One of the reasons for the low prevalence could be due to low awareness of code white protocol, as a study conducted in Riyadh showed 31.4% of healthcare workers were unaware if there is a system for violence reports, and 68.6% were not familiar with using these systems (11). Also, it is possible to have higher than 17% as this study was limited only to code white reports compared to the other studies, which were questionnaires distributed among healthcare workers to measure workplace physical violence (6). Moreover, a study conducted in Riyadh at the Ministry of National Guard - Health Affairs showed that 81.4% of healthcare workers had experienced verbal or physical violence (13). This high rate could be due to the nature of the patients, as this hospital belongs to the military sector, compared to our findings which mainly deal with the general public.

Nearly two thirds of healthcare workers were nurses, 61.1%. This finding is different from a study conducted in Arar city, as violence was reported by 59% of physicians (12). It may be due to high exposure to patients as nurses have long shifts and multiple contacts with these patients. Expectedly, 31.5% of violence-reported healthcare workers have more than ten years of career experience. Therefore, they had more adaptation and coping with these events and gained more experience managing them without announcing white code.

Our study shows the most common type of violence was verbal violence, toward 58.4% of healthcare workers, while verbal and physical violence was 33,6%, and physical violence was only 8.1%. Verbal violence also was the most common type of violence in Riyadh, with 79.5% of healthcare workers being verbally abused (13); in Arar city, 83% of healthcare workers were being verbally abused (14), and in Abha city, 55.9% of healthcare workers were verbally abused (15). Also, a systematic review of numerous international studies conducted in Asia, Europe, America, Africa, and Australia showed that verbal abuse is the most common type of violence (16).

The majority of verbal and physical violence (63.1%) occurred in the ward (patient's bedside), while in a cross-sectional study conducted in Riyadh, the majority of violence was in the emergency department (13). Perhaps this higher rate of violence in the ward is due to multiple reasons, one of which is direct communication matters. Other causes are resisting physician's orders and long waiting-time issues.

There was a significant difference in the type of violence compared to gender. Although verbal violence was found to be the highest type of violence and was 72.4% and 49.5% in males and females, respectively, there is a high percentage, 39.6%, of both verbal and physical violence in female healthcare providers. Compared to this study previous studies conducted in Saudi Arabia, Brazil, Nigeria, and Poland showed no significant difference between gender and type of violence (13,16,17,18).

The violence source was more likely to be male 59.1% and patients with chronic health conditions 51%. This may be influenced by their long hospital stay and chronic illness.

Limitation:

The study was restricted to only one hospital, KKUH, in Riyadh, which may limit the generalizability. In addition, the survey was self-reported depending on the healthcare worker's information which may induce recall bias.

Conclusion

In conclusion, out of all codes announced in KKUH in 2021-2022, the white code accounted for 17%. Workers in the healthcare sector usually deal with violence against them. The majority is verbal, and had considerable harmful effects. These findings demonstrate the necessity for a comprehensive strategy to prevent and manage workplace violence in healthcare facilities. Training in management skills for healthcare professionals may improve their ability to deal with violence especially with less experienced health workers who suffered more violence.. In addition, the health authority and the media should raise public awareness of the crucial role that healthcare workers play in maintaining the continuity of healthcare services. There is a need to conduct a larger study from multiple hospitals and regions all over Saudi Arabia to investigate violent events and increase awareness among healthcare workers and the public.

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Severity and Quality of Life of Migraine among Patients on Migraine Prophylactic Medications: A Cross Sectional Study at King Abdulaziz University Hospital, Jeddah

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Abstract

Background: Migraine was found to impact the patients' quality of life, resulting in significant disability.
Objectives: To assess the quality of life (QoL) of migraine patients on migraine prophylactic medications at King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia.

Methods: A cross-sectional study was conducted and data were collected through patient interviews and from hospital records. A questionnaire was used to collect demographic data, patient medical history related to migraine and a Migraine Specific Quality of Life Questionnaire (MSQ) was used to assess QoL. A Migraine Disability Assessment Score (MIDAS) was used to assess the number of days patients missed or lost productivity and any migraine related disability.

Results: 64.2% of respondents had been diagnosed with migraine for more than 5 years, and 35.8% were diagnosed between the ages of 18 and 29. 5.7% were using a prophylactic supplement or herb, while the majority (56.6%) were not on any current prophylactic. About 45.3% and 26.4% respectively, had little or no disability and mild disability while 15.1% and 13.2% of the study group, respectively, had moderate and severe disabilities. Participants taking Ketamine and having only one attack per month had significantly higher mean MSQ scores, suggesting a higher quality of life. Whereas, participants taking Topamax and having only one attack monthly had a much higher proportion of those who had little or no disability.

Conclusion: 15.1% and 13.2% of the participants had moderate and severe migraine disability. To give appropriate migraine headache management, a comprehensive examination must be performed, including a focus on mental health, well-being, and real-life effects on the patient.

Keywords: QoL, migraine, severity, prophylactic, medications, KAUH

Introduction

Migraine is a neurological disorder that is considered to be the third most common cause of disability among individuals below the age of 50. According to the 2015 global burden of disease report, 14.7% of people worldwide suffer from migraines (1,2). In Saudi Arabia (SA), a survey of 4,943 people revealed that 1,333 (26.77%) had migraines, with a male to female ratio of 1: 2.9. (3).

Migraines are distinguished by recurring headaches commonly accompanied by nauseousness, vomiting, photophobia, and phonophobia (1). According to the number of headache days per month, migraine is either chronic or episodic according to an international categorization of headache diseases (4).

Previous research demonstrated that migraine is frequently associated with disability and a reduced quality of life (QoL), as well as interference with work-related productivity and occasionally sleep (1). Preventive treatments for episodic migraine can lessen the frequency and intensity of attacks as well as potentially enhance the quality of life for people who suffer from migraines (5).

Despite this heavy burden and the availability of efficient and safe medications, migraine is nevertheless underdiagnosed and undertreated (antimigraine). Although there are a variety of drugs used to prevent migraines, including b-blockers, calcium channel blockers, and anticonvulsants, most patients have to test a variety of drug classes before finding the right one for them(6,7).

Finding the best preventive medication is a useful migraine prevention technique. Local research is scarce in KSA, therefore, the aim of this study was to measure the quality of life among patients at King Abdulaziz University Hospital, Jeddah, SA who had been diagnosed with migraine and who were taking migraine prophylactics.

Subjects and Methods

Study design, setting and time frame: A cross-sectional study was completed at King Abdulaziz University Hospital Jeddah, SA from February to May 2022.

Study participants: The data of patients diagnosed with migraine was collected through patient interviews and hospital records.

Study instrument: A validated questionnaire was used that had 4 sections. The first section consisted of demographic data. The second section was designed to ask about a patient's medical history related to migraine. The third section was the Migraine Specific Quality of Life Questionnaire (MSQ), version 2.1. The (MSQ) is a 14-item questionnaire that is designed to measure how migraines affect and/or limit daily functioning. Participants respond to items using a 6-point scale: ''none of the time,'' ''a little bit of the time,'' ''some of the time,'' ''a good bit of the time,'' ''most of the time,'' and ''all of the time,'' which are assigned scores of 1 to 6, respectively. Raw dimension scores were computed as a sum of item responses and rescaled from a 0 to 100 scale such that higher scores indicate a better quality of life. Multiple studies have demonstrated good reliability and validity of the MSQ in subjects with migraine (8,9,10).

The last section consisted of another validated questionnaire Migraine Disability Assessment Score (MIDAS). It is a numerical score representing the number of days patients missed or identifying lost productivity at work or school. In addition, the number can also include missed days from family and social events. The MIDAS is scored as the sum of the first five questions, each measured as days in the last 3 months, and then categorized into four disability grades: Grade I: Little to no disability (0–5 days); Grade II: Mild disability (6–10 days); Grade III: Moderate disability (11–20 days); Grade IV: Severe disability (21þ days). Two additional questions assess the number of days with headaches in the last 3 months (item A) and a scale of the painfulness of the headaches (item B) (11).

Ethical considerations: The ethical approval for the study protocol was obtained from the Unit of Biomedical Ethics Research Committee, Faculty of Medicine, King Abdulaziz University (Ref. no. 500-21).

Data analysis: Data were analyzed statistically using (SPSS) version 26. To test the relationship between variables, qualitative data were expressed as numbers and percentages, and the Chi-squared test ($\chi 2$) was used. Quantitative data were expressed as mean and standard deviation (Mean ± SD), and variables were tested using the One-Way ANOVA test and the independent sample t-test. Correlation analysis was performed using the Spearman's test, and a p-value of less than 0.05 was considered statistically significant.

Results

(Table 1) shows that half of the participants had an age that ranged from 30-39 or 40-49 years. Of them, three quarters were females, 81.1% were Saudi nationals, more than half of them had a higher than the secondary school education and 62.3% were not working. About 64.2% had been diagnosed with migraine for >5 years and 35.8% were diagnosed in an age that ranged from 18-29 years. More than half of them were not on any current prophylactic medication. However, 17% were on Amitriptyline, 7.5% were on Topamax and 5.7% were taking a prophylactic supplement or herb. Almost 60% had a one attack monthly.

The mean MSQ and MIDAS scores were 37.04 ± 16.58 and 8.54 ± 10.57 respectively. (Figure 1) illustrates that 45.3% and 26.4% of the participants had little/ no disability and mild disability, respectively. While 15.1% and 13.2% had moderate and severe disability, respectively based on the MIDAS score classification.

(Table 2) shows that participants who were on Riboflavin and who had only one attack per month had significantly higher mean MSQ scores indicating a better quality of life (p=< 0.05). On the other hand, a non-significant relationship was found between the MSQ mean scores and participants' demographics or other clinical data (p=> 0.05).

(Table 3) shows that participants who were on Topamax and who had only one attack monthly had a significant higher score than those who had little or no disability based on MIDAS classification (p=< 0.05). On the other hand, a non-significant relationship was found between the MIDAS levels and all participants' demographics or other clinical data (p=> 0.05).

(Figure 2) shows that a significant positive correlation was found between the MSQ and the MIDAS scores (r=0.85, p-value = < 0.001).

Figure 1. Percentage distribution of the participants according to their level of disability based on Migraine Disability Assessment Test (MIDAS) score classification (No.:53)

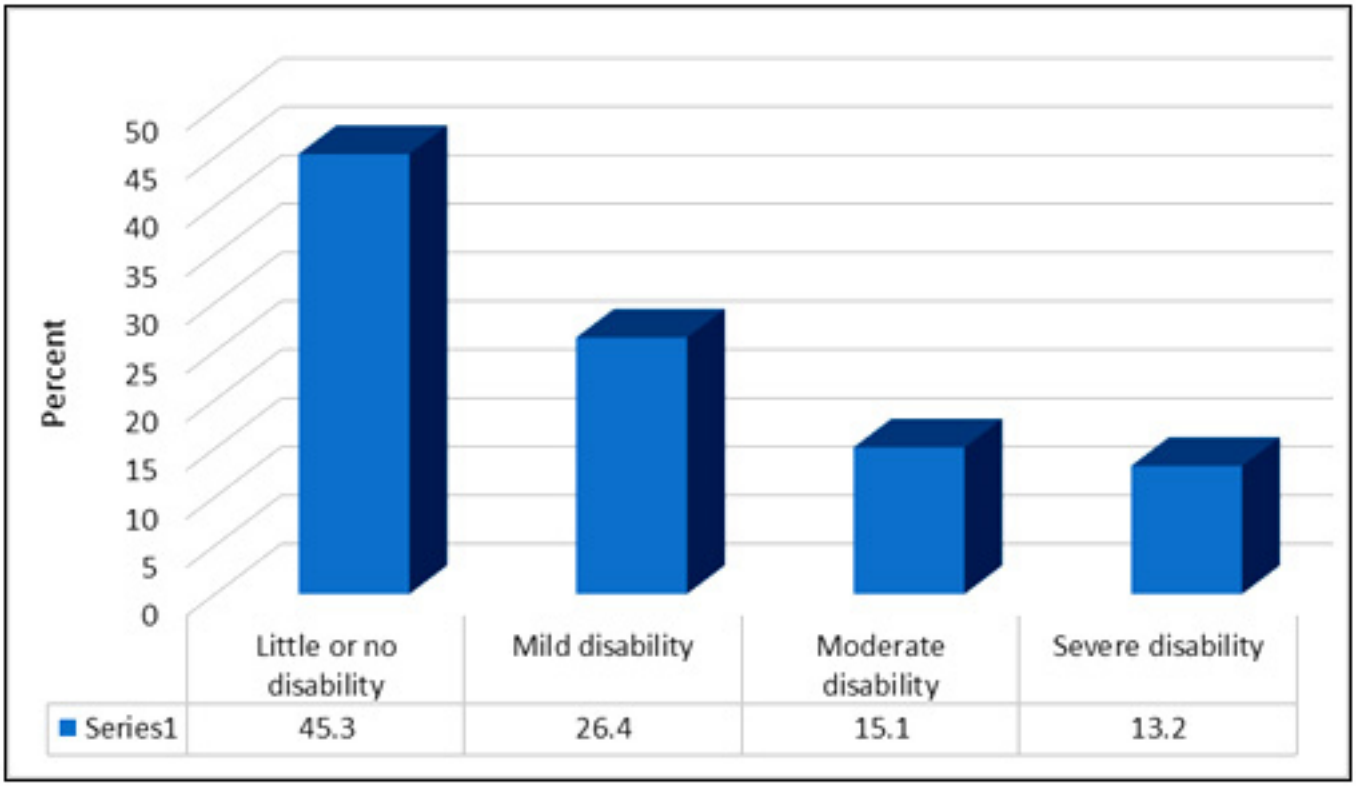


Table 1. Distribution of studied participants according to their demographics and clinical data (No.: 53)

Variable	No. (%)
Age	
18-29	9 (17)
30-39	14 (26.4)
40-49	14 (26.4)
50-59	7 (13.2)
≥60	9 (17)
Gender	
Female	42 (79.2)
Male	11 (20.8)
Nationality	
Non-Saudi	10 (18.9)
Saudi	43 (81.1)
Educational level	
Non educated	9 (17)
elementary	2 (3.8)
Intermediate	4 (7.5)
Secondary	10 (18.9)
Higher	28 (52.8)
Employment status	
Not working	33 (62.3)
Part time	2 (3.8)
Full time	18 (34)
Number of children	
None	8 (15.1)
1	13 (24.5)
2	11 (20.8)
3	9 (17)
>3	12 (22.6)
Time of diagnosis	
6m-12m	5 (9.4)
1-5 years	14 (26.4)
>5 years	34 (64.2)
Age at diagnosis	
18-29	19 (35.8)
30-39	16 (30.2)
40-59	18 (34)
Current prophylactic Medication	
None	30 (56.6)
Amitriptyline	9 (17)
Ketamine	2 (3.8)
Keppra	2 (3.8)
Riboflavin	1 (1.9)
Topamax	4 (7.5)
Amerol	1 (1.9)
Topiramate	2 (3.8)
Valproic acid	2 (3.8)

Table 1. Distribution of studied participants according to their demographics and clinical data (No.: 53) (continued)

Attacks per month	
1	27 (50.9)
1-3	20 (37.7)
>3	6 (11.3)
Taking any prophylactic supplement or herb	
No	50 (94.3)
Yes	3 (5.7)

Table 2. Relationship between Migraine-Specific Quality of Life Questionnaire, version 2.1 (MSQ) mean scores and participants' demographics and clinical data (No.: 53)

	Migraine-Specific Quality of Life Questionnaire, version 2.1(MSQ)	t-Test	p value
Age 18-29	40.89 ±15.26		
30-39 40-49	41.36 ±19.29 39.57±12.55	1.71*	0.161
50-59 ≥60	33.29 ±19.01 25.44 ±14.12		
Gender Female Male	37.02 ±17.22 37.09 ±14.64	0.01**	0.176
Nationality Non-Saudi Saudi	39.8 ±19.26 36.04 ±16.09	0.58**	0.839
Educational level Non educated Elementary Intermediate Secondary Higher	32.22 ±14.42 49 ±9.89 32 ±12.54 38.1 ±11.22 38.07 ±19.53	0.56*	0.693
Employment status Not working Part time Full time	33.97 ±16.18 46 ±9.89 41.67 ±17.1	1.59*	0.214
Number of children None 1 2 3 >3	32.63 ±17.13 30.23 ±16.54 38.18 ±19.5 42 ±16.45 42.58 ±12.32	1.26*	0.294
Time of diagnosis 6m-12m 1-5 years >5 years	38 ±21.9 39.86 ±18.68 35.74 ±15.25	0.3*	0.737
Age at diagnosis 18-29 30-39 40-59	43.74 ±17.29 35.38 ±12.44 31.44 ±17.39	2.84*	0.086

Table 2. Relationship between Migraine-Specific Quality of Life Questionnaire, version 2.1 (MSQ) mean scores and participants' demographics and clinical data (No.: 53) (continued)

Current prophylactic Medication No Amitriptyline Ketamine Keppra Riboflavin Topamax , Amerol Topiramate Valproic acid	 31.23 ±14.04 42.11 ±13.39 58 ±0.001 50 ±4.24 74 ±0.001 34.75 ±29.7 45 ±0.001 42 ±15.55 44.5 ±13.43	2.18*	0.047*
Attacks per month 1 1-3 >3	 51 ±10.41 27.93 ±14.3 45.15 ±13.99	12.33*	< 0.001*
Taking any prophylactic supplement or herb No Yes	 50 ±8 36.26 ±16.68	1.4**	0.125

N.B.: * = One Way ANOVA test ** = Independent sample t-test

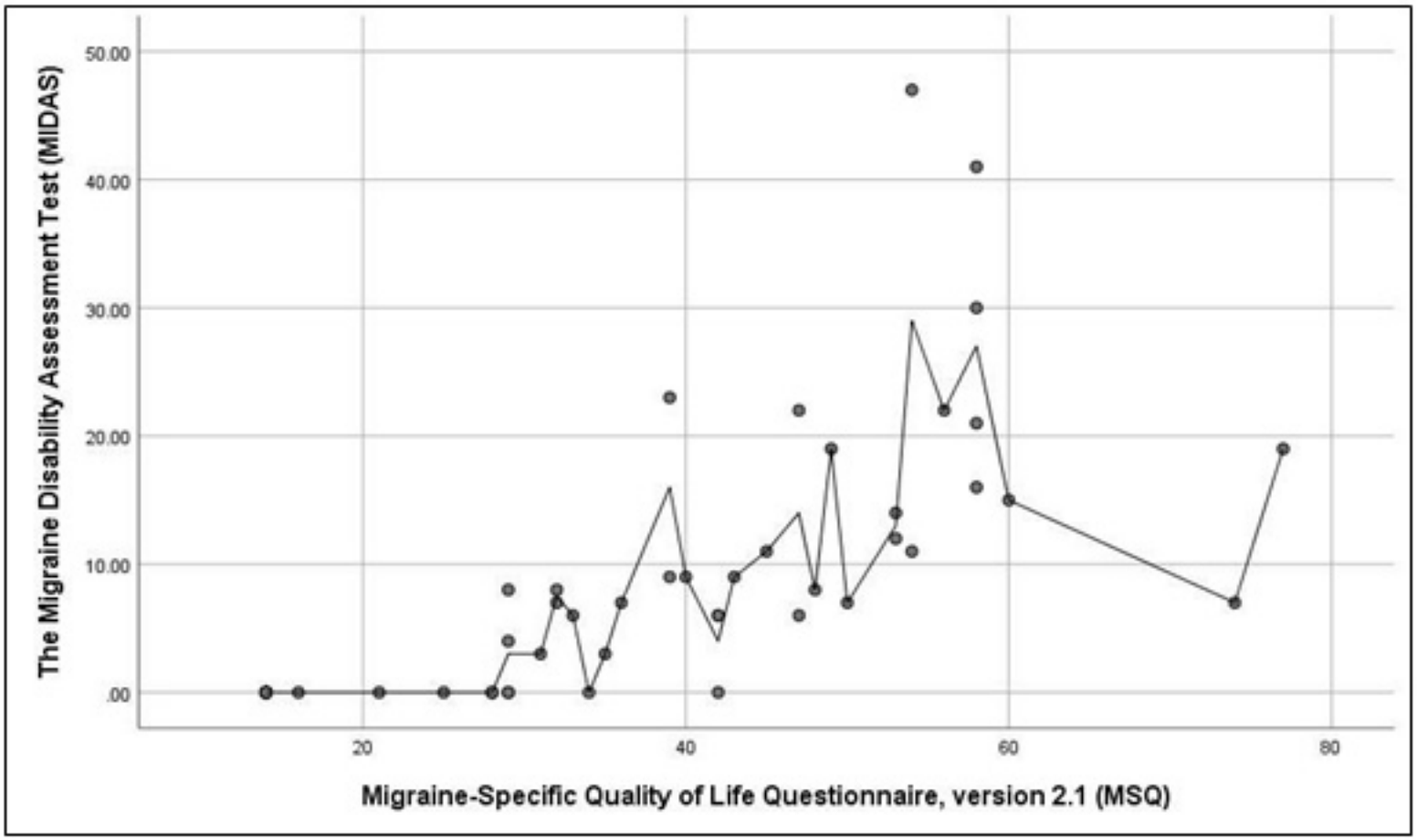
Table 3. Relationship between participants', level of disability based on The Migraine Disability Assessment Test (MIDAS) classification and participants' demographics and clinical data (No.: 53)

Variable	Little or no disability	Mild disability	Moderate disability	Severe disability	X^2	p value
Age					16.01	0.19
18-29	4 (44.4)	4 (44.4)	0 (0.0)	1 (11.1)		
30-39	5 (35.7)	3 (21.4)	4 (28.6) 2	2 (14.3)		
40-49	4 (28.6)	6 (42.9)	(14.3)	2 (14.3)		
50-59	3 (42.9)	1 (14.3)	1 (14.3)	2 (28.6)		
≥60	8 (88.9)	0 (0.0)	1 (11.1)	0 (0.0)		
Gender					6.24	0.1
Female	16 (38.1)	11 (26.2)	8 (19)	7 (16.7)		
Male	8 (72.7)	3 (27.3)	0 (0.0)	0 (0.0)		
Nationality					0.42	0.934
Non-Saudi	4 (40)	3 (30)	2 (20)	1 (10)		
Saudi	20 (46.5)	11 (25.6)	6 (14)	6 (14)		
Educational level					15.13	0.234
Non educated	4 (44.4)	4 (44.4)	1 (11.1)	0 (0.0)		
elementary	0 (0.0)	1 (50)	0 (0.0)	1 (50)		
Intermediate	3 (75)	1 (25)	0 (0.0)	0 (0.0)		
Secondary	3 (30)	4 (40)	3 (30)	0 (0.0)		
Higher	14 (50)	4 (14.3)	4 (14.3)	6 (21.4)		
Employment status					7.83	0.251
Not working	17 (51.5)	10 (30.3)	3 (9.1)	3 (9.1)		
Part time	0 (0.0)	0 (0.0)	1 (50)	1 (50)		
Full time	7 (38.9)	4 (22.2)	4 (22.2)	3 (16.7)		

Table 3. Relationship between participants', level of disability based on The Migraine Disability Assessment Test (MIDAS) classification and participants' demographics and clinical data (No.: 53) (continued)

Number of children					14.22	0.286
None	5 (62.5)	1 (12.5)	1(12.5)	1 (12.5)		
1	9 (69.2)	4 (30.8)	0 (0.0)	0 (0.0)		
2	5 (45.5)	1 (9.1)	2(18.2)	3 (27.3)		
3	2 (22.2)	4 (44.4)	2 (22.2)	1 (11.1)		
>3	3 (25)	4 (33.3)	3 (25)	2 (16.7)		
Time of diagnosis					4.9	0.557
6m-12m	4 (80)	0 (0.0)	1 (20)	0 (0.0)		
1-5 years	6 (42.9)	5 (35.7)	2 (14.3)	1 (7.1)		
>5 years	14 (41.2)	9 (26.5)	5 (14.7)	6 (17.6)		
Age at diagnosis					5.79	0.447
18-29	6 (31.6)	6 (31.6)	4 (21.1) 1	3 (15.8)		
30-39	7 (43.8)	6 (37.5)	(6.3)	2 (12.5)		
40-59	11 (61.1)	2 (11.1)	3 (16.7)	2 (11.1)		
Current prophylactic Medication					40.03	**0.021**
No	18 (60)	8 (26.7)	3 (10)	1 (3.3)		
Amitriptyline	1 (11.1)	5 (55.6)	0 (0.0)	3 (33.3)		
Ketamine	0 (0.0)	0 (0.0)	1 (50)	1 (50)		
Keppra	0 (0.0)	0 (0.0)	1 (50)	1 (50)		
Riboflavin	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)		
Topamax,	3 (75)	0 (0.0)	1 (25)	0 (0.0)		
Amerol	0 (0.0)	0 (0.0)	1 (100)	0 (0.0)		
Topiramate	1 (50)	0 (0.0)	1 (50)	0 (0.0)		
Valproic acid	1 (50)	0 (0.0)	0 (0.0)	1 (50)		
Attacks per month					21.2	**0.002**
1	18 (66.7)	7 (25.9)	1 (3.7)	1 (3.7)		
1-3	4 (20)	7 (35)	6 (30)	3 (15)		
>3	2 (33.3)	0 (0.0)	1 (16.7)	3 (50)		
Taking any prophylactic supplement or herb					4.84	0.183
No	0 (0.0)	2 (66.7) 12	0 (0.0)	1 (33.3)		
Yes	24 (48)	(24)	8 (16)	6 (12)		

Figure 2. Spearman's correlation between Migraine-Specific Quality of Life Questionnaire, version 2.1 (MSQ) and The Migraine Disability Assessment Test (MIDAS) scores



N.B.: (r=0.85, p-value = < 0.001)

Discussion

In this study, 26.4% of the participants were between the ages of 30-39 or 40-49. According to a recent Saudi study, the majority of their participants were between the ages of 20 and 40, which is consistent with the age at which migraines are most common (12,13,14,15).

In this study, 64% of the individuals had had a migraine diagnosis for more than five years. A previous Saudi study with a majority of participants who had migraines for at least five years came to the same conclusion (16). Other research also showed similar findings (17, 18,19).

According to The Migraine Disability Assessment Test (MIDAS) categorization, participants in this study who experienced just one attack per month were a much larger percentage than those who were classified as having little to no disability. Previous research indicated that since attacks typically last at least 15 days in a month, the frequency and intensity of migraine episodes may rise over time to chronic migraine (20).

The frequent episodes may be a major contributing factor to severe functional impairments, such as physical and psychological difficulties (21) and the negative effects on quality of life, academic performance, and social interactions (22,23,24). Additionally, during or in between migraine attacks, impairments related to migraines were also documented. Commonly, even between attacks, patients with migraines had a poor sense of wellbeing and quality of life compared to age- and gender-matched healthy control groups (25).

Only 5.7% of participants in this study were taking a prophylactic supplement or herb for migraine management. A previous Saudi study had found a low prevalence of the usage of alternative medications for headache management among the population in Riyadh, Saudi Arabia (26).

In this study, the average MSQ and MIDAS scores were 37.04 16.58 and 8.54, respectively.

10.57 in each case. Because of the missed days of work or school, decreased productivity, and the financial burden from the expense of prescriptions, migraine headaches have a negative impact on quality of life (26).

In this study, the percentages of patients with little to no disability and mild disability were 45.3% and 26.4%, respectively. 13.2% and 15.1%, respectively, had moderate and severe disabilities. Patients with migraines were shown to have a severely reduced quality of life, which resulted in significant disability (27).

A previous Saudi study was conducted in the neurology clinics at King Fahad Hospital-Hofuf, AlAhsa. The study found that more than half of the participants (57.3%) suffered from a severe

disability caused by migraines as compared to 20.7% with a moderate disability (28).

In the present study, a non-significant relationship was found between the MIDAS levels and all participants' demographics. A previous study found that disability was significantly higher among females and others with low-income levels (29).

In the current study, there was no significant correlation between the participants' demographics and the mean MSQ scores. Higher quality-of-life scores were found in the Saudi study by Al Ghadeer et al., 2021 among individuals with less education and those who never used medicines or other alternative techniques to manage migraine-associated discomfort (28). Shaik MM et al. (2015) reported a different outcome, finding that females with migraines had significantly lower overall WHOQOL-BREF scores (84.3) than healthy controls. This can be explained by the usage of several QOL assessment scales (30)
Participants who took riboflavin had significantly higher mean MSQ ratings in this trial, indicating an improved quality of life (31). According to studies, vitamin B12 levels were considerably lower for people with tension-type headaches, migraines, and unclassified headache groups than in the control group (32). According to other studies, people with lower vitamin B12 levels were more likely to get migraines (33).

The MSQ and MIDAS scores showed a substantial positive connection in this investigation. This correlation was also seen in a recent Saudi study that discovered a strong connection between migraine-related impairment and QOL (29). Another study revealed that most respondents said they had severe impairment that adversely affected their quality of life (34).

Limitations
The use of a self-reporting questionnaire in the present study could have a recall bias.

Conclusion

This study found that 64.2% of participants were had been diagnosed for migraine for >5 years and 35.8% were diagnosed between the ages of 18-29. The majority (56.6%) were not on any current prophylactic medications, 59.9% had a one attack monthly and 5.7% were taking a prophylactic supplement or herb. Of them, 45.3% and 26.4% of the participants had little or no disability and mild disability respectively and 15.1% and 13.2% had moderate and severe disability. Participants who were on Ketamine and who had only one attack per month had significantly higher mean MSQ scores indicating a better quality of life and participants who were prescribed Topamax and who had only one attack monthly had a significant higher percent than those who had little or no disability. A significantly positive correlation was found between the MSQ and the MIDAS scores.

Migraine headache assessment must be complete, encompassing mental health, well-being, and the real-life effects on the patient, in order to provide successful management of the condition. Clinicians should evaluate migraine-related disability and QOL on a regular basis as a complementary approach to migraine patients to ensure that they are receiving the appropriate therapy and to determine whether further methods are required.

Acknowledgment
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The Prevalence of Dental Anxiety among Dental Patients in Qassim Region

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Abstract

Objective : This study aimed to assess the prevalence of dental anxiety among patients visiting dental clinics in the Al-Qassim region of Saudi Arabia.

Methods: The 377 participants were selected from three major cities in the Al-Qassim region - Buridah, Onizah, and Alrass. A self-administered questionnaire based on the Modified Dental Anxiety Scale (MDAS) was used to gather the responses of the participants. The questionnaires were handed to respondents during their regular visits to dental clinics .

Results: The findings of the study revealed that 19% of the sample population suffer from severe dental anxiety. The analysis showed that feelings associated with anesthetic injection are the most-anxiety provoking factor while the next day visit is the least anxiety-provoking item.

The findings also found female patients are more anxious than their male counterparts and the difference between means of both genders is statistically significant. The study also noted that young age is associated with a high prevalence of dental anxiety.

Conclusion: The patients who come to visit dental clinics located in the Al-Qassim region feel dental anxiety. The prevalence is higher among females than male patients. Moreover, young patients demonstrated a higher prevalence of dental anxiety than patients of mature ages.

Keywords: Dental anxiety, Modified Dental Anxiety Scale, MDAS, Al-Qassim

Introduction

Dental anxiety (DA) refers to a physical or emotional response to a perceived threat where the stimulus is unknown, ambiguous, or even when it does not exist (Humphris et al., 2009; Jaakkola et al., 2009). This perceived threat could be a fear of dental injection or procedure, the uneasiness of keeping the mouth open for an extended period, or lengthy treatment. In general, dental fear and anxiety refers to negative feelings associated with the dental setting (Shim et al., 2015).

The incidence of dental anxiety is a global phenomenon. The patients' perceived uneasiness, discomfort, and pain associated with dental procedures promotes anxiety among them (White et al., 2017). However, the occurrence of dental anxiety is not uniform across the globe as it varies from country to country and even within a country. In the USA, up to 50% of the population suffer from some form of DA, while 3% to 20% of them have dental treatment-related fear and anxiety that is considered problematic (Krochak and Friedman, 1998; Milgrom et al., 1988).

There is a multitude of factors that are associated with the occurrence of dental anxiety, such as age (Yildirim et al., 2017), gender (Sghaireen et al., 2013), qualification (Jasser et al., 2019; Kamel et al., 2019), and the socioeconomic background of the patients (Abanto et al., 2017; Malvania and Ajithkrishnan, 2011). The results of the studies indicate being a woman and a young individual increases the likelihood of developing DA compared to other segments of the general population (Carlsson et al., 2015; Fayad et al., 2017). This list is not exhaustive; a few studies found some additional factors that may also relate to the development of an anxious state of mind towards dental treatment. Factors such as a previous traumatic dental experience (Fayad et al., 2017), or indirect learning from the bad experiences of peers and family members (Barreto et al., 2017; Boka et al., 2016; Morgan et al., 2017) may lead people to feel anxious.

In Saudi Arabia, different studies concluded different percentages of the general population suffer from dental treatment-related anxiety. One study, examining the prevalence of dental anxiety among patients visiting dental clinics in Al-Jouf University, found more than 11% of the patients suffer from it (Fayad et al., 2017). Another study conducted in outpatient clinics of the University in Jeddah concluded about 50% of their sample population suffer from moderate anxiety while 29% of the patients experience high dental anxiety (Kamel et al., 2019). Comparing the incidence of DA between the cities of Jeddah and Dammam, the results of a study showed the DA prevalence is 32% in Jeddah and 23% in Dammam (Al-Khalifa, 2015). Sghaireen et al. (2013) noted a low occurrence of dental anxiety among medical and dental students compared to computer sciences and art students. The results of a recent study show 36% of the adult population suffer from a dental phobia (Alyami et al., 2020).

The prevalence of dental anxiety has become a global public health concern since it causes numerous health and wellbeing-related outcomes for patients. It can prevent people from visiting the clinics and is a leading reason for appointment cancellations (Sanikop et al., 2011). Patients may avoid cooperating with the dentists, and at worst, they may refuse dental treatment (Esa et al., 2010). They tend to self-medicate to avoid visiting dentists (Minja and Kahabuka, 2019). Therefore, such patients are more likely to have missing teeth, untreated carious teeth surfaces, and poor oral health (Carlsson, 2015; Moore et al., 1993; McGrath and Bedi, 2004). A recent study conducted in the Eastern Province of Saudi Arabia found mothers' dental anxiety is significantly related to untreated decay in the primary dentition of children (Alhareky et al., 2021).

Given the high prevalence of DA and its effects on health and wellbeing, dental anxiety is among the most pressing public health concerns in Saudi Arabia. The increase in the number of research studies to explore the prevalence of dental anxiety in the Kingdom points to the growing interest of academics and policymakers in this issue. Despite the dedication of resources, the unchanged incidence of oral diseases among the Saudi population is concerning and it has turned the attention of policymakers to barriers that prevent utilization of dental care services (Gaffar et al., 2014). For example, the incidence of dental caries in the Saudi Kingdom is the highest in the world (Al-Khalifa, 2015; Al-Malik and Rebini, 2006; Gandeh and Milaat, 2000).

The studies conducted in the Saudi context have used a variety of geographic locations as their unit of analysis, such as citiy (Al-Madi and AbdelLatif, 2002), province (Alhareky, 2021), university (Alshammary et al., 2017), and clinic (Kamel et al., 2019) and involved various participants such as dentists (Alyami et al., 2020), students (Sghaireen et al., 2013), patients (Gaffar et al., 2014), and children-mother pairs (Alhareky et al., 2021).

The results of the studies conducted in the Saudi context show dental anxiety prevails in the general population, and tends to be higher in the younger population, females, and people with a previous traumatic experience (Fayad et al., 2017). The findings of these studies clearly show the prevalence of DA is not uniform across the entire kingdom, and that it varies from one geographic location to another. For example, Al-Khalifa (2015) noted a higher prevalence of anxiety among people in Jeddah city than in Dammam. The variation in dental anxiety scores among various cities highlights the need for policymakers to have accurate data on the prevalence of DA in a specific geographic location to design effective strategies to deal with the effects of dental anxiety among patients.

Since no previous study has investigated the prevalence of dental anxiety across the whole Al-Qassim region, this study fills the gap and investigates the extent to which dental anxiety is common among dental patients. Using a Modified Dental Anxiety Scale (MDAS), the present study sheds light on the state of DA prevalence in the Al-Qassim region.

MDAS is a widely used instrument since several global and local studies have gathered data on dental anxiety using this anxiety measuring scale (Alhareky et al., 2021; Bahammam, 2016; Campos et al., 2013). The popularity of this scale comes from the fact it is a simple scale that offers high reliability, validity, and good psychometric properties (Humphris et al., 2000). The Arabic version of the scale also showed high validity and reliability (Al-Nasser et al., 2016; Bahammam and Hassan, 2014).

The present study used the Arabic version of MDAS to explore the level of dental anxiety that prevails in the Al-Qassim region. This decision to use the MDAS Arabic version was based on the fact that the target population of the study could converse in Arabic while it could demonstrate high validity and reliability (Bahammam and Hassan, 2014). The findings of the study will help to improve patient management and develop better treatment strategies for anxious dental patients.

Methods

The data for the study was gathered using a self-administered questionnaire which consisted of two parts. The first part involved a scale based on MDAS which measured respondents' subjective reactions to different dental situations using multiple-choice items. Each questionnaire item offered five scores ranging from not anxious (1) to extremely anxious (5). The maximum possible score for each question was 5 and, in this way, the total maximum score for the entire scale was 25.

The second part of the questionnaire involved questions that intended to gather demographic information of respondents, such as age and gender.

The questionnaires were distributed to dental patients who attended dental clinics in three major cities - Buridah, Onizah, and Alrass - of the Al-Qassim region. The inclusion criteria was being 18 years old, mentally and medically fit, and living in any of three cities Al-Qassim region. Only Arabic-speaking, literate patients were selected to take part in the study. The data gathered was analyzed using the Statistical Package of Social Sciences (SPSS 17.0).

Results

The data in Table 1 shows that almost an equal number of participants were selected from three cities of the Al-Qassim region. In terms of gender, 52% of the participants were male while 48% were females. The patients were divided into three groups based on their MDAS scores. As such, Group 1 (slightly anxious) possessed a score below 11, Group 2 (moderately anxious) scored between 11 and 18, while Group 3 (extremely anxious) demonstrated a score between 19 to 25 (Al-Khalifa, 2015).

The results show that 41% of participants were slightly anxious, 42% were moderately anxious, while 19% were extremely anxious. The findings of Table 2 demonstrated that the most feared was an anesthetic injection (mean score = 3.07) while the next day visit was the least anxiety-provoking item (mean score = 2.12).

Finally, the effect of age on respondents' DA is calculated by performing the Oneway ANOVA test as shown in Table 4. Before conducting ANOVA, the assumptions of homogeneity were tested and satisfied based on Leven's F test, $F(3,373)=2.57$, $p=.064$. The independent variables between the analysis of the groups analysis yielded a statistically significant effect, $F(3,373)=4.51$, $p=.004$. According to descriptive data, the prevalence of dental anxiety was highest among those aged (18-30) ($M=3.1$) as shown in Table 4.

Table 1. Descriptive Statistics

		N	Percentage
City	Buridah	120	32
	Onizah	125	33
	Alrass	132	35
Gender	Male	197	52
	Female	180	48
Age	18-30	125	33
	31-40	111	29
	41-50	72	19
	50 & above	69	18
MDAS	Slightly anxious (<11)	152	40
	Moderately anxious (11-18)	160	42
	Extremely anxious (>18)	65	17

MDAS - Modified Dental Anxiety Scale **T**

Table 2. Descriptive statistics of MDAS items

Sr No.	MDAS items	Mean	Mode
1	Next day visit	2.12	1
2	Waiting for treatment	2.16	1
3	Tooth drilling	2.63	3
4	Scaling and polishing	2.38	1
5	Anesthetic injection	3.07	4

Table 3. Independent t test

	N	Mean	SD	t	df	Sig(2-tailed)
Male	197	2.7	0.79	57.35	376	0.001
Female	180	3.0	0.83			

Table 4. Oneway ANOVA

	Groups	Descriptive statistics				ANOVA	
		N	Percentage	Mean	SD	F	sign
Age	18-30	125	33	3.1	0.07	4.51	0.004
	31-40	111	30	2.8	0.08		
	41-50	72	19	2.8	0.1		
	50 & above	69	18	2.7	0.1		

Discussion

Dental anxiety is a global phenomenon. The present study effectively assessed the prevalence of dental anxiety among residents of the Al-Qassim region of Saudi Arabia. The study evaluated DA using MDAS – an instrument that demonstrates high reliability and validity scores in multiple studies (Appukuttan et al., 2012).

The findings categorized 17% of the study group as extremely anxious. The prevalence of high DA is detrimental to oral health and wellbeing since it not only can lead to patients to not seeking treatment but makes it difficult for dentists to complete their treatments (Taani, 2002). The results of the study support previous studies that concluded a significant portion of the population in Saudi Arabia suffers from high dental anxiety (Alyami et al., 2020; Fayad et al. 2017; Kamel et al. 2019). These studies ended up with high DA scores ranging from 11% to 36%. The difference could be attributed to varying cut-off points to categorize respondents into slightly anxious, moderately anxious, and extremely anxious groups.

The findings of the present study highlighted a higher prevalence of DA among females compared to male respondents living in the Al-Qassim region. Previous studies conducted in other parts of Saudi Arabia also found females are more dentally anxious than male dental patients (Al-Khalifa, 2015; Sghaireen et al., 2013). The present study supports the findings of these previous studies that conclude gender plays a role in dental anxiety.

Age is an important factor that plays a role in dental treatment-related anxiety. Those in younger age groups are associated with a high DA score as demonstrated by M=3.01. Younger people tend to feel more anxiety about dental treatment; and it is in line with the findings of studies conducted in varying national contexts (Kamel et al. 2019; Yildirim et al., 2017).

In relation to the MDAS scale, the study found the anesthetic injection is associated with the highest level of anxious thoughts (M=3.07). People feel the greatest level of anxiety when they need to get injected. This finding is consistent with the results of the studies conducted in Saudi and other contexts. For example, Al-Khalifa (2015) concluded dental injection is the highest anxiety-provoking item of MDAS (Mean=3.15); while with M=2.45, Humphris et al., (2009) described dental injection as the greatest anxiety-provoking item.

Feelings associated with the next day visit with M=2.12 are the least anxiety-provoking item, while anxious thoughts associated with sitting in the waiting room (M=2.16) are the next higher anxiety-provoking item of MDAS.

Given the fact that the majority of dental patients in Saudi Arabia do not visit dental clinics on a regular basis but instead seek emergency treatment it is unclear how to pre-empt dental problems before the start of actual treatment.

Overall, the findings of the study suggest that patients visiting different dental clinics located in Al-Qassim region feel anxiety about the entire treatment process. From feelings towards next day treatment and sitting in the waiting room, to dental injection, they feel anxiety toward all five MDAS items. Since most people in KSA visit dental clinics only to seek emergency relief, these findings are not surprising. Uncertainty about what lies ahead in terms of treatment provokes anxiety among them. However, further research is required to investigate if there is a difference in DA between people who regularly visit dental clinics and those who only go to get emergency treatment.

The findings also suggest that being female and young makes patients more likely to develop anxious thoughts. Again, further research can explore what is the difference in DA among young and mature aged females.

The study has important implications for dentists and healthcare administrators. By targeting groups highly vulnerable to dental anxiety, such as females, they can explain treatment and pain management procedures to help reduce the fear associated with dental treatments. Particularly, they should find ways to address the fear of dental injections, the highest anxiety-provoking factor among dental patients. Encouraging people to improve their oral health by regularly visiting dental clinics could promote preventive care and help address the anxiety related to dental procedures.

Limitations

This study has several limitations which need to be considered before explaining its findings. First, the study was conducted involving dental patients who visit dental clinics in three major cities of the Al-Qassim region. Caution needs to be exercised while generalizing the findings of the study to other contexts and settings.

The study finds the prevalence of DA among the sample population following a cross-sectional design, which determines the occurrence of a phenomenon only at a specific point in time. This research design limitation needs to be acknowledged while drawing insights from the findings of this study.

Other demographic and socioeconomic factors such as education, income level could also play a role in level of anxiety among dental patients. Consideration of these factors could help overgeneralization of the study to other contexts.

Conclusion

Dental anxiety is determined as a problem in the sample population. Some level of dental anxiety exists among all respondents irrespective of their gender and age. Dental anxiety continues to have implications both for dentists and patients. Despite efforts to determine the level of DA and find ways to address it, the problem persists.

Future research needs to focus on investigating if DA scores vary for patients who have more information on dental procedures than those who are less informed. Similarly, little attention has been paid to explore if the levels of DA for women subside with increasing age. Finally, studies with longitudinal designs involving multiple factors and respondents from several regions can better shed light on the prevalence of DA in Saudi Arabia.

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Prevalence of the Alarming Symptoms of Eating Disorders Among KSAU-HS Students, Riyadh, Saudi Arabia

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Abstract

Introduction: Eating disorders are considered one of the severe major illnesses which may lead to serious conditions and possibly fatality. They cause severe disturbances in a persons eating behaviours.

Aim: This study aimed to estimate the prevalence of symptoms of eating disorders among medical students at the King Saud bin Abdulaziz University for Health Sciences (KSAU-HS)who were at the basic science level.

Results: Of the 249 students, 75.1% were males. 44.2% of the students were either overweight or obese. The prevalence of students with symptoms of eating disorders according to the EAT-26 questionnaire was 26.5%. No significant differences were observed in the prevalence of eating disorders in terms of age and gender.

Conclusion: The prevalence of eating disorders with symptoms among medical students was 26.5%. Eating disorders(ED) were widely prevalent in overweight or obese students but there was no significance in terms of age and gender. A call for future research that could support and expand the understanding of the prevalence of ED in our region and what factors cause it to be warranted.

Keywords: Eating disorder, EAT-26, prevalence, KSAU-HS students

Introduction

The social context, including family and friends, as well as other elements like the media and the accessibility of fast food outlets, all have an impact on the eating habits of adolescents (1). A class of psychological issues known as eating disorders are characterised by abnormalities in eating behaviours and dissatisfaction with one's physical appearance. Anorexia nervosa (AN), bulimia nervosa (BN), and eating disorders not otherwise described (EDNOS) are three forms of the illness. Self-starvation, which occurs when people consciously eat too little out of a pathological dread of gaining weight, is a hallmark of AN. Even when they are extremely underweight, AN patients perceive themselves as overweight (2). On the contrary, bulimia nervosa is characterised by recurrent binge eating (eating an excessively large amount of food in a short period of time, in an out-of-control manner) followed by severe weight-controlling measures such protracted fasting, self-induced vomiting, and abusing laxatives and diuretics (3). Due to the alarming statistics of eating disorders in adolescents and their profound effects on morbidity and mortality, health professionals now give eating disorders a great deal of attention. Recent epidemiological study data indicates an increased incidence among college students(4,5). The two subtypes of bulimia nervosa are the non-purging type, which is characterised by excessive exercise, fasting, or strict diets, and the purging type, which is characterised by episodes of binge-eating followed by compensatory behavior, such as self-induced vomiting, laxative abuse, and diuretic abuse (6).

Recent epidemiological study data indicates an increased incidence among college students (7,8). Each organ in the body might be impacted by eating disorders. Due to poor musculoskeletal health, people who suffer from the illness may face greater levels of cardiovascular issues, infertility, digestive issues, insomnia, anxiety, sadness, and suicide as well as fatigue, discomfort, and activity limits (9). Additionally, of all psychiatric illnesses, eating disorders have the highest fatality rate. To address the concerning statistics surrounding eating disorders in this population , screening studies for these conditions must be conducted (10).

Regarding the epidemiology of eating disorders countries with high populations were found to be in highest contributions to DALY's of eating disorders, or instance, China, India, and the USA. On the other hand, African and Asian countries were difficult to find information from due to lack of data (11). A study was conducted in Taif University, Saudi Arabia using a cut off score of 20 using EAT-26 and the results showed that 34.5% of students were considered at risk of developing eating disorders (12) Medical and obese students scored significant EAT -26 scores. Other research published in the Iranian Red Crescent Medical Journal, found a prevalence of 24.6% of girls in specific school were at risk of developing eating disorders (13). Furthermore, a study was conducted in two Arab countries in comparing to USA data, and found depression, anxiety and eating disorders are significantly higher in college students in Qatar and Lebanon than in the USA (14).

The incidence of eating disorders is unknown locally. Indeed, a lack of reporting is a serious concern in the Arabic world, particularly in Saudi Arabia. The lack of data made us question what is the prevalence of the symptoms of eating disorders In Saudi Arabia and to initiate a study. We hope that this study will provide an initiative for further nationwide studies to help us better understand the prevalence of eating disorders amongst our student population as well as in the wider adult community. Our aim is to improve our knowledge about how common are symptoms of eating disorders among students of KSAU-HS and help to estimate the prevalence. We believe that our study will add valuable data to existing literature.

Methods

We used a cross-sectional questionnaire-based study among medical students at King Saud bin Abdulaziz University for Health Sciences in Riyadh, Saudi Arabia. A self-administered questionnaire was used to assess eating behaviours.

The tool that was used to conduct the study was the EAT-26 (Eating Attitude Test 26) . The test consisted of 2 parts:

A) Demographical data - (Independent variables, Height, Weight, Date of birth, and Gender)
B) Outcome variable(s) – Any student who scores above 20 will be considered as high risk

Minimum Test score is 0, and maximum test score is 78.

EAT-26 items are from three sub-scales (i.e. Dieting, Bulimia and Food Preoccupation and Oral Control) and sub-scale scores are computed by summing all items assigned to that particular scale (Dieting scale items: 1, 6, 7, 10, 11, 12, 14, 16, 17, 22, 23, 24, 25; Bulimia & Food Preoccupation scale items: 3, 4, 9, 18, 21, 26; Oral Control sub-scale items: 2, 5, 8, 13, 19, 20) and the last 6 questions are behavioural questions.

Data was gathered by a form paper-based survey which was distributed to students through PBL sessions and lecture halls in the King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), College of Medicine, Riyadh Campus. The study included medical students of both genders from the third and fourth year of study. The estimated sample size was 234 based on a 50% outcome response at 95% level of confidence and ± 5% Margin of error. The population size was estimated to be 500-600 students hence the sample size of 234 students. Data was collected, reviewed, and entered in MS Excel. Statistical analysis was conducted using JMP Software v.14. Categorical variables were measured by frequencies and percentages. Continuous variables were calculated by Mean and Standard deviation. A Chi-square test was used to compare gender with score. Descriptive statistics were presented as numbers and percentages (%) for all categorical variables. Univariate and multivariate analyses were performed to determine the independent significant

predictors of eating disorders. A P-value of 0.05 was used to indicate statistical significance. All statistical data were analyzed using Statistical Packages for Social Sciences (SPSS) version 26 (Armonk, NY: IBM Corp, USA).

Results

A total of 249 students completed the questionnaire. Table 1 presents the basic demographic characteristics of the students. Approximately 50.6% were aged between 22-23 years old with three quarters (75.1%) being males. Regarding their BMI level, 26.9% were overweight and 17.3% were obese.

In Figure 1, the prevalence of students identifying with an eating disorder was 26.5%.

In Figure 2, 56.6% had experienced eating binges in the last 6 months. A similar proportion, (56.6%), had exercised more than 60 minutes per day to lose or control weight, 17.3% had lost 20 pounds in weight or more, 11.2% had used laxatives or diuretics to control their weight or shape and 8.8% had forced themselves to vomit to control their weight or shape.

Regarding the behaviour of students and their eating habits (with or without the symptoms of eating disorder (Table 2)), we found there was an increased risk of eating disorders among students who used laxatives, diet pills, or diuretics to control their weight. This was as much as 4.31 times higher (AOR=4.31; 95% CI=1.39 – 13.3; p=0.011). Also, we observed that students who exercised for more than 60 minutes per day were more likely to increase the risk of developing an eating disorder by at least 2.19 times (AOR=2.19; 95% CI=1.13 – 4.25; p=0.020). Those who had lost 20 pounds in weight or more in the past 6 months had an increased risk of developing an eating disorder by at least 2.22-fold (AOR=2.22; 95% CI=1.07 – 4.59; p=0.032). On the contrary, binge eating, and self-induced vomiting to control weight did not show a significant effect on the symptoms of eating disorder (p>0.05).

In Table 3, we show that being obese or overweight was the sole independent significant predictor of an eating disorder. Compared to students with normal or underweight BMI levels, students who were obese or overweight were predicted to increase the risk of eating disorders by as much as 2.19 times (AOR=2.19; 95% CI=1.22 – 3.93; p=0.009) Gender and age group were not predicted to influence eating disorder symptoms in the group of students (p>0.05).

Table 1: Basic demographic characteristics of the students (n=249)

Study data		N (%)
Age group		
•	22 – 23 years	126 (50.6%)
•	>23 years	123 (49.4%)
Gender		
•	Male	187 (75.1%)
•	Female	62 (24.9%)
BMI level		
•	Underweight (<18.5 kg/m2)	21 (08.4%)
•	Normal (18.5 – 24.9 kg/m2)	118 (47.4%)
•	Overweight (25 – 29.9 kg/m2)	67 (26.9%)
•	Obese (≥30 kg/m2)	43 (17.3%)

Table 2: Students' behavior on eating disorder with or without the symptoms of eating disorder (n=249)

Statement	Eating disorder		AOR (95% CI)	P-value
	Positive N (%) (n=66)	Negative N (%) (n=183)		
Gone on eating binges where you feel that you may not be able to stop				
• Yes	45 (68.2%)	96 (52.5%)	1.32 (0.69 – 2.52)	0.396
• No	21 (31.8%)	87 (47.5%)	Ref	
Ever made yourself sick (vomited) to control your weight or shape?				
• Yes	11 (16.7%)	11 (06.0%)	0.74 (0.21 – 2.57)	0.633
• No	55 (83.3%)	172 (94.0%)	Ref	
Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?				
• Yes	16 (24.2%)	12 (06.6%)	4.31 (1.39 – 13.3)	**0.011 ****
• No	50 (75.8%)	171 (93.4%)	Ref	
Exercised more than 60 minutes a day to lose or to control your weight?				
• Yes	49 (74.2%)	92 (50.3%)	2.19 (1.13 – 4.25)	**0.020 ****
• No	17 (25.8%)	91 (49.7%)	Ref	
Lost 20 pounds or more in the past 6 months				
• Yes	18 (27.3%)	25 (13.7%)	2.22 (1.07 – 4.59)	**0.032 ****
• No	48 (72.7%)	158 (86.3%)	Ref	

AOR – Adjusted Odds Ratio; CI – Confidence Interval.
** Significant at p<0.05 level.

Table 3: Univariate and multivariate analysis to determine the influence of eating disorders in regard to the basic demographic characteristics of the students (n=249)

Statement	Eating disorder		AOR (95% CI)	P-value
	Positive N (%) (n=66)	Negative N (%) (n=183)		
Age group				
• 22 – 23 years	34 (51.5%)	92 (50.3%)	Ref	
• >23 years	32 (48.5%)	91 (49.7%)	0.95 (0.54 – 1.69)	0.872
Gender				
• Male	49 (74.2%)	138 (75.4%)	Ref	
• Female	17 (25.8%)	45 (24.6%)	1.29 (0.65 – 2.54)	0.462
BMI level				
• Normal or underweight	28 (42.4%)	111 (60.7%)	Ref	
• Obese or overweight	38 (57.6%)	72 (39.3%)	2.19 (1.22 – 3.93)	**0.009 ****

AOR – Adjusted Odds Ratio; CI – Confidence Interval.
** Significant at p<0.05 level.

Figure 1: Prevalence of eating disorders based on EAT-26

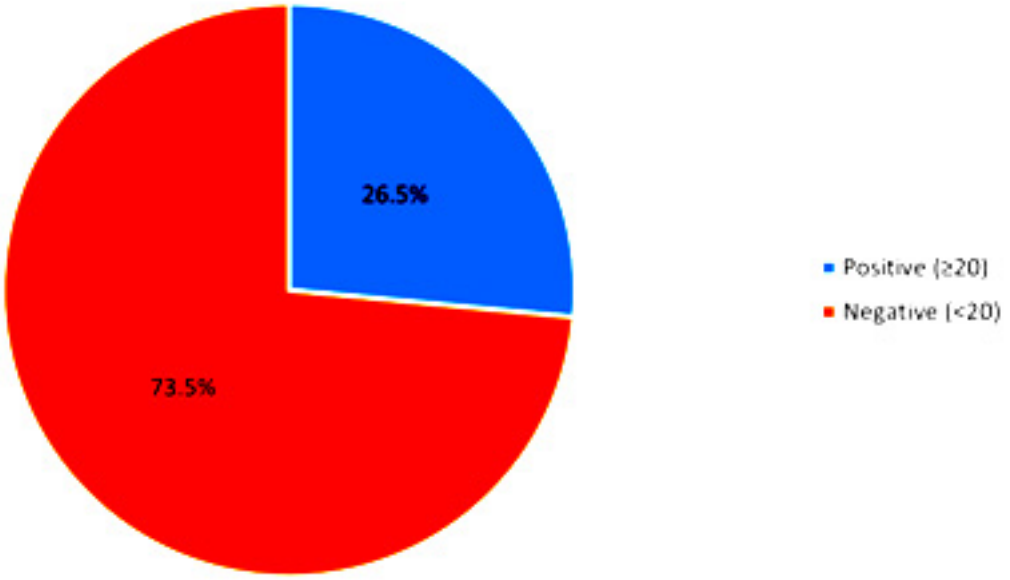
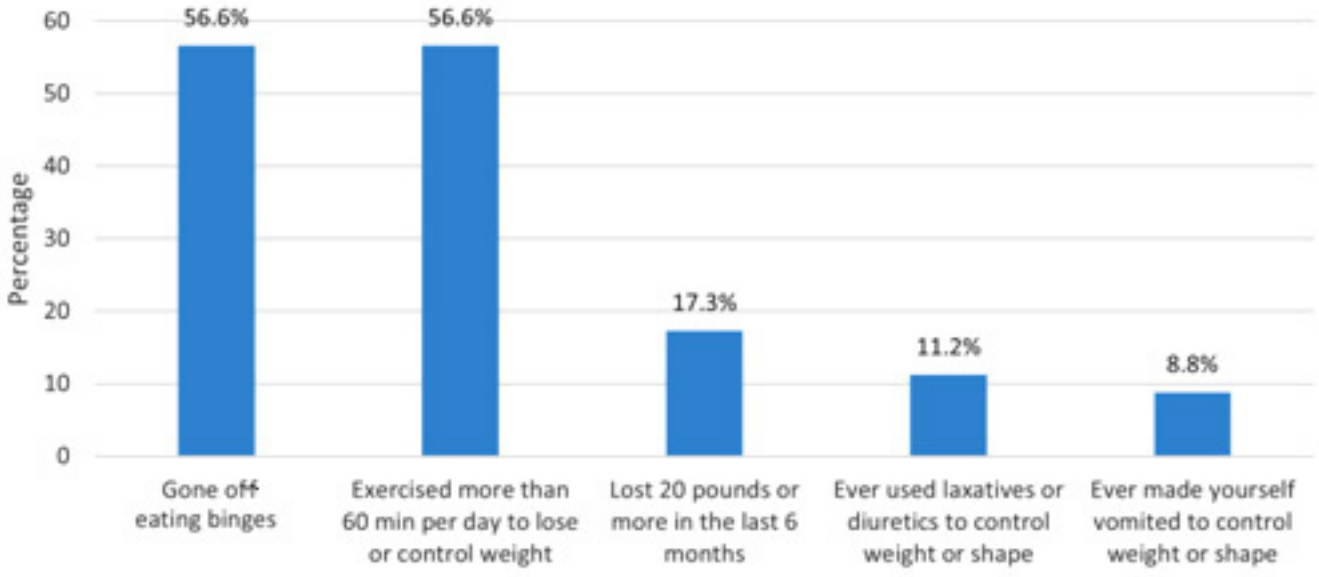


Figure 2: Students' behavior about oral control



Discussion

This study was carried out to determine the prevalence of eating disorders (ED) among KSAU-HS medical students in Riyadh, Saudi Arabia. The findings of this study revealed that there was a high prevalence of medical students who had symptoms of ED. Based on EAT-26 criteria, approximately one out of four (26.5%) of the students were positive for ED while the rest were normal (73.5%). Consistent with our findings, a review article conducted by Fatima et al.(16) found that the overall prevalence of ED in Arabic countries was approximately 26.9% with the highest prevalence amongst adolescennets in Saudi Arabia and the UAE. In South India, the prevalence of students who were at a high risk of developing ED was 13% lower than our report (17). A study carried out among American college students supported this claim and found that the prevalence of ED was 13.5% in females and 2.5% in males with 20% having received mental health treatment in the past year (18). The high prevalence of ED in the young population is concerning, and it is critical that we develop strategies to address this trend.

This study indicates that medical students who were obese or overweight had an increased risk of developing ED. This is consistent with the study done among university students in Taif (19). According to their research, medical and obese students achieved the highest significant ratings in EAT scores. The researchers emphasized the need for a national screening programme for the early detection and management of this disorder. Consistent with these reports, several studies conducted in Saudi Arabia proved that increased BMI was associated with an increased risk of ED whether they were university students(20), female adolescents (21), or people engaged in sports (22). In contradiction to these reports, a survey conducted among Indian college students (23), found that a lower body mass index was found among subjects with abnormal eating behaviour and that this was in agreement with a study carried out among Lebanese Health Science students and healthcare practitioners (24).

According to the report by Alhazmi and Al Johani (25), the prevalence of ED was significantly higher in females and those students aged 22 years or less. This was replicated in a study by Bizri et al (26), where female medical students and those aged between 22-25 years old were significantly more likely to be identified as at a higher risk of ED. However, in our results, gender and age were not identified as significant predictors of ED. This has been similarly documented by Iyer and Shriraam( ), as well as Al-Jumayan et al.( ) . Both studies indicated that there were no significant differences in the rates of eating disorders between genders. The effect of gender and age in terms of disturbed eating behavior was not conclusive, thus, more investigation is needed.

In terms of behavioural eating control, we have learned that more than half of the medical students (56.6%) had experienced eating binges in the past 6 months and were exercising daily for more than 60 minutes (56.6%) to lose or to control their weight. In addition, some students indicated that they had lost 20 pounds in weight or more (17.3%), or they used laxatives or diuretics to control their weight or shape (11.2%), and fewer than 9% had made themselves vomit to control their weight or shape. Accordingly, we noticed that behaviours such as exercising for more than 60 minutes per day, losing 20 pounds or more in the past 6 months, and taking laxatives, diet pills, or diuretics to control weight were also determined as significant predictors for an increased risk of ED. This is generally consistent with the findings of Hoteit et al( ). Based on their reports, binge eating, self-induced vomiting, the use of laxatives, diet pills, and diuretics, and losing 9 kg or more of body weight were significantly more in higher risk individuals. Previous reports documented the influence of behaviour on eating control, however, in a study by Al-Jumayan et al( ), eating disorder symptoms were linked to participants who were influenced by social media. They were 'encourgaed' to be slim and perceived that social media influencers motivated them to visit the gym. Further, similar associations were seen among participants who perceived that exercise was very important and therefore, the study highlighted the need for a screening programme to identify higher-risk individuals so that appropriate intervention and management planned.

Limitations

This study is subjected to some limitations. Firstly, our sample was not large (n=249). It would have been interesting to see a bigger sample which could generate more results which could give a greater understanding of the prevalence of ED in our region. Secondly, gender distribution was not equally collected, thus, we cannot generalize the comparison of ED between male and female students. Finally, being cross-sectional in nature is prone to disadvantages including any cause-and-effect relationships, and is prone to bias.

Conclusion

The prevalence of medical students with symptoms of eating disorders was 26.5%. Eating disorders were widely prevalent in overweight or obese students but there was no significance in terms of age and gender. Students who used methods to control their weight such as regular exercise and taking laxatives, diet pills, or diuretics were more likely to exhibit abnormal eating behaviours as compared to the rest of the students. Eating disorders may have severe consequences if left untreated, therefore, it is vital we develop a strategy and programme to prevent the incidence of ED. Collective efforts among government agencies and university institutions are needed to address the increasing trend of eating disorders among the young population. Long-term programmes for health education including raising the awareness of the importance of a good diet, nutrition and a healthy lifestyle would be beneficial. Future research is warranted.

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Prevalence, quality of life and risk factors of chronic rhinosinusitis in adults in Kingdom of Saudi Arabia 2021

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Abstract

Background: Chronic rhinosinusitis is one of the most prevalent chronic diseases worldwide, affecting all age groups. It is a condition leading to a significant decrease in the quality of life of patients, and requires a specific treatment approach. This study aims to assess the prevalence, quality of life and risk factors of chronic rhinosinusitis in order to develop and promote public health, wellbeing and awareness.

Methodology: This is a cross-sectional study which was conducted in the Kingdom of Saudi Arabia, from August to October 2021. We collected the data using a validated, self-administrated online sinonasal outcome test (SNOT-22) questionnaire in Arabic. The questionnaire was distributed through social media and aimed to assess the prevalence and risk factors of chronic rhinosinusitis in the Kingdom of Saudi Arabia in 2021.

Results: In the current study, we collected data from 4963 individuals in Saudi Arabia who responded to to our questionnaire. Participants had a mean age of 31.99 (SD=11.59) years old, 62.0% were females and 92.9% were Saudis. Among the total sample, the prevalence of chronic rhinosinusitis (CRS) was 22.5%. The prevalence of CRS was significantly lower in patients aged between 18-29 years old (19.4%) compared with the 30-49 age group (27.1%) and 50-69 age group (23.2%) (P=0.000). Moreover, we found that the prevalence of CRS was significantly higher among females (24.0% vs 20.2%, P=0.002) and among Saudis compared to non-Saudis (22.9% vs 17.6%, P=0.022). Furthermore, there was a significant reduction in the quality of life among patients with CRS where the mean score of SNOT-22 was 44.04 (SD=25.38) compared with 26.82 (SD=26.35) in non-patients.

Conclusion: The current study revealed a high prevalence of CRS among individuals in Saudi Arabia especially among older females, those with chronic conditions and those who had been exposed to different risk factors such as smoking. Moreover, CRS was found to have a significantly negative impact on the quality of life for those participants diagnosed with the condition.

Keywords: Quality of life, chronic sinusitis, adults, Saudi Arabia

Introduction

Chronic rhinosinusitis is a widespread chronic inflammation of paranasal sinuses.1 CRS affects 1% to 12% of persons worldwide [1]. CRS needs long-term treatment with medication with or without surgery for good outcomes [1]. That is why CRS impacts on the quality of life and is responsible for an increase in direct costs to hospitals and patients, and indirect costs such as a decrease in work activity and productivity [2,3]. CRS is defined according to EPOS criteria which needs two or more of 4 symptoms which are commonly nasal obstruction/blockage/ congestion, nasal discharge (anterior/ postnasal drip), facial pressure/pain, and anosmia/hyposmia) for more than 12 weeks [4]. The exact pathogenesis of CRS is unclear but may be related to decreasing ciliary clearance of the mucosa because of bacterial infection and an inflammatory condition [5]. Other risk factors are thought to be genetic such as cystic fibrosis, obstruction of the osteomatal complex or associated with comorbid diseases such as gastroesophageal reflux disease (GERD), asthma and allergic rhinitis or environmental factors such as tobacco exposure, allergens, toxins and pollutants [4,5]. Treatment of CRS consists of topical medications such as intranasal saline irrigation, intranasal steroid spray and antibiotics may play a role in treating any superimposed infection. The last option, after the failure of medical management, is endoscopic sinus surgery [4].

Many studies have looked at the prevalence, quality of life and risk factors of chronic rhinosinusitis globally. A study to establish the prevalence of chronic rhinosinusitis–related symptoms in the United States found that the most prevalent symptoms were dyssomnia (8.1%), nasal blockage (6.0%), sinus pain (2.1%), and discoloured mucous (1.1%). In total (13.0%) adults had precisely one sino-nasal symptom, and (2.1%) reported two or more primary symptoms for chronic rhinosinusitis. Regarding the gender of respondents, 1.9% males reported two or more symptoms consistent with chronic rhinosinusitis vs 2.2% females (P = .690), which is not statistically significant [6]. Another universal study was conducted in Korea to determine the prevalence and risk factors of CRS in elderly (≥65 years old) Koreans comparing the risk factors to those for younger adult participants (19-64 years old). The prevalence of CRS was significantly greater in the elderly group 6.55% vs 5.69%, P = .016. Some variation of socio-economic status and mental health status in the adult group was associated with an increased risk of CRS but showed no association in the elderly group [7]. Another study was conducted in Sao Paulo, Brazil, to estimate the prevalence of chronic rhinosinusitis. The study found that the mean age was 39.8 +- 21 years; 45.33% were male. The overall prevalence of CRS in the city of Sao Paulo was 5.51%. and researchers found a major connection between the diagnosis of CRS and the diagnosis of asthma, CRS and the diagnosis of rhinitis, and a notable association between the presence of CRS in the low-income subgroup.2 A global study conducted in China constituted a total of 10,636 respondents from seven cities. The CRS prevalence was 8.0% and varied from 4.8% to 9.7% in the locations. The estimated prevalence was slightly higher among males (8.79%) than in females (7.28%) (P = 0.004). The prevalence varied depending on age, ethnicity, marital status and educational level (P < 0.05), but not by household per capita income or living situation (P > 0.05). Both second-hand tobacco smoking and active smoking were independent risk factors for CRS (P = 0.001) [8]. A regional study was conducted in Bushehr, in the southwestern region of Iran. The study found that the prevalence of CRS was 28.4% based on the EPOS criteria, meanwhile the self-reported physician-diagnosed CRS prevalence was 20.0%. There was no gender difference but CRS was more prevalent in smokers aged between 25–34 years old, non-educated persons, and healthcare workers [9]. A total of 3,099 completed surveys were received (response rate 68.1%). Further research was completed in Denmark, which discovered that the overall prevalence of CRS was 7.8%, with no significant variations in age or gender. Female blue-collar employees had a higher risk of CRS than female white-collar workers, according to risk ratio estimations. The data on employed males was dependent on whether or not they smoked. The total risk of CRS was raised by occupational exposure to gases, fumes, dust, or smoke. CRS was observed four times more frequently in asthmatic and nasal allergy patients. The prevalence of CRS was doubled as a result of current smoking [10]. According to nationwide research completed in Korea, the prevalence of CRS in the country is 6.95%. Elderly males, and high stress levels were shown to be substantially linked to CRS among socio-demographic variables. Personal medical risk factors for CRS included the influenza vaccination, septal deviation, and chronic allergic rhinitis. Persistent/moderate to severe allergic rhinitis was shown to be the most significant risk factor for CRS at the population level among these risk variables [11]. Other research was carried out in Korea and chronic rhinosinusitis with nasal polyps (CRSwNP) and chronic rhinosinusitis without nasal polyps (CRSsNP) were found in 2.6% and 5.8% of 28 912 individuals respectively. CRSwNP was linked to age (odds ratio [OR], 1.03; 95% confidence interval [CI], 1.02-1.04; P =.001), education (OR, 1.40; 95% CI, 1.02-1.92; P =.04), and obesity (OR, 1.46; 95% CI, 1.16-1.84; P =.001).3 In terms of risk factors, a study was conducted in China to look at the occupational and environmental risk factors linked to CRS. The number of patients in the research was 10,633, with 850 (7.99%) of them being diagnosed with CRS using the EP3OS criteria. There were strong links between CRS and occupational and environmental variables. CRS was linked to having a cleaning-related job , occupational exposure to dust, occupational exposure to toxic gas, having a pet at home, and having a carpet at home or at work . Among participants with and without CRS, used to stay warm in the winter, manage the time using air conditioning in the summer, and the frequency of exposure to mouldy or damp surroundings were substantially different [12]. In other research carried out in the United Kingdom a study aimed to investigate the prevalence of CRS and to identify any links to demographic factors. The next objective was to evaluate the severity of the impairment, its influence on the quality of life, and any expenses incurred by the

patients. The study discovered that over 30% of the community suffers from upper respiratory tract symptoms and that this has an influence on many aspects of their quality of life, including emotional distress, financial expenses, and missed workdays. Compared to the Short Form 36 questionnaire, the MSNOT-20 gave a more sensitive evaluation of health-related quality of life [13]. Regarding the quality of life of CRS patients, a study of 131 adult patients with CRS in Boston using SNOT-22 scores confirmed the greatest effect was on the lives and and health of patients with facial/otology pain. Secondly, were symptoms related to sleep. Lastly, the least impacted were nasal symptoms [14]. Another Canadian cross-sectional study was performed on CRS patients awaiting endoscopic sinus surgery using the SNOT-22 score and patients with chronic bronchitis, emphysema or asthma had significantly higher SNOT-22 scores than those without. Among 91 out of 253 patients who had chronic pulmonary comorbidity reported higher clinically significant depression rates/scores than those without [15].

Methodology

This is a cross-sectional study that was conducted in the Kingdom of Saudi Arabia, from August to October 2021. We collected the data using a validated, self-administrated online sinonasal outcome test (SNOT-22) questionnaire in Arabic. [16]. The questionnaire was distributed through social media and aimed to assess the prevalence and risk factors of chronic rhinosinusitis in the Kingdom of Saudi Arabia in 2021.

The sample size was estimated as 384 participants depending on the EPI-Info app. We used a simple random sampling technique and selected participants from different cities in the Kingdom of Saudi Arabia who were older than 18 years. The study included all adult patients who fitted the diagnostic criteria of EPOS for CRS (with/without nasal polyps). Those who were under 18 years old or who were pregnant, or those who refused to participate in the study were excluded.

We collected the data using a validated, self-administrated online sinonasal outcome test (SNOT-22) questionnaire in Arabic[16]. We targeted different regions in the Kingdom of Saudi Arabia to increase the chance to generalise the findings. We obtained informed consent and ensured that confidentiality was clearly explained to participants and maintained.

The questionnaire consisted of three sections containing 36 questions: 1- Socio-demographic data which included age, gender, nationality, the region where they live,d education level, occupation, marital status and living location type. 2- Risk factors included lifestyle, family history, any chronic disease and EPOS criteria to include or exclude. 3- With exception of the name of participant , sinonasal outcome test (SNOT-22) questionnaire questions to diagnose and assess the symptoms and quality of life. Diagnosis was in line with participants who meet European position paper on rhinosinusitis and nasal polyps 2020 EPOS 2020. We investigated the symptoms and quality of life questions using a Likert scale (i.e. problem as bad as it can be, severe problem, moderate problem, mild or slight problem, very mild problem, and no problem).

MS Excel was used for data entry, cleaning, and coding while SPSS version 26.0 was used for data analysis. Quantitative data appeared as mean and standard deviation (mean+\-SD). Student t test was used for comparing the 2 quantitative variables and ANOVA test for comparing more than two variables with the significant level set at p-value >0.05. Qualitative data was expressed as numbers and percentages (NO&%). Chi square (x 2) was used to assess the relationship between two or more qualitative variables. The study was conducted securing ethical approval from the Qassim Research Ethics Committee

Results

In the current study, we were able to collect data from 4963 individuals in Saudi Arabia who responsed to our questionnaire with a mean age of 31.99 (SD=11.59) years old where 53.1% of the participants were aged between 18-29 years and 35.9% were between 30-49 years. 62.0% of participants were females and 92.9% were Saudis. The sample was collected from 12 regions in Saudi Arabia, predominantly in Riyadh (28.7%), Qassim 20.1%), and Mecca (18.5%). Regarding the educational level of participants, 67.9% reported having a college degree while 20.4% had secondary school education. 38.1% of the participants were employed, 35.6% were students, and 13.6% identified as housewives. 51.3% of participants were single and 47.5% were married. 62.0% of them reported living in a villa (Table 1).

56.9% of the participants reported having some lifestyle risk factors for CRS including smoking (43.6%), frequent exposure to detergents (40.4%), continuous exposure to dirt and plants (33.1%) and breeding pets (27.5 %) (Figure 1).

Among the participants, 46.9% reported having chronic conditions where the most common medical conditions were seasonal and non-seasonal sensitivity (28.3%), asthma (9.1%), nasal barrier deviation (8.6%), and gastroenterological disorders (8.1%). Other medical conditions including eczema (7.2%), depression (6.2%), and immune system disorders (1.3%) were also reported (Figure 2).

69.5% of the participants reported family history of chronic conditions including seasonal and non-seasonal sensitivity (32.5%), asthma (30.4%), sinusitis (22.8%), and eczema (15.9%) (Figure 3).

Among the study group, the prevalence of chronic rhinosinusitis was 22.5%. The prevalence of CRS was significantly lower in younger patients aged between 18-29 (19.4%) compared with the 30-49 age group (27.1%) and 50-69 age group (23.2%) (P=0.000). Moreover, we

found that the prevalence of CRS was significantly higher among females compared to males (24.0% vs 20.2%, P=0.002) and among Saudis compared to non-Saudis (22.9% vs 17.6%, P=0.022). No significant difference was found between the participants according to their educational level ((P=0.627) while housewives, the employed and unemployed showed the highest prevalence of CRS (27.0%, 25.3% and 25.8%, respectively P=0.000). Moreover, being single decreased the risk of having CRS (20.2% compared with 25.1% of married participants, P=0.000). The prevalence of CRS was significantly higher among participants who reported having lifestyle risk factors (28.5% vs 14.6%,P=0.000), a chronic condition (36.3% vs 10.4%, P=0.000), and family history of a medical condition (27.9% vs 10.4 %, P=0.0000) (Table 2)

According to Table 3, the most common symptoms of CRS reported by patients a 'bad' problem were waking up tired (17.9%), frustrated/restless/irritable (16.6%), reduced concentration (15.4%), lack of good sleep (15.3%), fatigue (15.2%), nasal obstruction (14.4%), and falling asleep (14.3%),. Additionally, sadness and embarrassment were reported by 13.4% and 13.2% respectively as being as bad as possible (Table 3).

As shown in Table 4, there is a significant reduction in the quality of life among patients with CRS where the mean score of SNOT-22 was 44.04 (SD=25.38) and in patients with CRS compared with 26.82 (SD=26.35) in non-patients considering that higher score of SNOT-22 indicates a poorer quality of life (Table 4).

Table 1: The demographic factors of the participants (N=4963)

		Count	Column N %
Age	18-29	2636	53.1%
	30-49	1783	35.9%
	50-69	535	10.8%
	>70	9	0.2%
Gender	Male	1887	38.0%
	Female	3076	62.0%
Nationality	Saudi	4611	92.9%
	Non-Saudi	352	7.1%
Region	Asir	561	11.3%
	Riyadh	1426	28.7%
	Al-Qassim	996	20.1%
	Northern Borders Region	20	0.4%
	Eastern	516	10.4%
	Mecca	917	18.5%
	Hail	28	0.6%
	Jouf	149	3.0%
	Jazan	84	1.7%
	Madina El Munawara	141	2.8%
	Najran	90	1.8%
	Tabuk	35	0.7%
Educational level	Uneducated	16	0.3%
	Primary	20	0.4%
	Average	89	1.8%
	Secondary	1012	20.4%
	Diploma	62	1.2%
	University	3368	67.9%
	Masters	396	8.0%

Table 1: The demographic factors of the participants (N=4963) (continued)

Occupation	**Unemployed**	**454**	**9.1%**
	Employee	**1893**	**38.1%**
	Student	**1765**	**35.6%**
	Retired	**122**	**2.5%**
	Housewife	**674**	**13.6%**
	Free business	**55**	**1.1%**
Marital status	**Single**	**2545**	**51.3%**
	Married	**2358**	**47.5%**
	Divorced/Widowed	**60**	**1.2%**
Housing	**Apartment**	**1777**	**35.8%**
	Villa	**3074**	**62.0%**
	Farm	**67**	**1.4%**
	House	**43**	**0.8%**

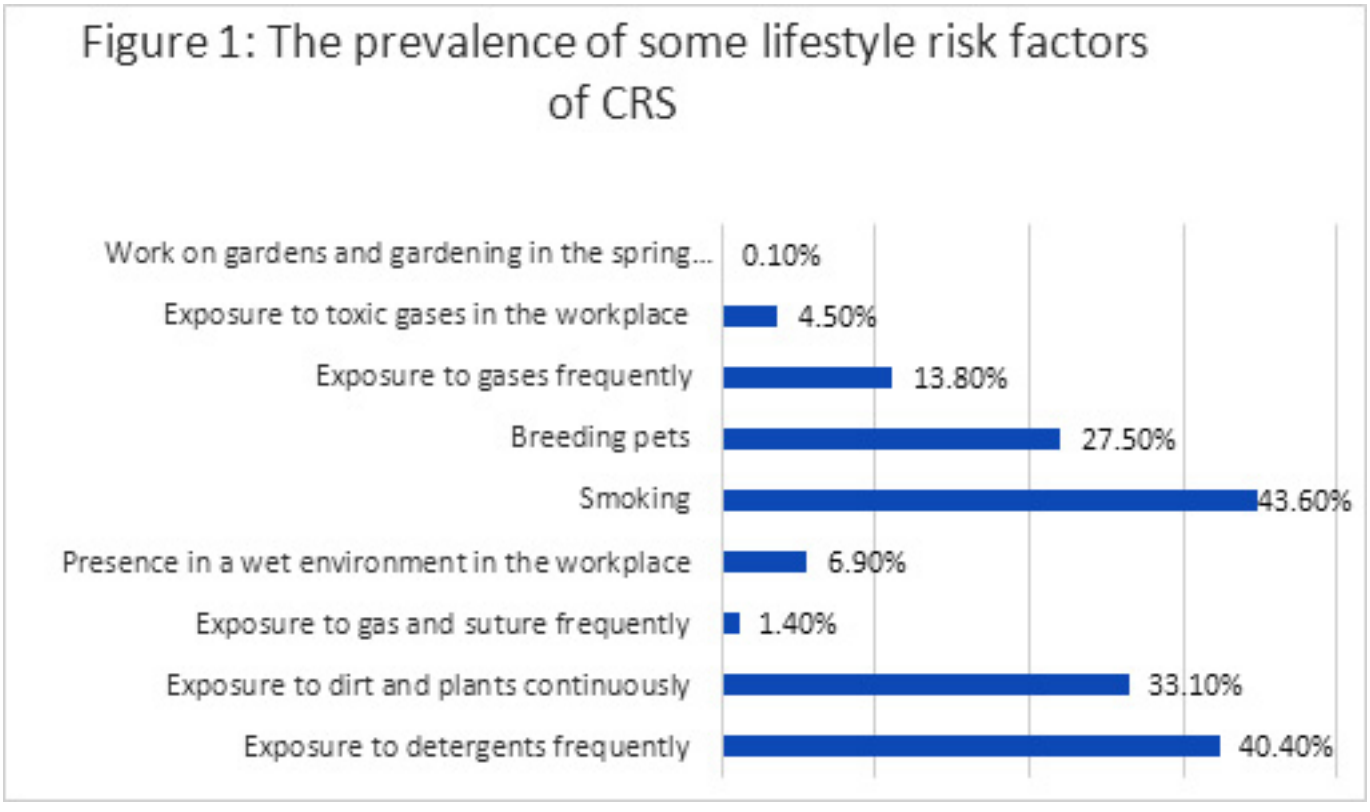

Figure 2: Prevalence of chronic conditions among the participants

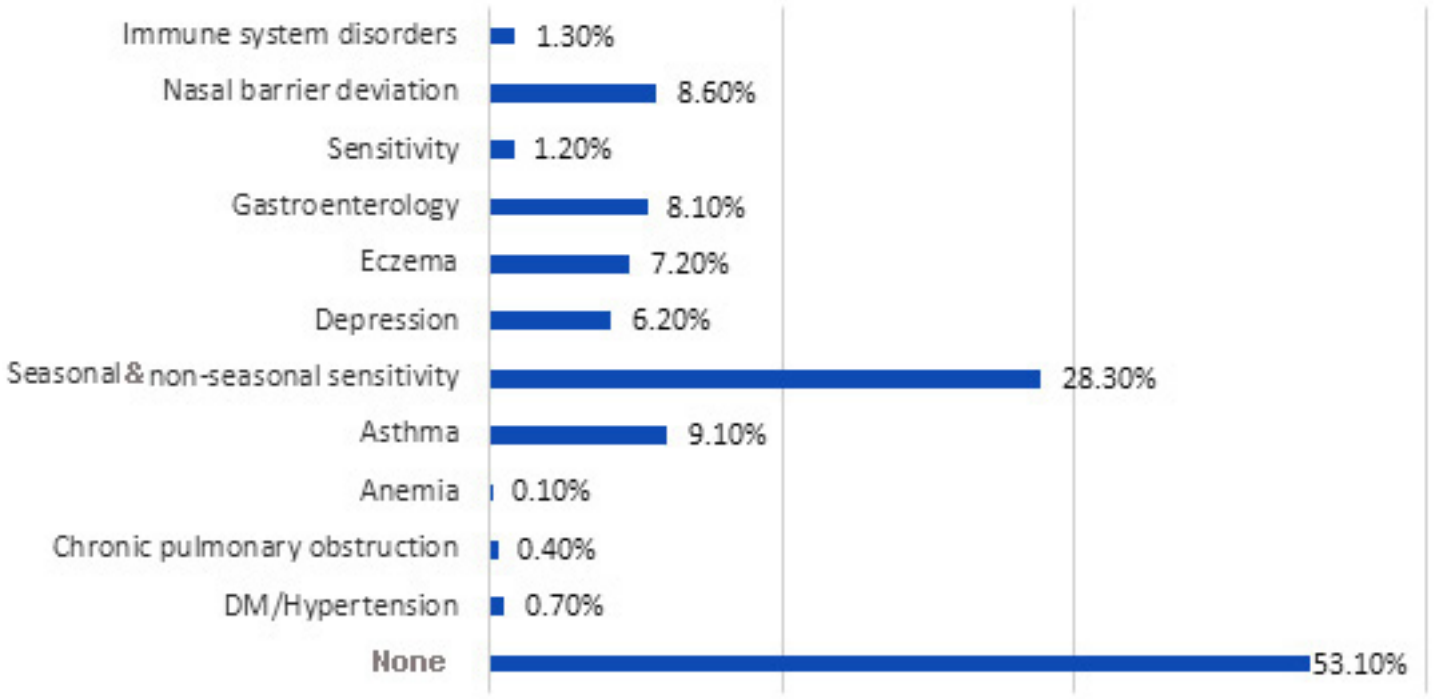

Figure 3: The prevalence of chronic conditions in famiies of the participants

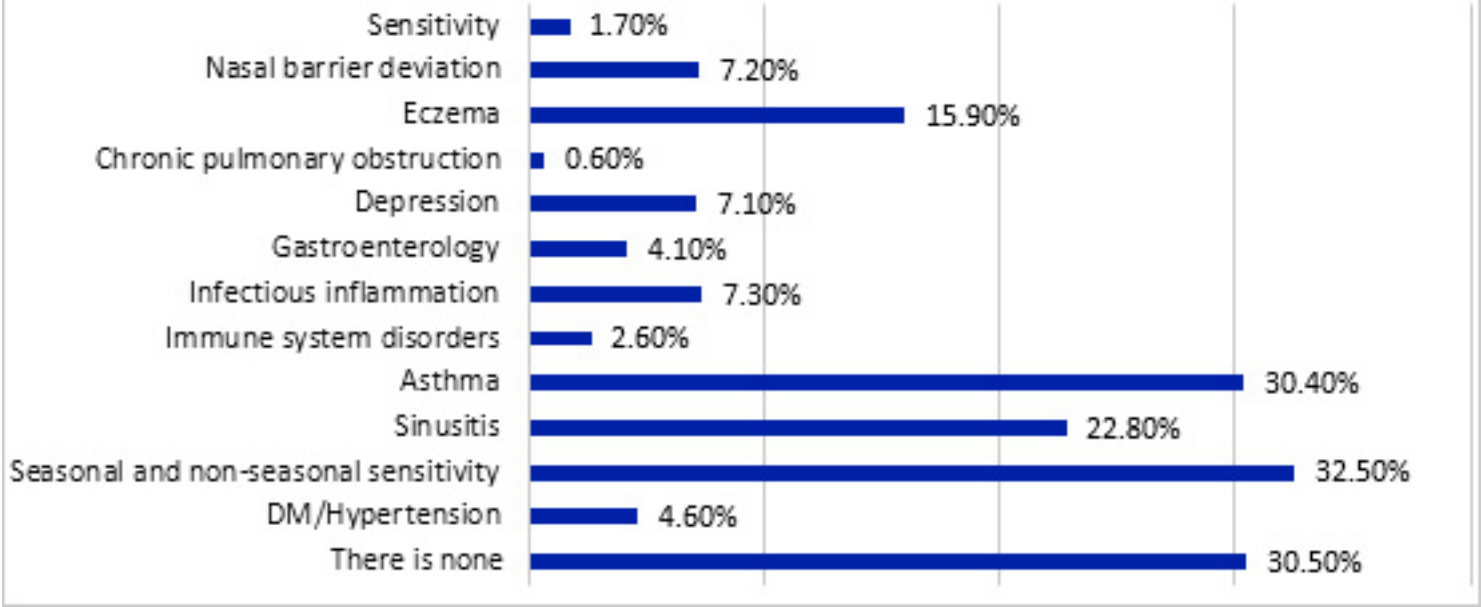

Table 2: The relation between incidence of chronic rhinosinusitis and demographic factors of the participants

		Chronic rhinosinusitis				P-value
		No		Yes		
		Count	Row N %	Count	Row N %	
Age	18-29	2125	80.6%	511	19.4%	0.000*
	30-49	1300	72.9%	483	27.1%	
	50-69	411	76.8%	124	23.2%	
	>70	8	88.9%	1	11.1%	
Gender	Male	1505	79.8%	382	20.2%	0.002*
	Female	2339	76.0%	737	24.0%	
Nationality	Saudi	3554	77.1%	1057	22.9%	0.022*
	Non-Saudi	290	82.4%	62	17.6%	
Educational level	Uneducated	12	75.0%	4	25.0%	0.627
	Primary	14	70.0%	6	30.0%	
	Average	68	76.4%	21	23.6%	
	Secondary	806	79.6%	206	20.4%	
	Diploma	47	75.8%	15	24.2%	
	University	2596	77.1%	772	22.9%	
	Masters	301	76.0%	95	24.0%	
Occupation	Unemployed	337	74.2%	117	25.8%	0.000*
	Employee	1415	74.7%	478	25.3%	
	Student	1461	82.8%	304	17.2%	
	Retired	96	78.7%	26	21.3%	
	Housewife	492	73.0%	182	27.0%	
	Free business	43	78.2%	12	21.8%	
Marital status	Single	2032	79.8%	513	20.2%	0.000*
	Married	1766	74.9%	592	25.1%	
	Divorced/ Widowed	46	76.7%	14	23.3%	
Housing	Apartment	1359	76.5%	418	23.5%	0.191*
	Villa	2390	77.7%	684	22.3%	
	Farm	54	80.6%	13	19.4%	
	House	39	90.7%	4	9.3%	

Table 2: The relation between incidence of chronic rhinosinusitis and demographic factors of the participants (continued)

Presence of lifestyle risk factors	Yes	2020	71.5%	806	28.5%	0.000*
	No	1824	85.4%	313	14.6%	
Presence of chronic conditions	Yes	1483	63.7%	844	36.3%	0.000*
	No	2361	89.6%	275	10.4%	
Family history of medical conditions	Yes	2488	72.1%	961	27.9%	0.000*
	No	1356	89.6%	158	10.4%	

Table 3: Symptoms and impact of CRS on quality of life among patients with CRS

	No problem	Very mild problem	Mild or slight problem	Moderate problem	Severe problem	Problem as bad as it can be
Need to blow the nose	23.8%	19.7%	16.9%	20.6%	12.2%	6.9%
Nasal obstruction	9.7%	17.8%	16.0%	25.9%	16.2%	14.4%
Sneezing	17.5%	20.0%	22.3%	23.1%	9.5%	7.6%
Runny nose	15.7%	20.3%	22.8%	19.6%	11.1%	10.5%
Cough	32.6%	20.6%	15.3%	15.3%	8.6%	7.6%
Postnasal discharge (postnasal drip)	25.5%	18.7%	18.1%	17.7%	9.4%	10.7%
Thick nasal discharge	35.6%	17.8%	16.4%	12.5%	9.2%	8.6%
Ear fullness	31.8%	19.7%	16.5%	14.0%	8.2%	9.7%
Dizziness	34.1%	20.3%	14.3%	13.1%	8.3%	9.8%
Ear pain	36.0%	18.7%	13.8%	13.8%	7.7%	10.1%
Facial pain or pressure	37.2%	16.7%	14.8%	13.0%	8.4%	9.8%
Loss of smell or taste	37.4%	19.0%	14.5%	12.7%	8.4%	8.0%
Difficulty falling asleep	25.6%	16.5%	17.3%	15.9%	10.4%	14.3%
Waking up at night	32.1%	17.2%	15.7%	14.5%	9.7%	10.8%
Lack of good sleep	24.7%	18.1%	14.7%	17.0%	10.4%	15.3%
Waking up tired	16.2%	19.2%	15.5%	19.0%	12.2%	17.9%
Fatigue	18.5%	18.6%	16.4%	18.2%	13.0%	15.2%
Reduced productivity	28.5%	17.9%	15.3%	15.3%	11.3%	11.8%
Reduced concentration	23.2%	20.0%	14.4%	17.0%	10.0%	15.4%
Frustrated/restless/ irritable	21.0%	16.8%	16.3%	17.7%	11.6%	16.6%
Sad	29.3%	16.4%	14.8%	15.5%	10.5%	13.4%
Embarrassed	32.5%	17.6%	13.6%	13.9%	9.2%	13.2%

Table 4: The impact of chronic rhinosinusitis on quality of life

SNOT-22 scores				
Chronic rhinosinusitis	Mean	N	Std. Deviation	P-value
No	26.8249	3844	26.35409	0.000*
Yes	44.0447	1119	25.38149	
Total	30.7074	4963	27.10817	

Discussion

CRS causes a significant impact on the quality of life (QoL) that leads to lost productivity at home and at work and which translates to billions of dollars in costs every year [17,18]. Many studies have shown that the severity of CRS-specific symptomatology, taken as a whole, is associated with diminished general health-related QoL [19]. Only few reports have evaluated its epidemiology and risk factors, especially in Asian countries, although the influence of the CRS on the population was significant. In the current study, the prevalence of CRS among the general population, depending on EPOS 2020 criteria, was 22.5%. This prevalence is significantly higher than reported in many studies including the study of Kim Y et al. which reported a prevalence of CRS of 6.95% depending on EPOS criteria. [11] However using clinical examinations, a study of Hastan D et al. which was conducted among 57,128 respondents living in 19 centres in 12 European countries reported a prevalence of CRS of 10.9% depending on EP³OS which ranged between 6.9-27.1% [20]. Moreover, the results of study of Pilan R et al., among the general population in Sao Paulo, showed a prevalence of CRS of 5.51% [2], and a study by Shi J et al., among 10,636 participants in China reported an overall prevalence of CRS of 8.0% which ranged from 4.8% to 9.7% in seven centres [8]. Furthermore, the prevalence of CRS was 11.9% among 23,700 participants in the study of Hirash A et al. [21], and 12-16% in different studies conducted in the USA [22–24]. Our results were similar to the results of a study conducted in Bushehr which reported a prevalence of 28.4% and which used a similar design to our study [9]. The high prevalence of CRS in the current study could be explained by some reasons. Firstly, results depended on participants' self-reporting which may overestimate the current prevalence as some participants who had previously suffered from CRS,though now recovered, may still report having CRS symptoms on the survey. Moreover, the predominantly hot and dry climate of the Saudi Arabia is known to increase the incidence of CRS and other allergic conditions [25–27]. In Saudi Arabia, previous studies confirmed our results and reported a prevalence of CRS of 25.3% [28]. One of the findings that confirmed the high prevalence in the current study relates to conditions in the country itself evidenced by a higher prevalence among Saudis than non-Saudis. Non-Saudis who may live in Saudi Arabia for only a short time might not be as affected by the climate.

The current study showed a significant higher prevalence of CRS among females than males and younger participants reported less prevalence of CRS. This is in disagreement with some previous studies which did not recognize any significant different in the prevalence of CRS depending on age or gender [2,9,10]. However, some other studies confirmed our results including the study by Min J. and Tan B. which showed that females develop CRS more than males [5,11]. On the other hand, other studies reported that the prevalence of CRS was significantly higher among males [29–32]. Moreover, the study of Cheul J et al. reported that aging was a risk factor for developing CRS [32] which is similar to our results.

The current study showed that exposure to risk factors including smoking, frequent exposure to detergents, continuous exposure to dirt and plants, and breeding pets was significantly associated with a higher prevalence of CRS. This also was reported in different studies including the study of Lieu and Feinstein which revealed a 20% increased risk of rhinosinusitis in current smokers [33], the study of Shi J et al., which showed that tobacco smoking was associated with a significantly increased risk of CRS [8] and the study by Thilsing T et al.[10]. Having other chronic conditions such as asthma and other allergic conditions were found to increase the risk for developing CRS in the current study which is similar to previous studies [8,34,35].

Furthermore, the current study showed a significant reduction in the quality of life as assessed by SNOT-22 in patients with CRS who reported significantly higher scores. This is similar to results of the previous study conducted by Asiri M. and Alokby G.who reported a SNOT-22 score of 64.2 among CRS patients compared to 19.5 in a control group [16]. Some studies also reported the negative impact of CRS of both types and causes on the quality of life [36,37]. The results of the current study indicate that there is a need to develop strategies to reduce the prevalence of CRS among Saudis.

In conclusion, the current study revealed a high prevalence of CRS among individuals in Saudi Arabia especially among older females, those with chronic conditions and those exposed to different risk factors such as smoking. Moreover, CRS was found to have a significantly negative impact on the quality of life.

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Quality of life among patients with glaucoma in Riyadh

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Abstract

Background: There is lack of research which identifies and analyses the quality of life among patients with primary open angle glaucoma by using the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) and the World Health Organization Quality of Life abbreviated version questionnaire (WHOQOL-BREF) tool. Therefore, the aim of the current study was to assess the quality of life among patients in Riyadh, Saudi Arabia with primary open angle glaucoma using these tools.

Methodology: This was a cross sectional study conducted among patients with primary open angle glaucoma who lived in Riyadh, Saudi Arabia. Data was collected via an online questionnaire and through contact with the patients in Arabic. The questionnaire included two main tools to assess the quality of life among patients with open angle glaucoma including the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) and the World Health Organization Quality of Life abbreviated version questionnaire (WHOQOL-BREF) tool.

Results: In the current study, we collected 392 responses to our questionnaire from patients who were diagnosed with open angle glaucoma. The mean score of the NEI VFQ-25 was 69.68 (SD=21.08) where the highest scores were reported in colour vision (76.47 (SD=27.28)), followed by social functioning (74.32 (SD=25.21)), general vision (73.55 (SD=16.72)), general health (71.4 (SD=18.64), and distance activities (71.46 (SD=23.53)). The poorest quality of life because of open angle glaucoma was reported considering role difficulties (65.53 (SD=27.58)), ocular pain (66.01 (SD=23.54)) and mental health (66.06 (SD=23.84)). According to the WHOQOL-BREF, the mean total score was 3.38 (SD=0.72) out of score of 5 where the highest quality of life was reported for physical health (61.04 (SD=18.39) while the worst scores were reported regarding the environmental domain (58.4 (SD=18.14). There is a significant difference between patients with better vision compared with those with poor vision in all domains of both tools.

Conclusion: The current study confirmed the previous studies which showed that open angle glaucoma had a significant negative impact on the patients' quality of life.

Keywords: quality of life, glaucoma, Riyadh

Introduction

As it causes irreversible blindness, glaucoma is the second leading cause of vision loss worldwide [1]. Glaucoma is a group of diseases in which there is an increase in the intraocular pressure which leads to optic nerve destruction due to a buildup of fluid and impaired drainage. Primary open angle glaucoma is a progressive type of glaucoma in which there is buildup of fluid which cannot naturally drain. Patients gradually lose their field of vision. Angle closure glaucoma is a sudden rise of fluid within the eye with concomitant manifestations such as blurry vision, headaches, and pain in the eye [2]. Saudi citizens are mainly affected by primary open angle glaucoma as it is the most common type of adult glaucoma in Saudi Arabia followed by angle closure glaucoma and juvenile glaucoma [3]. The estimated prevalence of glaucoma in the country is 5.6% [4] while 2.2% of the worldwide population is affected by the disease. The predicted incidence of the disease worldwide exceeds 110 million [5]. As the disease progresses, patients with glaucoma experience the narrowing of their field of vision which limits their physical activity. While central vision is the last visual field affected it puts the patient at risk of car accidents and trauma, limits their physical activity and leads to a reduction in their quality of life [6]. Sample size, the lack of a control group and the questionnaire are designed specifically to identify the quality of life among glaucoma patients. Quality of life may not influence the disease burden quickly, but it helps the physician to work collaboratively with patients to minimize the effect of the disease on their lives. Being aware of the quality of life of any patient is crucial to achieve the best outcome.

There is a lack of research which identifies and analyses the quality of life among patients with primary open angle glaucoma using the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) and the World Health Organization Quality of Life abbreviated version questionnaire (WHOQOL-BREF) tool. Therefore, we conducted a cross-sectional study to assess the quality of life among patients with primary open angle glaucoma by using these tools in Riyadh, Saudi Arabia.

Methodology

This was a cross sectional study conducted among patients with primary open angle glaucoma who lived in Riyadh Saudi Arabia. The sample size needed was calculated with the EPI INFO (Epidemiological Information Package) version 7.2. According to the software, the sample size needed was at least 384 participants, using a margin of error of ± 5%, a confidence level of 95%, and a 50% expected frequency. The inclusion criteria included males and females who were diagnosed with primary open angle glaucoma and who were aged 18 and above. Patients who were diagnosed with angle closure glaucoma or cataracts were excluded. The questionnaire was an online self-administered questionnaire. Data was collected via an online questionnaire, through contact with the patients in Arabic.

The questionnaire included two main tools to assess the quality of life among patients with open angle glaucoma including the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) and the World Health Organization Quality of Life abbreviated version questionnaire (WHOQOL-BREF) tool. The National Eye Institute (NEI) sponsored the development of the VFQ-25 with the goal of creating a survey that would measure the dimensions of self-reported vision-targeted health status that is important for persons who have chronic eye diseases. The VFQ25 generates the following vision-targeted subscales: global vision rating, difficulty with near vision activities, difficulty with distance vision activities, limitations functioning socially, role limitations, dependency on others, mental health symptoms, driving difficulties, limitations with peripheral and colour vision, and ocular pain. For each subscale, the scores were ranged between 0-100 points where higher results indicated a better quality of life. For the WHOQOL-BREF, the total scores of the questions were calculated where higher scores indicated better results.

MS Excel was used for data entry, cleaning, and coding while SPSS version 26 was used for data analysis. Frequency and percent were used for the description of categorical variables while mean, standard deviation, maximum and minimum were used for description of ongoing variables. ANOVA test was used to find the correlation between scores of both tools with the status of vision. All statements were considered significant if p value is lower than 0.05. The study was conducted after receiving ethical approval from the Imam Mohammed Ibn Saud Islamic University, College of Medicine. All patients had to provide consent before participating in the questionnaire.

Results

In the study, we collected 392 responses to our questionnaire from patients who were diagnosed with open angle glaucoma. Among the patients, 31.6 % reported having excellent vision (with glasses or lenses among users) while 32.1 % reported good vision, 26.8 % reported fair vision while poor and very poor vision were reported in 6.9 % and 2.6 % of the participants. No patients reported blindness (Figure 1).

The National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) was completed by patients with open angle glaucoma to assess the quality of life according to 12 main topics. For each domain, the range was between 0 % and 100 % where 100 % reported the highest and 0 % reported the lowest possible score. The highest scores were reported in colour vision (76.47% (SD=27.28)), followed by social functioning (74.32% (SD=25.21)), general vision (73.55% (SD=16.72)), general health (71.4 % (SD=18.64), and distance activities (71.46 % (SD=23.53)). The poorest quality of life because of open angle glaucoma was reported considering role difficulties (65.53% (SD=27.58)), ocular pain (66.01% (SD=23.54)) and mental health (66.06% (SD=23.84)). The total VFQ-25 score of the sample was 69.68% (SD=21.08) (Table 1).

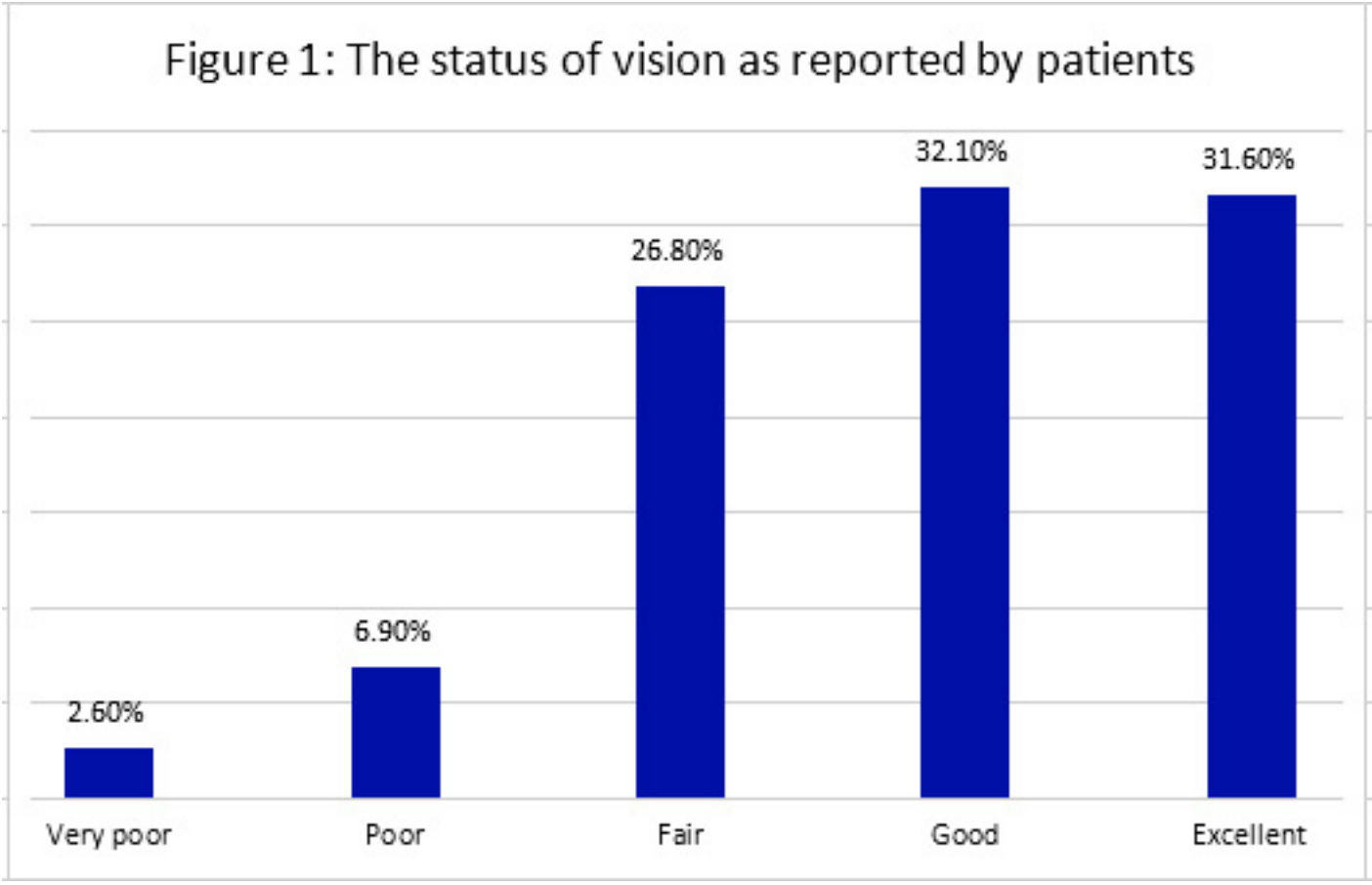

Table 1: National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) subscales and total scores

	Mean	Standard Deviation	Minimum	Maximum
General health	71.40	18.64	15.00	100.00
General vision	73.55	16.72	25.00	100.00
Ocular pain	66.01	23.54	.00	100.00
Near activities	69.46	23.43	.00	100.00
Distance activities	71.46	23.53	4.20	100.00
Social functioning	74.32	25.21	.00	100.00
Mental health	66.06	23.84	.00	100.00
Role difficulties	65.63	27.58	.00	100.00
Dependency	69.77	26.65	.00	100.00
Driving	67.93	23.86	8.30	100.00
Colour vision	76.47	27.28	.00	100.00
Peripheral vision	69.83	25.98	.00	100.00
Total	69.68	21.08	6.00	100.00

Also the World Health Organization Quality of Life abbreviated version questionnaire (WHOQOL-BREF) tool was used to assess the quality of life. Because of the presence of two scoring systems used by different studies (one scored between 4-20 and the other scored between 0-100), in the current study, we assessed both scores. The highest quality of life was reported in physical health (61.04% (SD=18.39) while the worst scores were reported regarding environmental domain (58.4% (SD=18.14) while psychological and social relationships domains had scores of 58.4% (SD=18.56), and 59.87% (SD=21.58) respectively. In total, the mean total score was 3.38 (SD=0.72) out of score of 5 (Table 2)

Table 2: World Health Organization Quality of Life (WHOQOL-BREF) abbreviated version questionnaire scores

		Mean	Standard Deviation	Minimum	Maximum
Domain 1: Physical health	Scores (4-20)	13.75	2.94	4.00	20.00
	Scores (0-100)	61.04	18.39	.00	100.00
Domain 2: Psychological	Scores (4-20)	13.32	2.97	4.00	20.00
	Scores (0-100)	58.40	18.56	.00	100.00
Domain3:Social relationships	Scores (4-20)	13.57	3.44	4.00	20.00
	Scores (0-100)	59.87	21.58	.00	100.00
Domain 4: Environment	Scores (4-20)	13.32	2.90	4.00	20.00
	Scores (0-100)	58.40	18.14	.00	100.00
Total	Score (1-5)	3.38	.72	1.00	5.00

As shown in Table 3, there is a significant difference between patients with better vision compared with those with poor vision in all domains of both tools. Patients reporting excellent vision reported a higher quality of life in the physical health domain (66.88% vs 53.3% compared to those with very poor vision), in the psychological domain (61.81% vs 53.9 %), in the social relationships domain (65.22% vs 50.00%) and environmental domain (64.15% vs 48.10 %). Considering the total score, we found that the patients who reported excellent had a total score of 3.53 which is significantly higher than those who reported good vision (3.46), fair vision (3.21), poor vision (3.11) and very poor vision (3.10) (P=0.000). Considering the domain of VFQ-25, better vision was significantly associated with better scores in all domains where a total VFQ-25 for those with excellent vision was 75.61% which is significantly higher than reported by those with good vision (72.81 %), fair vision (65.57 %), poor vision (52.55 %) and very poor vision (46.04 %) (P=0.000) (Table 3).

	Vision										
	Very poor		Poor		Fair		Good		Excellent		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Domain 1: Physical health	53.30	28.28	50.81	15.23	55.70	14.58	62.54	17.03	66.88	20.11	.000*
Domain 2: Psychological	53.90	26.47	50.07	14.02	55.07	15.47	59.96	19.49	61.81	19.32	0.001*
Domain 3: Social relationships	50.00	32.56	50.96	18.89	54.88	17.54	61.47	22.44	65.22	21.84	.000*
Domain 4: Environment	48.10	25.00	51.07	14.70	53.68	13.92	59.05	18.54	64.15	19.19	.000*
Total	3.10	1.20	3.11	.51	3.21	.55	3.46	.73	3.53	.77	.000*
General health	52.00	22.79	51.85	19.17	62.76	15.15	73.06	16.02	82.86	14.84	.000*
General vision	42.50	13.18	47.78	9.74	63.33	8.34	75.67	10.28	88.15	12.52	.000*
Ocular pain	43.75	33.46	49.07	20.49	62.74	18.51	69.44	21.54	70.77	26.14	.000*
Near activities	46.25	35.66	51.79	17.64	63.64	18.10	73.76	19.46	75.75	26.91	.000*
Distance activities	50.92	35.22	52.25	17.95	66.91	19.82	75.80	20.85	76.73	25.42	.000*
Social functioning	47.50	37.28	57.71	21.55	69.05	22.87	80.13	22.38	78.67	25.95	.000*
Mental health	42.53	32.78	52.57	17.95	63.42	19.87	67.28	23.33	71.90	25.44	.000*
Role difficulties	43.14	37.44	50.48	17.76	64.84	21.76	67.33	26.97	69.67	31.58	.000*
Dependency	48.14	35.96	56.28	23.64	68.35	21.33	71.45	25.91	73.95	29.64	.000*
Driving	37.50	42.22	56.25	22.93	65.12	19.76	72.60	19.83	68.86	27.91	.000*
Colour vision	52.50	41.58	62.96	24.39	70.95	23.03	82.54	24.75	79.84	29.68	.000*
Peripheral vision	40.00	31.62	52.78	23.34	67.38	21.12	71.03	25.38	76.81	27.08	.000*
Total	46.06	30.39	52.55	14.35	65.57	16.44	72.81	18.37	75.61	23.68	.000*

Table 3: The relationship between the state of vision and quality of life

Discussion

Patients-reported outcomes of some conditions which include their quality of life (QoL) are considered an important measurement to evaluate the burden of disease and assess the evaluation of any therapeutic interventions [7]. The NEI-VFQ-25 is one of the most commonly used questionnaires that are used to assess the vision-related quality of life in patients with different ocular disorders including glaucoma [8]. This condition is associated with a negative impact on the overall score and the different subdomains of the NEI-VFQ-25, and this effect is correlated with the severity of loss of the glaucomatous visual field [9–12]. In the current study, the average overall score for quality of life using BEI-VFQ-25 was 69.68 points. In the study of conducted among patients with glaucoma Picanço A et al. reported a quality of life of 77.62 points [8]. Another study, conducted by Pinheiro et al. reported a quality of life for patients with glaucoma of 73.13 [13], and a study, Los Angeles Latino Eye, reported a score of 76.45 among patients with glaucoma [14]. Moreover, a study by Kalyani et al., a cross-sectional study in 2018 of 200 patients attending a tertiary care hospital in western India's glaucoma clinic, assessed the impact of primary glaucoma of varying severity and duration on psychosocial functioning and quality of life using the National Eye Institute Visual Function Questionnaire (NEIVFQ)-25. The average NEIVFQ-25 composite score was 74.4 ± 18.6 [15]. Furthermore, another cross-sectional study was conducted in Brazil in 2018 to evaluate the impact of visual acuity, visual field damage, and other factors affecting the quality of life of 49 Brazilian patients with glaucoma. Results were based on the presence of reproducible standard automated perimetry defects in at least one eye at the time of evaluation where the results showed that the standard deviation of the sample was 63.79±15.59 [1]. Additionally, the study of the Early Manifest Glaucoma Trial showed an average of 88.8 [16], and the study by Onakoya et al. reported an average quality of life among patients with glaucoma of 85.2 points [17].

The current study reported that the most severe impacts to quality of life due to open angle were regarding role difficulties (65.53 (SD=27.58)), ocular pain (66.01 (SD=23.54)) and mental health (66.06 (SD=23.84)), while participants reported better averages for colour vision (76.47 (SD=27.28)), social functioning (74.32 (SD=25.21)), general vision (73.55 (SD=16.72)), general health (71.4 (SD=18.64), and distance activities (71.46 (SD=23.53)). This is similar to the results of Picanco A et al. who reported the lowest averages for the subdomains 'eye pain', 'mental health' and 'general sight', and better averages for 'color vision' and 'social aspects' [8]. In another cross-sectional study conducted by Wu et al., the authors commented that the worst scores were reported in general health, general vision, and limitations to role while the highest scores reported impacts to colour vision, social functioning, and driving [18]. Moreover, Labiris et al. reported that general health, mental health, and general vision showed the lowest scores while social functioning, central vision, and peripheral vision showed the highest scores [19].

In comparison with the results for other ocular conditions or within the normal population, many studies revealed that the total scores of the general population were significantly higher when compared with patients with primary open angle glaucoma which indicated they enjoyed a better quality of life [20–24]. In a study by Mangione et al., the overall scores were significantly lower in patients with different chronic eye conditions including primary open angle glaucoma (80.2 (SD=12.5)) than reported in a reference sample of participants with no evidence of an underlying of eye condition (88.1 (SD=15.3)) however, it was higher than reported in patients with age-related macular degeneration (AMD) (67.1 (SD=13.4)) [23].

In the current study, we used the WHOQOL-BREF questionnaire to assess the social impact of eye disease among patients with primary open angle glaucoma. The results of our study showed a total score of 3.38 (67.6 on scale of 0-100) where the worst scores were reported regarding environmental domain (58.4 (SD=18.14)). In a previous study, conducted in southern India, the authors reported that patients with glaucoma had lower mean scores than patients without any visual impairment (62.6 vs 84.4 respectively) and patients with other eye diseases including 78.1 with refractive errors, 74.4 with cataracts and 72.7 with retinal disease [25].

The current study confirmed that deteriorating vision and a diagnosis of primary open angle glaucoma were associated with lower scores using both tools. These lower scores indicated a poorer quality of life for those patients. In the study by Picanco et al, the authors reported that generally, responses from patients with mild defects showed higher medians in the NEI-VFQ-25 which indicated a better QoL when compared with patients who had moderate or severe defects in their vision [8]. In another study, the authors showed that there is a significant correlation between the NEI-VFQ-25 values and low visual acuity in the best eye, worse perimetric mean deviation and crystalline opacities [16]. In study by Kalyani et al., the authors reported that the mean scores for mild, moderate, and severe glaucoma groups were 87.0 (SD 7.2), 75.9 (SD 8.1), and 47.0 (SD 13.7), respectively indicating that the quality of life was reduced for patients with severe glaucoma [15].

In conclusion, the current study confirmed findings from previous studies which had shown that open angle glaucoma had a significant negative impact on the quality of life of patients with this diagnosis. These reductions in the quality of life mostly occurred in the environmental domains, ocular pain, and mental health. More severe cases of glaucoma were associated with an increasingly negative impact on the quality of life. Further investigation is required to assess the demographic factors of patients to exclude the impact on non-modified factors.

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Barriers to pre-dialysis education in hemodialysis patients with end-stage renal disease in Kingdom of Saudi Arabia

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Abstract

Background: Adequate pre-dialysis education was found to help patients select the best modality at the time dialysis is needed.

Objectives: To identify the barriers to pre-dialysis education in the nephrology clinics among end-stage renal disease (ESRD) in the Kingdom of Saudi Arabia (KSA).

Methods: We did a multi-center, cross-sectional study on 221 patients. A questionnaire was used to collect data about patients' demographics, the primary cause of renal failure, and barriers to pre-dialysis education in the nephrology clinic. We selected the healthcare providers randomly from the same centers.

Results: The leading cause of renal failure was diabetes mellitus (DM) in 24.9% of the Patient participants. About 64.7% were with hemodialysis, and 35.3% had peritoneal dialysis. The distance to the nephrology clinic is more than 50 km, about 63.7%. About 65.2% have followed up in the CKD clinic, and dietitians have seen 64.3% in the clinic. Dialysis educators.s have previously seen 59.7%. About 68.8% of the participants had the chance to understand dialysis modality before the commencement of treatment. The barriers from healthcare participants point out are 43.5 % of participants have no CKD clinic, 74% are without a multidisciplinary team, 61% evaluate more than 15 patients every clinic, and 43.5% assess patients with advanced chronic kidney disease every three months or more. 47.8% found many services in their hospital required to refer patients to another hospital because lack of nephrologists per 74% of participants, and 39% of them indicated no peritoneal dialysis unit. And 47.8% found no sociopsychology services play a role as a barrier.

Conclusion: The barriers to pre-dialysis education studied in this paper from patients and healthcare providers points. That included the deficiency of a formal structured multidisciplinary chronic kidney disease clinic, lack of psychosocial support for CKD patients, and patients required to travel between hospitals more than 50 kilometers to get renal services.

Key words: barriers, pre-dialysis, education, hemodialysis, ESRD, Saudi Arabia.

Introduction

Pre-dialysis education is an important step in the visit before dialysis application. Effective and sufficient pre-dialysis education can delay the progression of chronic kidney disease, and the need for urgent dialysis, prepare patients to make the best modality selection before dialysis is needed and reduce the hospital staying duration (1). This education assures that the patient knows the process, mechanism, benefits, side effects, indications, contraindications, and how to improve the outcomes in the future.

Among Saudi patients, about 20,000 patients are on dialysis (2). It is rapidly growing with increased concern about prolonging survival via decreased risk of cardiac events and improved life quality (3). Most of these patients started on dialysis unplanned using central catheters (4). Pre-dialysis education will influence the choice of home dialysis modality (5).

Conventional hemodialysis is still the most common dialysis modality compared to home modalities such as peritoneal dialysis, which have multiple advantages, especially for a younger patient with end-stage renal disease (6). Even with no mortality superiority associated with peritoneal dialysis, the quality-of-life improvement is an indicator of this modality (7).

The barriers to home dialysis modalities that could affect the situation differ from patient to patient depending on many factors like the patient and doctor's different cultures or languages, different levels of education, and enough time to conduct enough amount of information (8,9).
Moreover, in 2007 a study by Dr. Merlin C Thomas was published, which indicated that patients exposed to pre-dialysis education have better control for blood pressure, calcium, and phosphate and less chance for urgent dialysis (10).

This study aimed to identify barriers to pre-dialysis education for end-stage renal disease (ESRD) patients at the nephrology clinic according to patients' and healthcare providers' views. And some solutions will be included as recommendations to improve adherence to pre-dialysis education and enhance cost-effective management.

Methods

Study design, setting, and time

A multi-center, cross-sectional, observational study was done in five different dialysis centers around Saudi Arabia from February 2022 to November 2022. The study centers involved the following regions: western, central, eastern, southern, and northern, and variable numbers of patients and healthcare providers were selected.

Study population

The inclusion criteria for patients were those aged 18 years or higher, who have an end-stage renal disease (i.e. GFR < 15 mL/min/1.73 m2), and who are on dialysis. The inclusion criteria for healthcare providers who are involved in dialysis care include nephrologists, vascular surgeons, interventionists, access coordinators, dialysis nurses, social workers, and clinical pharmacists. The exclusion criteria were patients or healthcare providers unable to consent or complete the interview/questionnaire.

Sampling technique and sample size

Using the Raosoft sample size calculator; Using 5% as a margin of error and 95% as a confidence interval, and 50% as response distribution, we assume that 230 patients would be adequate to ensure the generalizability of responses. We assume the response rate is 50%, as responses are not known because no identical article was published.in Saudi Arabia exist. Fifty-five patients were recruited from each region with a non-probability consecutive sampling technique. A total of 221 patients were included in this study. We excluded nine patients for incomplete forms. We selected the healthcare providers randomly from the same centers.

Randomization

It is a nonrandomized study. We recorded informed consent for participants. And all the non-eligible or who did not complete the questionnaires are excluded. We collected participants' responses until we reached the target number per region. To minimize selection bias at the patient level, consecutive patients from each center who meet entry criteria were enrolled.

Data collection and management

Consented patient and healthcare provider participants competed for a pre-tested, validated questionnaire. We collected demographic data, the participant's current modality of dialysis, the duration of the pre-dialysis clinical visits, the availability of a source of information, and the availability of the multidisciplinary medical team.

Statistical analysis

This study uses a measure of association to identify the relationship between two or more variables. Parametric approaches describe the numerical data, and percentages represent variation. The comparison between groups was made by p-value calculation using the variable rate, and P-values were considered statistically significant at $P < 0.05$. The Statistical Package for the Social Sciences version 23.0 was used for analysis (IBM Corporation, Armonk, NY, USA).

Results

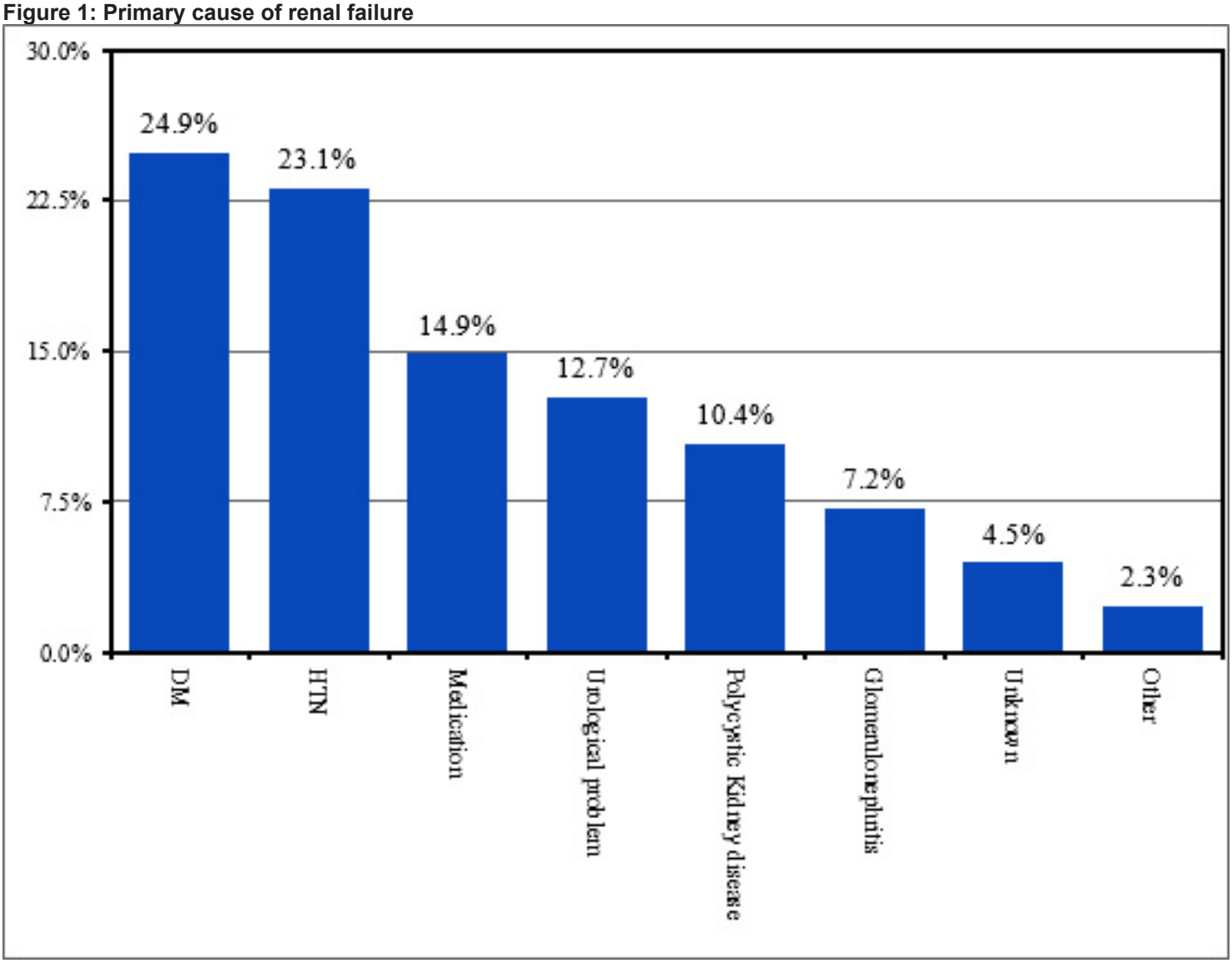
We included a total of 221 participants in the current study. 115 (52%) were females, and 106 (48%) of the participants were males. About 43 (19.5%) of the participants were within the age group of 66 - 75 years old, and 42 (19%) were within the age group of 56 - 65 years old. 34 (15.4%) of the participants were within the age group of 18 - 25 years old, 30 (13.6%) of the participants were within the age group of 26 - 35 years old, 29 (13.1%) were within the age group of 46 - 55 years old. 26 (11.8%) were within the age group of 36 - 45 years old, and 17 (7.7%) were within the age group of 76 - 85 years old. About 61 (27.6%) of the participants were from the western province, 59 (26.7%) were from the eastern, 49 (22.2%) were from the southern, 43 (19.5%) were from the central, 9 (4.1%) were from the northern province. Regarding dialysis modalities, about 143 (64.7%) of the participants were with hemodialysis and found 78 (35.3%) to be with peritoneal dialysis (Table 1).

Table 1: Characteristics of the study participants (n=221)

Variable	Category	Frequency	Percent
Gender	Male	106	48%
	Female	115	52%
Patient age (in years)	18 - 25	34	15.4%
	26 - 35	30	13.6%
	36 - 45	26	11.8%
	46 - 55	29	13.1%
	56 - 65	42	19%
	66 - 75	43	19.5%
	76 - 85	17	7.7%
Province	Western	61	27.6%
	Central	43	19.5%
	Eastern	59	26.7%
	Southern	49	22.2%
	Northern	9	4.1%
Primary cause of renal failure	DM	55	24.9%
	HTN	51	23.1%
	Medication	33	14.9%
	Urological problem	28	12.7%
	Polycystic Kidney disease	23	10.4%
	Glomerulonephritis		
	Unknow	16	7.2%
	Other	10	4.5%
		5	2.3%
Dialysis Modalities	Hemodialysis	143	64.7%
	Peritoneal Dialysis	78	35.3%

We found the cause of end-stage renal disease in about 55 (24.9%) of the participants is diabetes mellitus (DM), hypertension was in about 51 (23.1%) of the participants, medications were the cause in about 33 (14.9%) of the participants, 28 (12.7%) of the participants, the cause was to be a urological problem; and polycystic kidney disease was the cause in about 23 (10.4%), Glomerulonephritis was the cause in about 16 (7.2%) of the participants, 10 (4.5%) with unknown cause, and in about 5 (2.3%) the cause of the end-stage renal disease was another cause (Figure 1).

Figure 1: Primary cause of renal failure



Approximately 69 (31.2%) of the participants were diagnosed with chronic kidney disease (CKD) less than six months before starting dialysis, 64 (29%) within 6 months to 1 year, 41 (18.6%) at the same time started hemodialysis, 34 (15.4%) about 1 to 3 years before starting dialysis, and 13 (5.9%) of the participants were diagnosed with CKD more than three years before starting dialysis. About 148 (67%) had a previous follow-up in the nephrology clinic, and the remaining participants, 73 (33%), with no follow-up. 68 (30.8%) had followed up in the clinic for less than six months, 63 (28.5%) followed up six months to one year, 64 (29%) had followed up six months to one year, 46 (20.8%) had 1 to 3 years follow up, and 44 (19.9%) had followed up in nephrology clinic for more than three years. 150 (67.9%) had a nephrology clinic in the same city of their living, 80 (36.2%) the distance to the clinic was less than 50 kilometers (km), 58 (26.2%) distance was 50 to 100 (km)distance, 35 (15.8%) was from 101 to 200 km, and found the space to be more than 200 km for about 48 (21.7%) of the participants.

Concerning the frequency of follow-up, about 71 (32.1%) of the participants followed up every four months, 64 (29%) every three months, 60 (27.1) twice a year, and 26 (11.8%) followed up every month. About 144 (65.2%) were followed up in the CKD clinic, and 142 (64.3%) were seen by a dietitian. The dialysis educator evaluated about 132 (59.7%) of the participants were evaluated by a dialysis educator. Only 94 (42.5%) of the participants had previously been seen by a social worker, and 152 (68.8%) of the participants had the chance to understand dialysis modality before the commencement of treatment (Table 2).

The questionnaire healthcare participants raised many barriers to pre-dialysis education, 43.5 % of participants have no CKD clinic in their institution, 74% without a multidisciplinary team, 61% evaluate more than 15 patients every clinic, and 43.5% of them assess patients with advanced chronic kidney disease every three months or more. Also, 47.8% found many services in their hospital required to refer patients to another hospital because lack of nephrologists per 74% of participants, and 39% of them indicated no peritoneal dialysis unit. Approximately 74% thought one of the significant barriers is difficulty accepting dialysis as a treatment by patients, and 47.8 found no sociopsychology services play a role as a barrier (Table 3).

Table 2: Barriers to pre-dialysis education according to patients' questionnaires

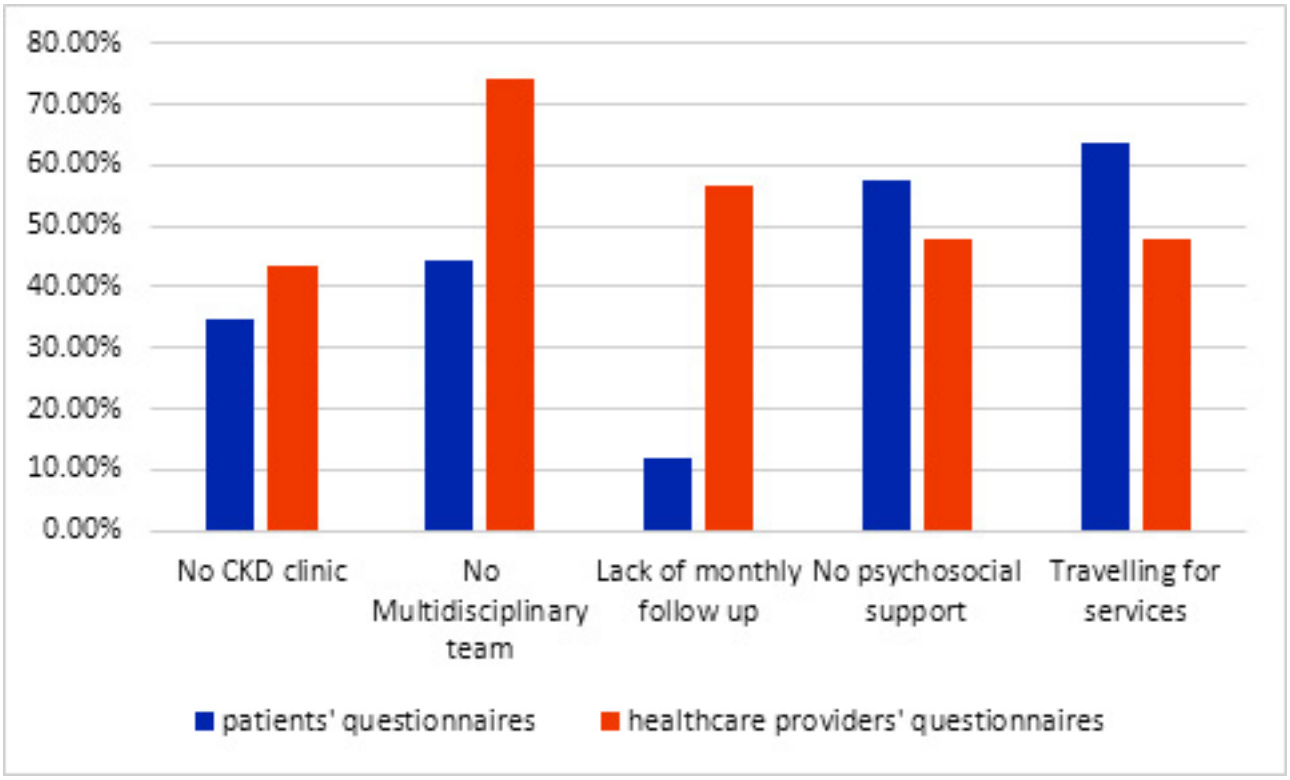
Variable	Category	Frequency	Percent
The time from diagnosis to dialysis started	The same time Less than 6 months 6 months to 1 year 1 to 3 years More than 3 years	41 69 64 34 13	18.6% 31.2% 29% 15.4% 5.9%
Seen in nephrology clinic	Yes	148	67%
	No	73	33%
Assessment duration	Less than 6 months	68	30.8%
	6 months to 1 year	63	28.5%
	1 to 3 year	46	20.8%
	More than 3 year	44	19.9%
The nephrology clinic in your same city	Yes	150	67.9%
	No	71	32.1%
The distance to the clinic	Less than 50 KM	80	36.2%
	50 to 100 KM	58	26.2%
	101 to 200 KM	35	15.8%
	More than 200 KM	48	21.7%
Follow-up frequency per year	Twice a year	60	27.1%
	Every 4 months	71	32.1%
	Every 3 months	64	29%
	Every month	26	11.8%
Follow-up in CKD clinic	Yes	144	65.2%
	No	77	34.8%
Dietitian assessment in the clinic	Yes	142	64.3%
	No	79	35.7%
Dialysis educator assessment	Yes	132	59.7%
	No	89	40.3%
Social worker evaluation	Yes	94	42.5%
	No	127	57.5%
Understand dialysis modality before starting on dialysis	Yes	152	68.8%
	No	69	31.2%

Table 3: Barriers to pre-dialysis education according to healthcare providers' questionnaires

Variable	Percent
Number of nephrologists in hospital 4 or less	74%
No CKD clinic	43.5%
No Multidisciplinary team	74%
Patients assessment in clinic every month	56.5%
Number of patients per clinic 15 or more	61%
Patients have difficulty to accepted dialysis as a treatment.	74%
No psychology service	47.8
No peritoneal dialysis unit	39%
Some services need a referral to another hospital	47.8

When we compare patients' and healthcare providers' responses to the significant barriers, both groups react similarly to the lack of a chronic kidney disease clinic, no social or psychological support, and many services that need to travel between hospitals (Figure 2).

Figure 2: The significant barriers to pre-dialysis education, according to patients and healthcare providers



From the healthcare provider's perspective, the no presence of the multidisciplinary team was a significant barrier with a p-value of 0.03. The lack of monthly follow-up was a significant barrier from the patients' perspective, with a p-value < 0.0001 (Table 4).

Table 4: The significant barriers to pre-dialysis education, according to patients and healthcare providers

Variable	Patients' questionnaires	Healthcare providers' questionnaires	p value
No CKD clinic	34.8%	43.5%	0.5
No Multidisciplinary team	44.5%	74%	0.03
Lack of monthly follow up	11.8%	56.5%	< 0.0001
No social or psychological support	57.5%	48%	0.58
Travelling more than 50 km is required for services	63.7%	47.8%	0.36

Discussion

Assessing barriers to pre-dialysis education is of significant importance as pre-dialysis education for chronic kidney disease patients can help them choose the dialysis modality that best meets their needs and preferences (11). One study found that multidisciplinary pre-dialysis education decreased the mortality rate in end-stage renal disease (12). The current study aimed to identify the barriers to pre-dialysis education in the nephrology clinic.

The demographic characteristics in the paper covered gender, which was equal distribution between males and females. We involved almost all ages, from 18 to 85 years old. The dialysis centers were the sampling source for patients. This population can evaluate pre-dialysis care in general and education in specific and use their experience to highlight the barriers, especially for patients who used peritoneal dialysis. Interestingly we found only one-third 35.3% to be with peritoneal dialysis, and this percentage of participants is similar to the study carried out by Dahlan et al. in which the lack of pre-dialysis education was one of the barriers to considering peritoneal dialysis in 61.6% of participants (13). We included the primary cause of end-stage renal disease; Diabetes Mellitus was the most common cause, a parallel to the study conducted by Al-Sayyari et al. study about CKD in Saudi Arabia (14). It indicates that most patients have chronic conditions, so it is possible to detect chronic kidney disease earlier to benefit from pre-dialysis care.

The Narva et al. study assessed the barriers to pre-dialysis education in the United States. They divided the barriers into three levels patients, healthcare providers, and system levels. They have many similar findings to our study, such as needing a multidisciplinary team, more formal CKD clinics, and limited patient numbers in each clinic. Also, they were looking for methods to improve education using multimedia and engaging family and groups to support, which is different from this study. They advised focusing on advanced kidney disease patients, one of the inclusions we concentrate on in this paper (15).

Regarding the frequency of the follow-up, 11.8% of the total patients were followed up in the clinic every month from the patients' questionnaire. The explanation for the result is a late diagnosis in many patients and the long distance to the hospital with nephrology services. That differ from the healthcare provider's questionnaire, which indicated 56.5% of the total patients were followed up monthly. The difference in results explains that most patients with earlier diagnoses are the ones who attend the nephrology clinic. The monthly follow-up for stages 4 and 5 carried benefits such as planning access and monitoring for the disease progression. Hirano et al, suggested a frequency of 1.2 months is the suitable follow-up every month for stage 5 CKD (16).

The lack of CKD clinic assessment was similar between the two groups' responses. It has many factors, according to patients, such as late diagnosis, difficulty in accepting dialysis as a treatment, and traveling distanceThe healthcare provider's factors included a lack of nephrologists who would influence the pre-dialysis education per one study (17) and no multidisciplinary team. This clinic carries many advantages, such as early planning for access, delayed progression, and providing patients with social support. White et al. found it improves the patient quality of life (18). The traveling distance was a barrier between the two groups; it carried the risk of non-adherence for the follow-up. Also, it is associated with an increased risk of developing complications or death, as stated in the Tonelli et al. study (19).

Collister et al., a scoping review, discussed the importance of multidisciplinary chronic kidney disease clinics beyond mortality reduction or decreased disease progression. It is

cost-effective for the health care program in the country. No single service in the multidisciplinary team will improve pre-dialysis education, but it combines multiple benefits (20). In our study, the lack of an interdisciplinary team was the primary concern of the healthcare provider. It was the same from the patient's perspective if we collected their response to each service in the team, mainly social worker evaluation that explains the difference in response between the two groups. The lack of psychosocial support was a significant concern for both groups. A meta-analysis by Pascoe and his group found psychosocial support helps reduce anxiety and depression among chronic kidney disease patients (21).

About 59.7% of the patient's participants had previously seen by dialysis educator, and two-thirds had the chance to understand dialysis modality before the commencement of treatment. Compared with Alghamdi et al. study, only 35.2% of the participants received dialysis education (22). Despite the exposure to education, it did not affect dialysis modality choice or decreased progression in this population. It increased the need for a formal pre-education program, as recommended by other studies (22).

The study limitation is a small sample size and the use of a self-reported questionnaire that could have a recall bias. And to formal assessment for the type of education that some patients receive, because patients have a different level of awareness and their response to new knowledge is variable, there are many new methods of teaching using digital media or telehealth that we need to consider in further study (23). The study's strength involved patients and healthcare providers comparing their responses, which helped to detect the lack of CKD clinics and the weak role of a multidisciplinary team; we recommend furth working in a formal structure of multidisciplinary CKD clinic inspired by the culture of Saudi Arabia. Another strength involved many factors such as traveling distance and social support that raise the concern to work on them, given the small numbers of studies on these two factors among chronic kidney disease patients. The sample selection included patients from all the regions in the country, which is a strength of this study.

Conclusion

The pre-dialysis education has a significant role to reduced mortality, delaying chronic kidney disease progression, and early planning for access. The barriers to pre-dialysis education studied in this paper from patients and healthcare providers points. That included the deficiency of a formal structured multidisciplinary chronic kidney disease clinic, lack of psychosocial support for CKD patients, and patients required to travel between hospitals more than 50 kilometers to get renal services. Efforts should be directed towards more concentration on pre-dialysis education, which will lead to more patients' understanding of their condition and improve the quality of medical services provided, which will positively affect patients' decision-making and well-being.

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None.

Conflicts of interest
No conflicts related to this work.

Ethical consideration
An ethical approval for the study was obtained from the research ethics committee of Approval of faculty's ethical committee of Al-Baha university, Saudi Arabia.

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The prevalence of empiric antibiotic use in an emergency department on children with suspected urinary tract infections: A retrospective study in Saudi Arabia

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Abstract

Objectives: The prescription of antibiotics for suspected urinary tract infection (UTI) is common practice and may result in unnecessary antibiotic exposure. Our goal was to review the diagnosis and management of UTI in an emergency department and to determine the goals of antimicrobial stewardship.

Methods: This is a single-centre, retrospective study that was conducted among children aged between 12 months and 18 years old who had been discharged from the emergency department with a diagnosis of UTI in the period between January and August 2022. Clinical information, laboratory findings, urine collection methods and urine culture results as well as details of prescribed antibiotics were gathered. The relation between urinalysis characteristics and confirmed UTI was assessed as a secondary outcome of the study.

Results: In this study, we were able to collect data for 183 children with a mean age of 4.2 (1.1-7.5) years and 82.5% of them were girls. Almost all children with UTI were discharged to home with prescribed antibiotics (98%) for a median duration of seven days ranging between 7-10 days. Among those who used antibiotics, 46.4% of the patients had negative urine cultures, resulting in 525 unnecessary antibiotic prescriptions. Presence of nitrite in the urine was the strongest and highly specific predictor of UTI (odds ratio of 20.22, P< 0.001).

Conclusions: Current practice in the management of suspected pediatric urinary tract infections in the selected emergency department resulted in significant and unnecessary exposure to antibiotics. We set goals to reduce unnecessary antibiotic exposure, including improving the accuracy of UTI diagnosis, establishing a process to discontinue antibiotic consumption for negative cultures, and standardizing the duration of antimicrobials.

Keywords: urinary tract infections, pediatrics, children, antimicrobial monitoring, urinalysis, antibiotics, empiric use, E. coli, nitrite, urine culture.

Introduction

Urinary tract infection (UTI) is one of the main causes of intensive care consultations and is estimated to affect between 2.6% and 7.5% of children with fever annually in the US [1]. UTI is determined by the presence of growth bacteria that exceeds 105 colony-forming units per millilitre (CFU/ml) [2]. Predisposing factors leading to UTIs include female gender, Caucasian race, history of previous UTIs, dehydration, irritable bladder, diabetes, urogenital devices (e.g., urinary catheters and double-J stents), congenital urogenital malformation (e.g., vesicoureteral reflux, posterior urethral valves), phimosis, incomplete/rare voiding, and chronic constipation [3–5].

UTI in the pediatric population has symptoms of fever and occasionally symptoms of sepsis which may present as crying whilst voiding and a change in urine colour or poor stream [6]. In children older than two, symptoms include urinary urgency, frequency, enuresis, malodorous urine, dysuria, cloudy urine, and suprapubic pain or tenderness [7]. Moreover, children with pyelonephritis would experience more urinary symptoms as well as some systemic signs including fever, chills, and rigor in addition to flank pain and costovertebral angle tenderness [8].

Urinary tract infection is usually diagnosed on the basis of typical symptoms and confirmed by showing significant bacterial growth from an adequate urine sample [9]. Identification and susceptibility testing of causative bacteria usually require a turnaround time of 48 hours [10]. The clinical diagnosis of a UTI is often difficult and requires a high degree of suspicion, especially in younger children who do not always show typical symptoms. Because UTIs can develop into a potentially serious infection, clinicians often prescribe empiric antibiotics for suspected UTIs pending confirmation by culture, especially when follow-up is uncertain (i.e., emergency department [ED]). However, dipstick urinalysis has the disadvantage of lacking specificity, and this practice can lead to the prescription of unnecessary antibiotics [11]. Moreover, because of lack of continuity of care and healthcare resource constraints in acute care settings as well as the high volume of outstanding test results, many emergency departments are only able to follow-up on positive test results. As part of the Antimicrobial Stewardship Initiative, we aimed to review the practice of diagnosing and treating suspected UTIs in an emergency department to determine the frequency of empirically prescribed antibiotics for suspected UTIs that were not confirmed by urine culture and identify intervention targets to reduce unnecessary antibiotic exposure.

Methods

This was a single-centre retrospective study that was conducted at the pediatric department at a governmental hospital in Saudi Arabia in the period between January to August 2022. In this study, we included all pediatric patients aged between 12 weeks and 18 years old who were discharged from the emergency department with a diagnosis of UTI. Exclusion criteria included patients younger than 12 weeks and those older than 18 years old, those having underlying genitourinary tract abnormalities, patients who admitted or transferred to another centre, those who received antibiotics on presentation, those who received a conditional prescription to be filled if the urine culture was positive, patients who had urine tests which had been conducted in another laboratory outside the hospital, and those who had a duplicate occurrence (more than one visit to the emergency department within the same illness period).

For all patients, charts were reviewed in order to collect data on patients' demographic factors including age and gender, clinical presentation, significant underlying co-morbidities, medical management as well as urinalysis and urine culture results. Determining the upper UTI signs and symptoms were defined as the presence of vomiting, fever or costovertebral angle tenderness while lower UTI symptoms included urgency, dysuria, frequency, or incontinence. Moreover, confirmed UTI was defined as the presence of pyuria and the presence of more than 50,000 CFU/ml or one or more uro-pathogens [12]. Furthermore, significant growth was defined with the presence of more than 50,000 CFU/ml of a uro-pathogen in addition to less than 50,000 CFU/ml of nonuro-pathogen. The semiquantitative results of leukocyte esterase (LE) were trace corresponded to 15 WBC/high power field, small (+1), moderate (+2) and large (+3) corresponding to 75, 125 and 500 WBC/high power field respectively. Presence of greater than 10*106 WBC/L which was assessed by the hemocytometer analysis of uncentrifuged urine determined the clinically significant pyuria.

urinalysis and confirmed UTIs. All estimates are presented with 95 % confidence intervals where p value of lower or equal to 0.05 was considered statistically significant.

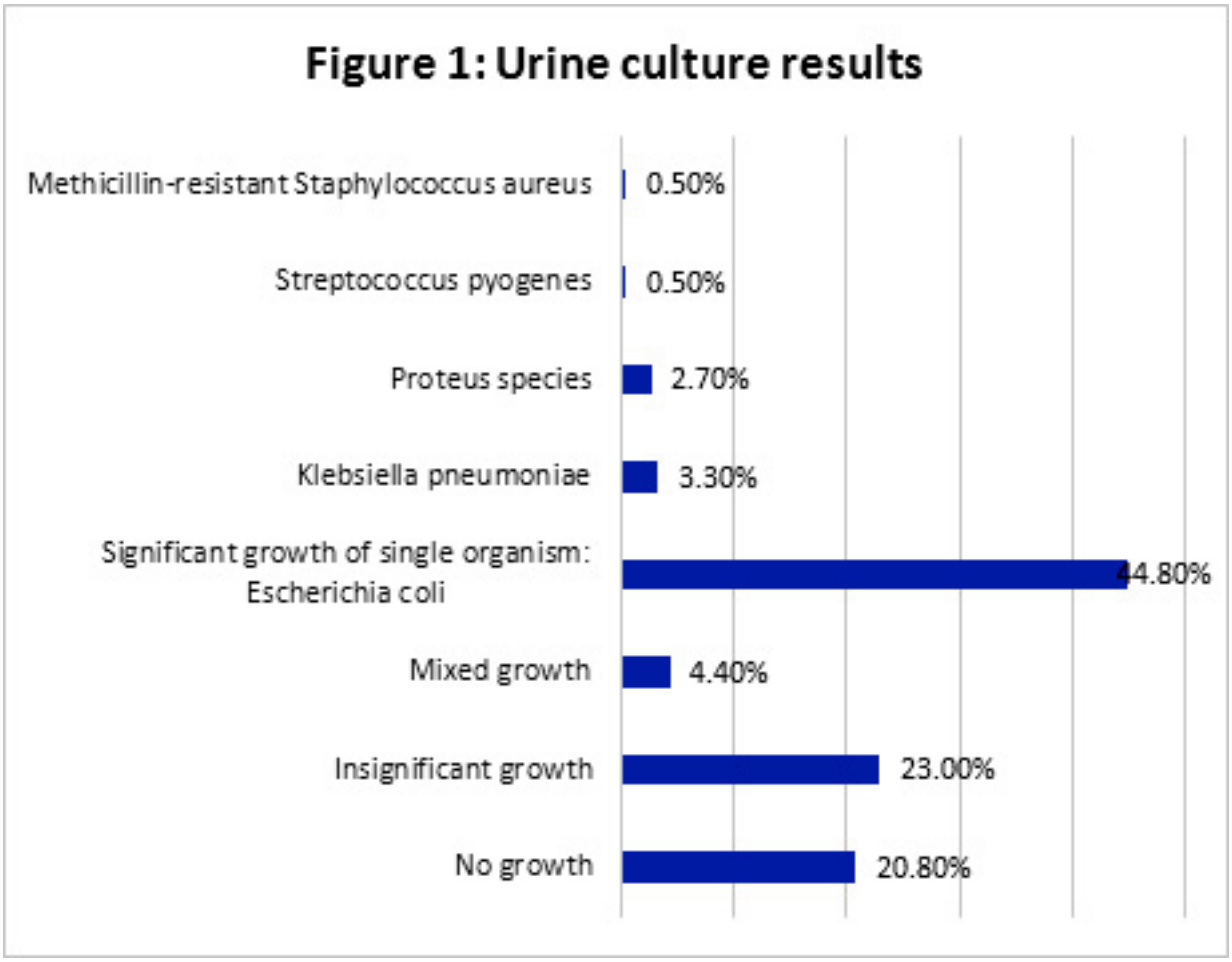
Results

In this study, we were able to collect data for 293 patients who were discharged from the emergency department with the diagnosis of UTI which represented 2.5 % of the total ED visits during the period of the study. Among this population, 110 patients were excluded from the analysis because of being admitted (26), urine culture results (25) which were not ordered for ten patients or had been done elsewhere for 15 patients, having underlying genitourinary tract abnormalities (23), being on UTI prophylaxis (2), transferred to another institution (6), duplicate (3), being younger than 12 weeks (6), having conditional antibiotic prescriptions (7) and having a urine culture test which was conducted during therapeutic antibiotic (12). The study was conducted among 183 patients and their data were included in the analysis. Most of the patients were females (82.5 %) with a mean age of 4.2 years old and ranging between 1.1 and 7.5 years old. Most of the specimens were collected by midstream urine (65.8 %), and catheterization was used to collect specimens in 33.3% of the patients. Signs and symptoms of upper UTI were reported in 54.1% of the pediatric patients while lower UTI symptoms and signs were reported in 41.5% (Table 1).

Table 1. Demographic Characteristics of Study Population (n = 183)

Variable		Count	Percent
Age, y	Median (IQR)	4.2 (1.1–7.5)	
Gender	Male	32	17.4 %
	Female	151	82.6 %
Urinary symptoms (n = 175)	Upper	99	56.6 %
	Lower	76	43.4 %
Urine collection method	Catheter	61	33.3 %
	Midstream urine	119	65.0 %
	Bag	2	1.1 %
	Not specified	1	0.6 %
Urinalysis (n = 180)	LE negative	10	5.5 %
	LE trace	33	18.3 %
	LE positive	137	76.1 %
	Nitrite positive	42	23.3 %

Moreover, we found that 44.8 % of the patients had significant growth of a single organism of Escherichia coli while 4.4% had mixed growth while klebsiella pneumoniae presented in 3.3% of the patients. On the other hand, 23% of the patients had insignificant growth and 20.8% had no growth (Figure 1).



This study reported that almost all patients with suspected UTIs were discharged home on antibiotics (98.4%). The most commonly prescribed antibiotic was cephalexin which was prescribed for 57.2% of the patients followed by amoxicillin-clavulanic acid (prescribed for 26.7%). The mean duration of using the antibiotics was 7 days which ranged between 7 and 10 days. In general, most of the antibiotic choices and duration were compatible with local UTI guidelines based on the susceptibility pattern. Among 88 patients with negative urine cultures (38 no growth, 42 insignificant growth and 8 mixed growth), 85 patients received antibiotics despite negative urine cultures and none of these patients received a call to stop the antibiotics which indicated that 46.4 % of those with prescribed antibiotics were for negative cultures.

Table 2: Prevalence of prescribing of antibiotics in children with suspected UTI and type of antibiotic used

Antibiotic prescription for negative culture		85	46.4 %
Antibiotic prescription for positive culture		95	51.9 %
Total antibiotic prescriptions*	Total	180	98.4 %
	Amoxicillin	3	1.7 %
	Amoxicillin/clavulanic acid	48	26.7 %
	Cefixime	8	4.4 %
	Cephalexin	103	57.2 %
	Ciprofloxacin	3	1.7 %
	Nitrofurantoin	3	1.7 %
	TMP/SMX	9	5.0 %
Duration of antibiotics (day)	Median (IQR)	7 (7–10)	

*1 patient received 2 antibiotics.
TMP/SMX indicate strimethoprim/sulfamethoxazole.

The results of this study showed that urine LE on point-of-care testing was associated with the presence of pyuria on microscopy where the odds of microscopic pyuria were found to increase as the LE results increased from traces to +3 (P< 0.001). The sensitivity and specificity of LE and nitrite positivity are presented in Table 3. Furthermore, the presence of nitrites in the urine analysis was found to be the strongest predictor of UTO (OR=20.22, 95 % confidence interval of 5.95: 68.71, P < 0.001). Depending on subgroup analysis of urine samples collected by catheter, it was found that the presence of nitrites was 100 % predictive of UTI and had (OR=11.51, 95 confidence interval of 3.15: 42.06, P < 0.001) for other samples. Moreover, LE results of +2 and +3 were predictors of UTI in all specimens however this did not reach the statistical significance (OR= 28.96, and 4.07, 95 % CI= 7.78: 107.84 and 0.88: 18.87, P < 0.001 and 0.096 respectively). However, on subgroup analysis, LE results of +2 was only significant predictor of UTI in catheter specimens (Table 4).

Table 3. Test Performance for LE and Nitrite Detection

		Sensitivity, %	Specificity, %	PPV, %	NPV, %
All specimens	LE*	83.0	32.6	57.4	63.6
	Nitrite	43.6	97.7	95.3	61.3
Catheter specimens	LE*	86.0	41.2	78.7	53.8
	Nitrite	51.2	100	100	44.7
Non catheter specimens	LE*	82.0	31.4	46.1	71.0
	Nitrite	36.0	95.7	85.7	67.7

*Positive result considered to be ≥ +1.
NPV indicates negative predictive value; PPV, positive predictive value.

Table 4: Predictors of UTI (Univariable Analysis)

Variable	OR (95% CI)	P	Catheter Only, OR (95% CI)	P	Other, OR (95% CI)	P
Nitrite positive	20.22 (5.95–68.71)	<0.001	NA*		11.51 (3.15–42.06)	<0.001
LE neg	REF		REF		REF	
Trace	0.65 (0.15–2.83)	0.568	0.83 (0.04–16.99)	0.906	0.49 (0.09–2.81)	0.423
1+	1.18 (0.31–4.58)	0.806	1.86 (0.10–34.44)	0.678	0.91 (0.19–4.30)	0.909
2+	4.07 (0.88–18.87)	0.073	NA*		2.15 (0.38–12.20)	0.390
3+	3.35 (0.81–13.90)	0.096	4.67 (0.22–97.50)	0.321	2.5 (0.49–12.89)	0.273
Pyuria	8.12 (3.73–17.67)	<0.001	5.46 (1.43–20.88)	0.013	9.46 (3.37–26.60)	<0.001

*Unable to estimate—predicts success perfectly.
NA indicates non-applicable; neg, negative; REF, reference.

Discussion

Urinary tract infections are responsible for a large number of intensive care visits and antibiotic prescriptions issued to children. We found that about 50% of patients with a suspected UTI based on symptoms or a dipstick urinalysis had a negative urine culture. This highlights the limited specificity of clinical assessment and rapid urinalysis testing in an acute care setting [9] and results in significant and unnecessary exposure to antibiotics.

Outpatient visits for UTIs place a significant burden on health care use and economic cost [13]. Promotion of rapid diagnosis is critical to reduce health care costs and potential complications, including pyelonephritis, abscess formation, and subsequent kidney scarring. However, the performance of the LE and nitrite assays in urine differs. Leukocyte esterase has good sensitivity, 83% on average, and increases to 94% in clinically suspected UTI. However, it is of poor quality for detecting UTIs in children (64%-92%). Many conditions can lead to a false-positive result, including fever [9]. On the other hand, urinary nitrites have good quality (98%) but poor sensitivity (53%) [9]. The same results were found in this study where most of the patients who had a positive nitrite test had a positive urine culture especially among catheter specimens. Moreover, an absence of nitrite in addition to low- level LE is associated with the lowest predictive value for UTI. Therefore, empiric treatment according to the guided strategy should be conducted for patients with nitrite positive results or those with nitrite negative specimens but with +1 or more LE on catheter specimens and +2 or more on other specimens. This could increase the accuracy of UTI diagnosis and avoid several days of unnecessary exposure to antibiotics. According to the strategy proposed in our study, if this had been followed it could have avoided antibiotic usage for 75 patients and avoided 587 days of unnecessary antibiotic therapy. Moreover, seventeen patients (23 %) would have had a delay in initiating antibiotics for culture-confirmed UTI. However, according to the strategy, 27 patients would have received unnecessary antibiotics for negative urine culture (217 of antibiotic days). Delaying the early initiation of antibiotics is linked with increasing the risk for renal scarring [14], therefore, evaluation of a larger study population using this type of strategy is required to determine the long-term effect on patients.

Approximately half (46.4%) of the patients who received antibiotic treatment for a suspected UTI had a negative urine culture. Watson et al. noted a similar finding that 49% of patients with suspected UTI had negative urine cultures [15]. The practice of empiric therapy for all patients with antibiotics, although it can prevent serious complications of a UTI, is associated with high and unnecessary prescriptions of antibiotics, which leads to a lower value of care and higher costs for the health system. Moreover, this practice of using empirical antibiotic for all suspected patients can cause antimicrobial-associated adverse reactions and increase the rate of development and selection of antimicrobial resistance [16–18]. In a previous study conducted by Garraffo et al., the authors showed that antibiotic exposure in the pediatric population in the 12 months preceding a UTI diagnosis is associated with increasing the risk of bacterial resistance particularly with amoxicillin, cotrimoxazole and first/ third- generation cephalosporin [19].

However, the pattern of resistance depended on the type of antibiotic to which the patients were exposed [19]. Moreover, the increase in the duration of antibiotic exposure is associated with the increased risk of developing of antimicrobial resistance [20]. Although, the impact of using of brief course of antibiotics until a culture is reported negative for bacterial resistance is not clear [10]. Without a proper follow-up of urine results, prescribing antibiotics to a child with a UTI diagnosis may lead to frequent urinalysis with all future febrile illnesses.

There are several antimicrobial stewardship strategies that have been proposed in different infection syndromes including some skin infections and pneumonia [21]. In a previous study conducted by Saha et al., the authors implemented a standard antibiotic discontinuation protocol for patients with a negative urine culture [11]. This practice outlined by Saha et al., was associated with an increase in the rate of antibiotic discontinuation from 4 % to 84 % and helped avoiding 3429 antibiotic unnecessary days for 29 months [11]. In the current study, the lack of such protocol led to 525 unnecessary antibiotic days during seven months. Moreover, another potential area of antimicrobial stewardship is standardizing the antibiotic prescription duration. In the current study, 41 % of the prescriptions of antibiotics were for 10 days or longer although, recent guidelines recommend 7 – 10 days of therapy with antibiotic in patients with UTI [9].

This study had some limitations including its retrospective nature where details of patients' clinical data may not be well documented. Moreover, some patients with UTIs may have been missed as they were discharged with an alternative diagnosis without urinalysis or urine culture. In addition, some patients were instructed to follow-up with their primary physicians and it is not clear whether any subsequent clinician changed the initial antibiotic management plan.

In conclusion, this study highlights the results that the current practice in our department in management of pediatric UTI often results in significant and unnecessary use of antibiotics. This knowledge would help to develop antimicrobial stewardship interventions that aimed to improve the antibiotic prescriptions practice in the emergency departments in order to reduce the unnecessary antibiotic associated adverse events and decrease the costs to the healthcare systems. This study identified potential strategies in order to reduce the unnecessary exposure of antibiotic by improving the diagnostic accuracy of UTIs, discontinuing antibiotics for negative cultures, and standardizing antimicrobial duration.

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Bleeding associated with new oral anticoagulants: a retrospective study

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Abstract

Background: Stroke and systemic embolic occurrences have been significantly reduced by novel oral anticoagulants, though theoretically a side effect of this anticoagulant treatment is hemorrhagic stroke.

Objectives: to determine bleeding associated with new oral anticoagulants in King Abdullah Medical City (KAMC), Makkah, Saudi Arabia.

Methods: A retrospective study was done at King Abdullah Medical City (KAMC), Makkah, Saudi Arabia on patients who used NOAC between January 2013 to June 2019. Data about patients' demographics, comorbidities, clinical data, NOAC used and subsequent bleeding complications, and antiplatelets use, were collected.

Results: This study found that atrial fibrillation (AF) was the most common reason NOACs like Edoxaban and Rivaroxaban were administered. About 71% of patients received antiplatelet therapy, with aspirin and stains being the most popular options. 1.2% of the patients with GIT bleeding, 1.2% with UGIB, and 2.4% with LGIB experienced cerebral haemorrhage following NOAC treatment. However, patients who experienced GIT haemorrhage after taking a NOAC were much more likely to have a history of UGIB or LCIB and to have taken Edoxaban as a NOAC.

Conclusion: To demonstrate the safety, efficacy, and effectiveness of NOACs, future multi-center studies with a larger sample size should be conducted.

Keywords: bleeding, associated, NOACs, retrospective, KAMC

Introduction

In various therapeutic circumstances, oral anticoagulant (OAC) medicines are used to prevent thromboembolic consequences (1). Vitamin K antagonists (VKA) were the sole class of OAC used up until the past ten years (2). They are primarily utilised in the treatment of cardiogenic shock, prosthetic heart valve dysfunction, pulmonary embolism, and atrial fibrillation (AF) (3). Although they can help prevent thromboembolic illnesses, they also carry a risk of several side effects, such as intracranial haemorrhage (ICH) and gastrointestinal bleeding (GIB) (4).

Oral anticoagulants associated intracerebral haemorrhage (OAC-ICH) incidence has climbed to 15% in the general population and up to 24% in tertiary care facilities during the past few years, as the prevalence of AF increased to (1%–2%) of the general population (4,5). OAC-ICH has a 7–10-fold higher mortality rate than spontaneous ICH, despite the fact that both conditions share the same risk factors, such as advanced age, hypertension, and a history of ischemic stroke (6).

Due to its extremely dismal prognosis and despite newer, more aggressive therapy options, ICH is the most dreaded consequence (7). GIB, a frequent emergent condition, is another serious consequence. With a mortality rate of 5–10% and an annual hospital admission rate of 150 per 100,000 of the overall population (7). GI bleeding is seen as a life-threatening condition that requires aggressive therapy, yet many instances can mostly be treated in an outpatient setting (8).

Among other medications that were shown to be closely connected with GIB, such as nonsteroidal anti-inflammatory medicines (NSAIDs), low dose aspirin, and antiplatelet agents, anticoagulants have been revealed to have the highest risk of GIB (9). VKA was highly effective at preventing thromboembolism despite this. They have a limited therapeutic range, a high risk of bleeding, frequent monitoring, and dose modifications, all of which add up to significant danger and discomfort (10).

A novel class of oral anticoagulants known as NOACs has recently been created (dabigatran etexilate, varoxaban, apixaban, edoxaban, betrixaban eribaxaban). They are superior to VKA, which has reduced the rate of ICH by 40–70%, in several ways (11). Patients taking new oral anticoagulants saw a significant decrease in stroke and systemic embolic events. This advantage was primarily caused by a significant reduction in haemorrhagic stroke risk, which was cut in half. Haemorrhagic stroke is conceptually a side effect of anticoagulant therapy even though it is measured as part of the total efficacy of these medications (12).

The anticoagulant impact of NOACs is substantially shorter than that of VKAs, with the beginning of anticoagulation occurring 1 to 4 hours after initial dose (13). Contrary to VKAs, the anticoagulant action does not require monitoring, and dose modifications are typically not required. Although NOAC-specific antidotes are undergoing preclinical and clinical testing, they have not yet been made widely accessible (13.14). Compared to individuals who are not taking anticoagulants, it is currently unknown if NOACs raise the risk of subsequent hematoma enlargement in ICH (14).

Apixaban, dabigatran, and rivaroxaban are three new oral anticoagulants (NOACs) that have had inconsistent outcomes. Dabigatran 150mg reduces risk of stroke with similar bleeding risk, but slightly increases risk of gastrointestinal bleeding and myocardial infarction; rivaroxaban may be as effective as warfarin in preventing stroke or systemic embolism. Apixaban reduces risk of stroke without increasing risk of major bleeding or intracranial haemorrhage (14,15).

Although the effect of NOAC on gastrointestinal bleeding is still unknown, strong evidence for a higher risk may be drawn from an analysis of the most recent data from phase II/III studies involving more than 150,000 patients (16). GI haemorrhage increases by 30% when NOAC is used in comparison to normal anticoagulant medication, on top of a 2- to 3-fold increase in GI bleeding risk when NOAC is not used (9). Anticoagulants are required for all patients due to the recent rise in the number of Atrial Fibrillation patients who have received a new diagnosis. The determination of the risk associated with the use of new oral anticoagulants could help in using them in a more proficient manner that would reduce the risk of thromboembolism to patients without the risk of bleeding (17).

This retrospective study aimed to assess bleeding associated with new oral anticoagulants in King Abdullah Medical City (KAMC), Makkah, Saudi Arabia.

Subjects and Methods

Study design, location and time: This was a retrospective study done at King Abdullah Medical City (KAMC), Makkah, Saudi Arabia from May to August 2022.

Study population: the study participants were all cases that used NOAC between January 2013 to June 2019.
Data collection: a pre-designed checklist was prepared to collect data from patients' medical records. Data collected included patients' demographics, comorbidities, clinical data, NOAC used and subsequent bleeding complications and antiplatelets use.

Ethical considerations: ethical approval for the study was obtained from KAMC Institutional review board (IRB) (No: 18-484).

Data analysis: data were analyzed using the (SPSS) program version 26. To assess the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test ($\chi 2$) was used. Quantitative data was expressed as mean and standard deviation (Mean ± SD), and non-parametric variables were tested using the Mann-Whitney test. A p-value < 0.05 was considered statistically significant.

Results

(Table 1) shows that the mean age of studied patients was 62.73 ± 15.09 years and 52.4% were females. Of them, 9.1% were smokers, 79.8% were hypertensive, 0.7% were drug abusers and 0.3% were alcohol abusers. Only 0.9% had bleeding disorders and 3.6% had vascular diseases. Only 5.7% had previous history of bleeding, 0.9% had a history of ICH and 1% had a history of UGIB or LGIB. Of them, 8.3% had chronic diseases with heart diseases the most common (59.5%).

Table 1. Distribution of studied patients according to their demographic and clinical data (No.: 580)

Variable	No. (%)
Age	62.73 ±15.09
Gender	
Female	304 (52.4)
Male	276 (47.6)
Smoking	
Yes	53 (9.1)
No	527 (90.9)
HTN	
Yes	463 (79.8)
No	117 (20.2)
Drug abuse	
Yes	4 (0.7)
No	576 (99.3)
Alcohol abuse	
Yes	2 (0.3)
No	578 (99.7)
Bleeding disorder	
Yes	5 (0.9)
No	575 (99.1)
Vascular disease	
Yes	21 (3.6)
No	559 (96.4)
Previous history of bleeding	
Yes	33 (5.7)
No	546 (94.3)
Previous history of ICH	5 (0.9)
Previous history of UGIB	6 (1)
Previous history of LGIB	6 (1)
Chronic diseases	
Yes	48 (8.3)
No	532 (91.7)
If yes, specify:	
Heart disease	345 (59.5)
Renal disease	87 (15)
Liver disease	15 (2.6)

Table 2. Distribution of studied patients according to pattern of NOAC used and subsequent bleeding complications and antiplatelets use (No.: 580)

Table 2. Distribution of studied patients according to pattern of NOAC used and subsequent bleeding complications and antiplatelets use (No.: 580)

Variable	No. (%)
NOAC used	
Dabigatran	82 (14.1)
Apixaban	179 (30.9)
Edoxaban	448 (77.2)
Rivaroxaban	316 (54.5)
Reason for using NOAC	
AF	409 (70.5)
Ischemic heart diseases	146 (25.2)
DVT, PE	93 (16)
Other	78 (13.4)
Antiplatelets use	
Yes	415 (71.6)
No	165 (28.4)
If yes, specify:	
aspirin	399 (68.8)
Clopedigril	213 (36.7)
Statins	373 (64.4)
Other medications: NSAIDs	111 (19.1)
Cerebral hemorrhage after using NOAC	
Yes	6 (1)
No	547 (99)
GIT bleeding after using NOAC	
Yes	19 (3.3)
No	561 (96.7)
If yes, specify:	
UGIB	7 (1.2)
LGIB	14 (2.4)
Other bleeding after using NOAC	
Yes	7 (1.2)
No	573 (98.8)
if yes, specify:	
epistaxis	4 (0.7)
vaginal bleeding	4 (0.7)

A non-significant relationship was found between occurrence of cerebral hemorrhage after NOAC use and participants' demographics, clinical data or NOAC usage pattern or antiplatelets use (p=>0.05) (Tables 3 and 4). While patients who had GIT hemorrhage after NOAC use had a significant higher percentage of those having a previous history of UGIB or LCIB (p=<0.05) (Table 5).

Table 3. Relationship between occurrence of cerebral hemorrhage after NOAC use and participants' demographic and clinical data (No.: 580)

Variable	Cerebral hemorrhage after using NOAC		χ2	p-value
	Yes No. (%)	No No. (%)		
Age	62 ±14.39	62.73 ±15.11	0.07*	0.941
Gender				
Female	3 (50)	301 (52.4)	0.01	0.905
Male	3 (50)	273 (47.6)		
Smoking				
Yes	0 (0.0)	53 (9.2)	0.61	0.435
No	6 (100)	521 (90.8)		
HTN				
Yes	4 (66.7)	459 (80)	0.64	0.419
No	2 (33.3)	115 (20)		
Drug abuse				
Yes	0 (0.0)	4 (0.7)	0.04	0.837
No	6 (100)	570 (99.3)		
Alcohol abuse				
Yes	0 (0.0)	2 (0.3)	0.02	0.885
No	6 (100)	572 (99.7)		
Bleeding disorder				
Yes	0 (0.0)	5 (0.9)	0.05	0.818
No	6 (100)	569 (99.1)		
Vascular disease				
Yes	1 (16.7)	20 (3.5)	2.95	0.086
No	5 (83.3)	554 (96.5)		
Previous history of bleeding				
Yes	0 (0.0)	33 (5.7)	0.36	0.545
No	6 (100)	541 (94.3)		
Previous history of ICH				
Yes	0 (0.0)	5 (0.9)	0.05	0.818
No	6 (100)	569 (99.1)		
Previous history of UGIB				
Yes	0 (0.0)	6 (1)	0.06	0.801
No	6 (100)	568 (99)		
Previous history of LGIB				
Yes	0 (0.0)	6 (1)	0.06	0.801
No	6 (100)	568 (99)		
Chronic diseases				
Yes	0 (0.0)	48 (8.4)	0.54	0.46
No	6 (100)	526 (91.6)		
If yes, specify:				
Heart disease	4 (66.7)	341 (59.4)	0.13	0.719
Renal disease	2 (33.3)	85 (14.8)	1.59	0.206
Liver disease	0 (0.0)	15 (2.6)	0.16	0.688

N.B.: * = Mann-Whitney test

Table 4. Relationship between occurrence of cerebral hemorrhage after NOAC use and its usage pattern and antiplatelets use (No.: 580)

Variable	Cerebral hemorrhage after using NOAC		χ2	p-value
	Yes No. (%)	No No. (%)		
NOAC used				
Dabigatran	1 (16.7)	81 (14.1)	0.03	0.858
Apixaban	1 (16.7)	178 (31)	0.57	0.449
Edoxaban	4 (66.7)	444 (77.4)	0.38	0.535
Rivaroxaban	4 (66.7)	312 (54.4)	0.36	0.547
Reason for using NOAC				
AF	5 (83.3)	404 (70.4)	0.47	0.489
Ischemic heart diseases	1 (16.7)	145 (25.3)	0.23	0.629
DVT, PE	2 (33.3)	91 (15.9)	1.34	0.246
Antiplatelets use				
Yes	5 (33.3)	410 (71.4)	0.41	0.52
No	1 (16.7)	164 (28.6)		
If yes, specify:				
aspirin	5 (83.3)	394 (68.6)	0.59	0.44
Clopedigril	3 (50)	210 (36.6)	0.46	0.498
Statins	4 (66.7)	369 (64.4)	0.01	0.908
Other medications: NSAIDS	3 (50)	108 (18.8)	3.73	0.053

Table 5. Relationship between occurrence of GIT hemorrhage after NOAC use and participants' demographic and clinical data (No.: 580)

Variable	GIT hemorrhage after using NOAC		χ2	p-value
	Yes No. (%)	No No. (%)		
Age	68.56 ±14.89	62.53 ±15.07	1.87*	0.06
Gender				
Female	13 (68.4)	291 (51.9)	2.01	0.155
Male	6 (31.6)	270 (48.1)		
Smoking				
Yes	1 (5.3)	52 (9.3)	0.35	0.551
No	18 (94.7)	509 (90.7)		
HTN				
Yes	17 (89.5)	446 (79.5)	1.13	0.287
No	2 (10.5)	115 (20.5)		
Drug abuse				
Yes	0 (0.0)	4 (0.7)	0.13	0.712
No	19 (100)	557 (99.3)		
Alcohol abuse				
Yes	0 (0.0)	2 (0.4)	0.06	0.794
No	19 (100)	559 (99.6)		
Bleeding disorder				
Yes	0 (0.0)	5 (0.9)	0.17	0.679
No	19 (100)	556 (99.1)		
Vascular disease				
Yes	0 (0.0)	21 (3.7)	0.73	0.39
No	19 (100)	540 (96.3)		
Previous history of bleeding				
Yes	5 (26.3)	28 (5)	15.57	**<0.001**
No	14 (73.7)	533 (95)		
Previous history of ICH				
Yes	0 (0.0)	5 (0.9)	0.17	0.679
No	19 (100)	556 (99.1)		
Previous history of UGIB				
Yes	2 (10.5)	4 (0.7)	17.28	**<0.001**
No	17 (89.5)	557 (99.3)		
Previous history of LGIB				
Yes	2 (10.5)	4 (0.7)	17.28	**<0.001**
No	17 (89.5)	557 (99.3)		
Chronic diseases				
Yes	1 (5.3)	47 (8.4)	0.23	0.628
No	18 (94.7)	514 (91.6)		
If yes, specify:				
Heart disease	14 (73.7)	331 (59)	1.64	0.2
Renal disease	3 (15.8)	84 (15)	0.01	0.922
Liver disease	1 (5.3)	14 (2.5)	0.55	0.455

N.B.: * = Mann-Whitney test

At the same time, while patients who had GIT hemorrhage after NOAC use a significant higher percentage of those received Edoxaban as NOAC and had no DVT or PE (p=<0.05) (Table 6).

Table 6. Relationship between occurrence of GIT hemorrhage after NOAC use and its usage pattern and antiplatelets use (No.: 580)

Variable	GIT hemorrhage after using NOAC		χ2	p-value
	Yes No. (%)	No No. (%)		
NOAC used				
Dabigatran	3 (15.8)	79 (14.1)	**0.04**	0.834
Apixaban	4 (21.1)	175 (31.2)	0.88	0.347
Edoxaban	13 (68.4)	435 (77.5)	0.86	0.351
Rivaroxaban	12 (63.2)	304 (54.2)	0.59	0.44
Reason for using NOAC				
	15 (78.9)	394 (70.2)	0.67	0.413
AF	6 (31.6)	140 (25)	0.42	0.513
Ischemic heart diseases	3 (15.8)	90 (16)	**0.001**	0.976
DVT, PE				
Antiplatelets use				
Yes	16 (84.2)	399 (71.1)	1.54	0.214
No	3 (15.8)	162 (28.9)		
If yes, specify:				
aspirin	14 (73.7)	385 (68.6)	0.21	0.64
Clopedigril	6 (31.6)	207 (36.9)	0.22	0.636
Statins	10 (52.6)	363 (64.8)	1.19	0.275
Other medications: NSAIDS	3 (15.8)	108 (19.3	0.14	0.706

Discussion

This retrospective study was conducted in King Abdullah Medical City (KAMC), Makkah, Saudi Arabia, to evaluate bleeding related to novel oral anticoagulants.

The present study found that the most commonly used NOACs were Edoxaban and Rivaroxaban, and the most common indication for their use was AF. The most frequently used medications were aspirin and stains with antiplatelets being used by 71.6% of patients. Among studied patients, after utilizing NOAC, only 1% experienced cerebral bleeding and 3.3% experienced GIT bleeding after taking NOAC. Only one patient experienced both UGIB and LGIB and only 1.2% experienced more bleeding after taking NOAC.

A retrospective cohort study was conducted in 2018 in five tertiary care hospital across three cities in Canada (Ottawa, Hamilton, Kingston) (18). This study revealed that the most common type of bleeding after using OAC (Dabigatran, Rivaroxaban, Apixaban, Warfarin) by TIMI defined major bleeds as intracranial hemorrhage and by ISTH as gastrointestinal bleeding and among patients with CRNMB hematuria the most common type and Dabigatran was the most common OAC cause of bleeding according to TIMI, ISTH, BARC (18).

Another study was done on patients who were prescribed dabigatran, rivaroxaban, or apixaban in a community teaching hospital in the United States (19). The study found that the majority of patients received NOAC for stroke prevention in AF and there were three bleeding incidents, one for each NOAC (19). In our study only 6 patients developed ICH.

A prospective observational study was carried out at 35 stroke units across Europe, the United States, and Asia (20). This study found that among patients who received Dabigatran, the rates of early recurrence of stroke event and major bleeding were 1.8% and 2.5% in those who received Rivaroxaban and their rates of occurrence was 2.9% in those who receive Apixaban (20). In Saudi Arabia, a retrospective cohort study was done in King Abdullah Medical City, a tertiary care center in the Makkah region. The study was carried out on patients who received Rivaroxaban from 2014 to 2019. The study found that the incidence of spontaneous ICH after using Rivaroxaban was 0.58% (21).

Limitations

The limitation of our study was being a single center study. This can hinder the generalization of the study results.

Conclusion

The present study found that the most commonly used NOACs was Edoxaban and Rivaroxaban, and the most common reason for usage was AF. Antiplatelets were used for about 71% of patients, with aspirin and stains the most common. Of studied patients, 1% had cerebral hemorrhage after NOAC use, 3.3% had GIT bleeding of whom 1.2% had UGIB and 2.4% had LGIB. Patients who had GIT hemorrhage after NOAC use had a significant higher percentage of those having a previous history of UGIB or LCIB than those who received Edoxaban as NOAC. Future multi-center studies done on larger sample size should be done to prove the safety, efficacy, and effectiveness of these drugs and to avoid drug-related problems in clinical practice.

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Awareness and Features of PCOS in Students of AlMaarefa University 2019 – 2020

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Abstract

Background: PCOS affects all women of reproductive age, especially adolescents. In KSA, the estimated prevalence of PCOS is 53.7%. The feasibility of conducting such a study justifies the need for providing an opportunity for early detection and prevention of morbidities among adolescents.

Objective: The aim of this study is to identify the awareness and features of PCOS in students of AlMaarefa University, Riyadh.

Methods: It is an observational descriptive cross-sectional study design of 216 female students based on a questionnaire consisting of 3 sections: demographic data, knowledge and quality of lifestyle. All data was cleaned, coded, and entered using SSPS.

Result: It was found that 64% of PCOS cases had positive family history compared to 32% of non-PCOS students and 11% of those who were not tested for PCOS. (p-value: 0.000). Regarding overweight students, most of them are not tested students 11%, coming after 8% with PCOS and 2% with non-PCOS. It was found that 21% of medical students have excellent knowledge of PCOS symptoms compared with 6.5% of other specialties.

Conclusion: Students with a positive family history are more likely to get PCOS. Excellent level of knowledge regarding PCOS was highly associated with the medical field of the students.

Keywords: PCOS, Awareness, features, students, AlMaarefa University

Introduction

Background:
Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine disorders in women of reproductive age. The symptoms typically associated with PCOS are amenorrhoea, oligomenorrhoea, hirsutism, obesity, subfertility, anovulation and acne. Women with PCOS may display a number of metabolic and cardiovascular abnormalities and several psychological disorders such as depression, anxiety, marital concerns, social problems and sexual impairment. The main cause of the PCOS is unknown but studies say genes are involved. The familial incidence of PCOS is established well and its prevalence differs from different countries and ethnicities. PCOS is diagnosed by biochemical abnormalities on investigation or polycystic ovaries by transabdominal or transvaginal ultrasound. Correcting diet and incorporating exercise are the first line of treatment. Insulin-sensitizing agents, oral contraceptives, spironolactone, and topical eflornithine can be used in patients with hirsutism.

Problem Statement:
Prevalence estimates of PCOS are highly variable, ranging from 2.2% to as high as 26%, globally. Prevalence in Middle Eastern countries is found to be: 1990 NIH 6.1% 95% interval: 5.3-7.1%; 2003 Rotterdam 16.0% 95% interval: 13.8-18.6%; 2006 AES 12.6% 95% interval: 11.3-14.2%. In a 2017 study conducted in KSA on Saudi girls, the estimated prevalence of PCOS was observed to be 53.7%. PCOS affects all women of reproductive age but studies have shown increased incidence in adolescents and young adults. Infertility was found to have negative effects on marital relations as spouses often request divorce or separation.

Justification:
The feasibility of conducting such community-based study justifies the need to upscale this effort to get an overall estimate of the disorder in a diverse sociocultural and economic background, providing an opportunity for early detection and prevention of morbidities among adolescents and young women.

Hypothesis:
Women with PCOS when compared to healthy women, are more likely to have an unhealthy diet, less physical activity, augmented psychosocial disturbances and marital issues due to infertility.

General Objective:
To identify the features of PCOS amongst female students of AlMaarefa University, Riyadh and their awareness regarding PCOS.

Methodology

Study Approach:
Study design:
It is an observational descriptive cross-sectional study design (2019-2020). Study Area and population:
The study took place in students of AlMaarefa University in Al-Diriya, Riyadh, Kingdom of Saudi Arabia. AlMaarefa University is a private establishment of higher education. Females of all levels in these colleges: medicine, pharmacy, nursing, respiratory therapy and anesthesia were targeted.

Sample size and technique:
The data was collected from 216 students by non-probability quota sampling technique including the preparatory year students excluding the male section.

Data needs:
Data Collection Tools:
The study was based on a questionnaire that is prepared especially for PCOS. It consists of 3 sections: demographic data, knowledge and quality of lifestyle.

Definition and procedure
Scores of knowledge (out of 9):
>6 correct answers: excellent knowledge 3-5 correct answers: moderate knowledge
<3 correct answers: poor knowledge

Score for effects on quality of lifestyle (out of 21):
>12: strongly affected
7-11: moderately affected
<7: not affected to a great extent

Data Collection Method:
The electronic questionnaire was written in English and Arabic. The link was distributed via the University's email to all female students.

Data analysis & presentation:
All data was cleaned, coded, and entered using SPSS. The results were expressed in tables and graphs as frequencies and percentages. Suitable statistical tests were used.

Ethical consideration:
The protocol of the study was reviewed and approved by the Institutional Review Boards of the Faculty of Medicine, Al-Maarefa University. Permission was taken the same time the participants opened the questionnaire link. The data was kept confidential secured to maintain the privacy. Moreover, data was only used for this research.

Results

Table 1 shows the relationship between family history and occurrence of PCOS among female students in AlMaarefa University. PCOS was positive for (19%), negative for (10%) and not tested for (70%). Of the total, family history was positive for (23%) and negative for the remainder. It was found that (64%) of PCOS cases had positive family history compared to (32%) of non-PCOS and (11%) of those not tested for PCOS. This variation in the proportions of positive family history among the respondents was statistically highly significant. (p=0.0000)

Table 1: The relationship between family history and PCOS among the students of AlMaarefa University, Riyadh. (Awareness and features of PCOS in students of AlMaarefa University)

	PCOS	Non-PCOS	Not Tested	Total
Positive family history	27	5	17	49
Negative family history	15	17	135	167
Total	42	22	152	216

Graph 1: The relationship between family history and PCOS among the students of AlMaarefa University, Riyadh. (Awareness and features of PCOS in students of AlMaarefa University)

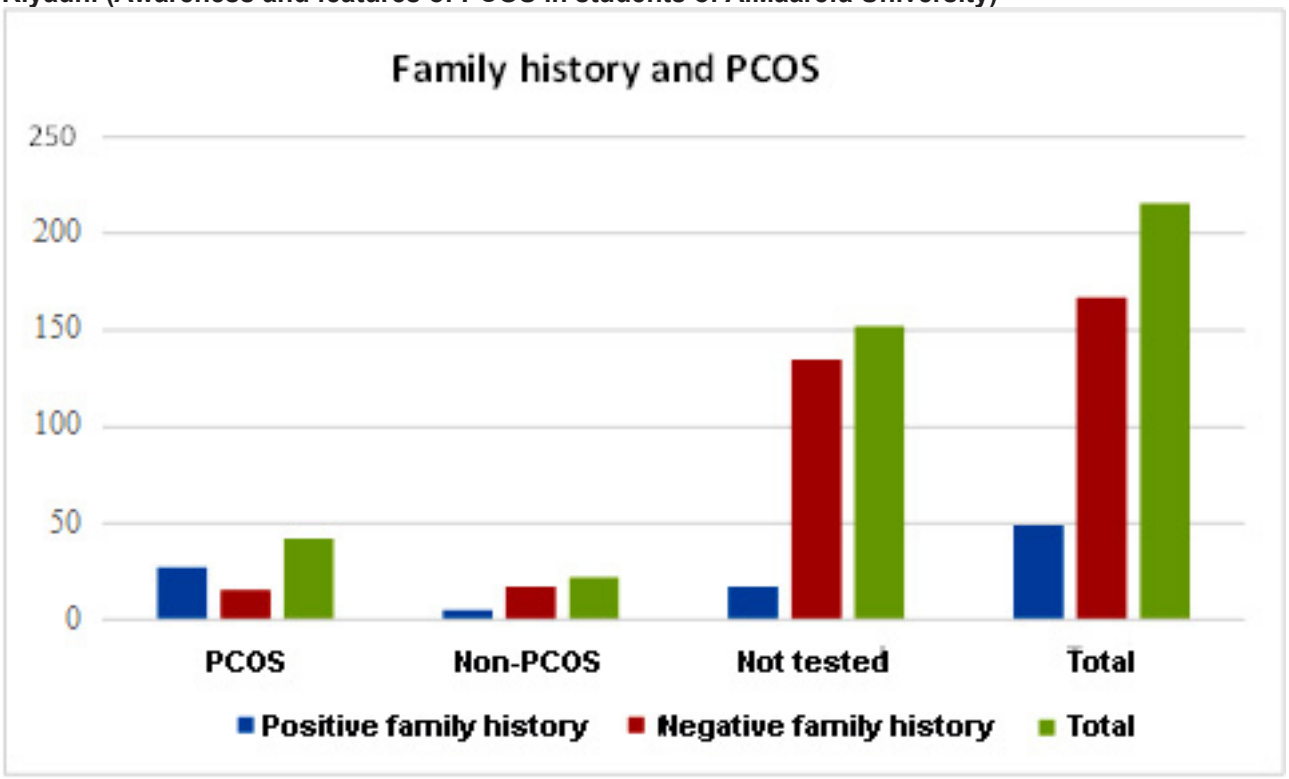
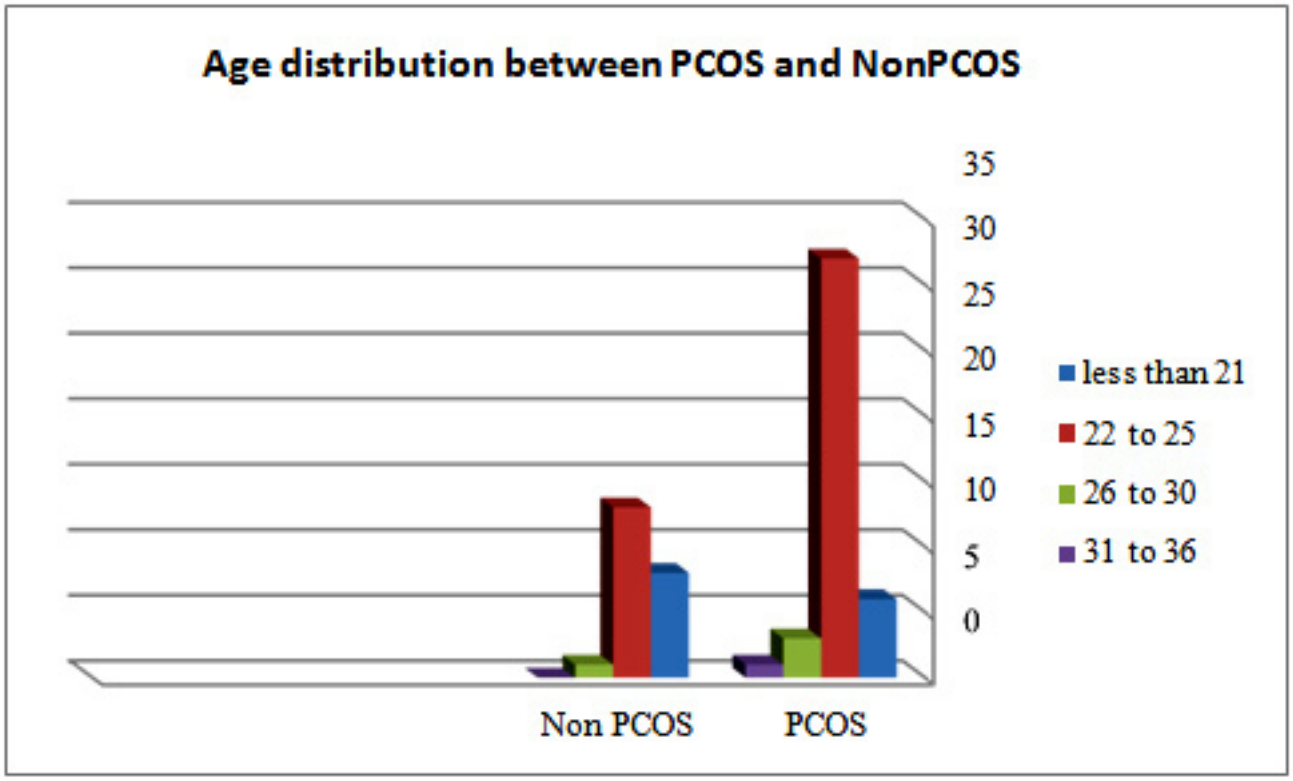


Table 2 shows the relationship between age group and occurrence of PCOS among female students in Al-Maarefa University. It was found that (93%) of PCOS cases were at the age of 21 and above, (91%) of NON-PCOS and (17%) of those Not Tested for PCOS. It was found that (6.90%) of PCOS cases were below the age of 21, (9.20%) of NON-PCOS and (84%) for Not Tested. This variation in the proportions of students above the age of 21 was statistically significant (p= 0.0004). PCOS was positive for (19.46 %), negative for (10.18%) and not tested for (70.37%) of the total.

Table 2: The relationship between age group and PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

Characteristics	PCOS		NON-PCOS		Not Tested	
Age (Year)	F	%	F	%	F	%
< 21	6	6.90%	8	9.20%	73	83.91%
22-25	32	26.67%	13	10.83%	75	62.50%
26-30	3	37.50%	1	12.50%	4	50%
31-36	1	100%	0	0.00%	0	0.00%
37-40	0	0%	0	0%	0	0%

Graph 2: The relationship between age group and PCOS. (Awareness and features of PCOS in students of AlMaarefa University



The data from Table 3 shows the students from different colleges and the occurrence of PCOS. (69%) students from medical college had PCOS which is not very significant compared to the rest of the colleges. (72%) of medical students do not suffer from PCOS, whereas only (27%) from the rest of the colleges, implying a clear link between the awareness of disease and its occurrence.

Table 3: The relationship between different colleges of AlMaarefa University Riyadh and occurrence of PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

	PCOS		NON-PCOS		NOT TESTED	
Specialty	F	%	F	%	F	%
Medicine	29	18.83%	16	10.39%	109	70.78%
Pharmacy	5	16.13%	2	6.45%	24	77.42%
Nursing	1	14.29%	1	14.29%	5	71.43%
Respiratory Therapy	6	40%	1	6.67%	8	53.33%
Anesthesia	1	11.11%	2	22.22%	6	66.67%

Graph 3: The relationship between different colleges of AlMaarefa University Riyadh and occurrence of PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

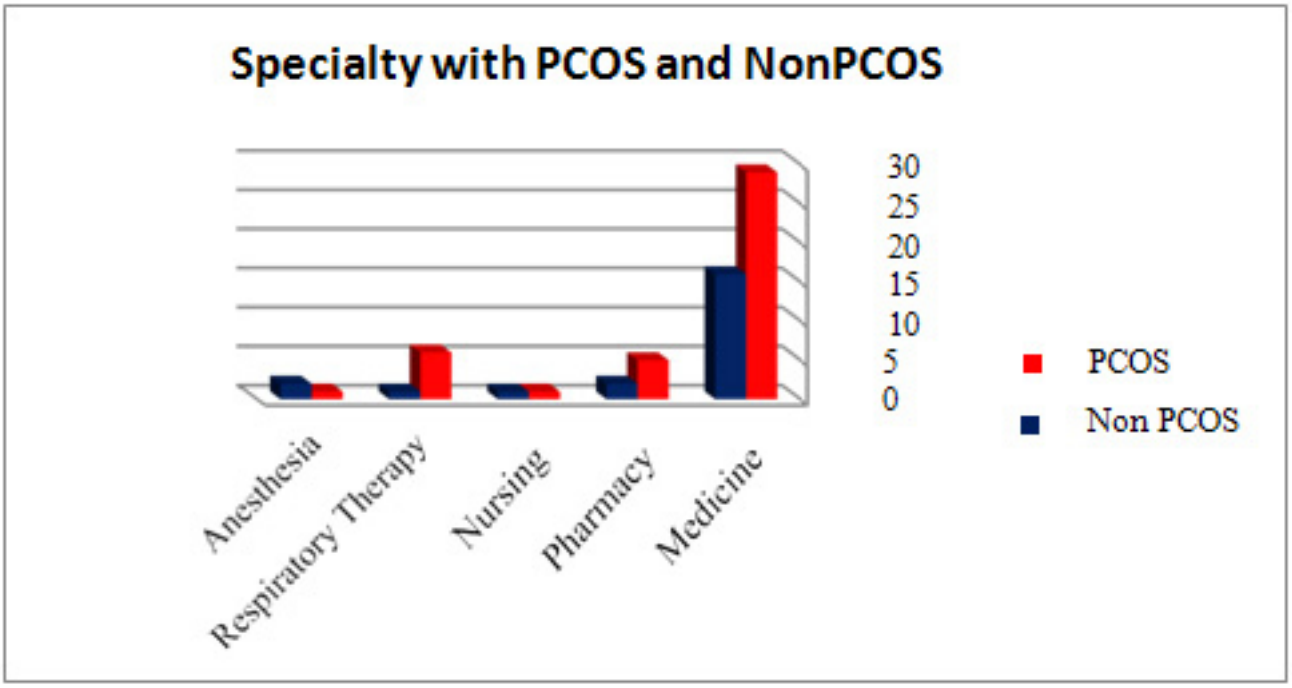


Table 4 shows the relationship between marital status and occurrence of PCOS. It was found that (18%) of PCOS cases were single compared to (10%) of non-PCOS and (71%) not tested for PCOS. The variation among the respondents of those who were single was not significant (p=0.0739). Regarding married women, (45%) had PCOS, (9%) did not have PCOS and (45%) were not tested for PCOS.

Table 4: The occurrence of PCOS and its association with marital status of women. (Awareness and features of PCOS in students of AlMaarefa University)

Characteristics	PCOS		NON-PCOS		Not tested	
Marital status	F	%	F	%	F	%
Single	37	18.23%	21	10.34%	145	71.43%
Married	5	45.45%	1	9.09%	5	45.45%
Divorced	0	0.00%	0	0.00%	2	100%

Graph 4: The occurrence of PCOS and its association with marital status of women. (Awareness and features of PCOS in students of AlMaarefa University)

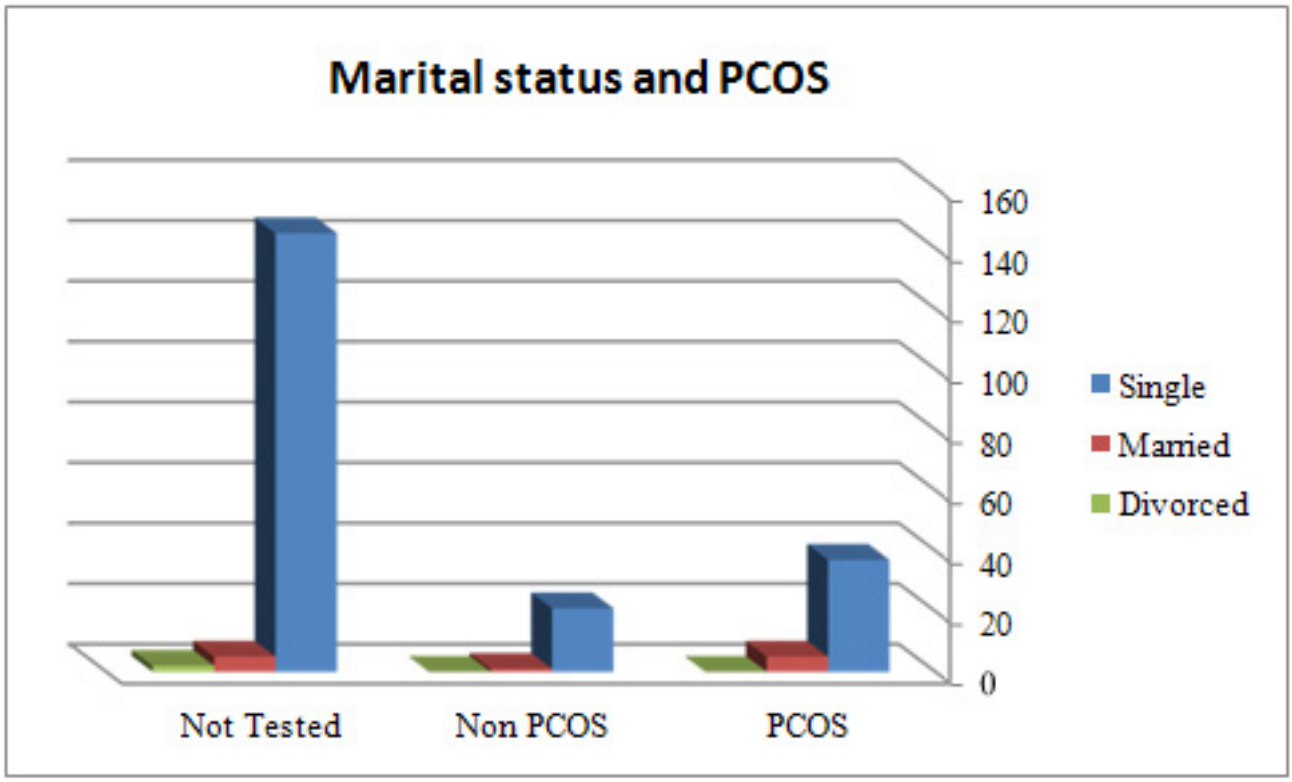


Table 5 shows the relationship between body mass index and the occurrence of PCOS among female students in Almaarefa university. It was found that (11%) of underweight students are not tested for PCOS, (0.46%) are non-PCOS, and (0%) are PCOS students.

Moreover, (38%) of normal weight students are not tested for PCOS, (6%) are non-PCOS, and (8%) are PCOS students. Regarding overweight students, most of them are not tested students (11%), coming after (8%) with PCOS and (2%) with non-PCOS. The table also shows that (10%) of students not tested for PCOS are obese, (2%) are non-PCOS and (4%) are . PCOS students.

Table 5: The relationship between BMI and the occurrence of PCOS among AlMaarefa students. (Awareness and features of PCOS in students of AlMaarefa University)

BMI	PCOS		NON-PCOS		NOT TESTED	
	F	%	F	%	F	%
Underweight	0	0%	1	0.46%	24	11.11%
Normal weight	17	7.87%	12	5.56%	83	38.43%
Overweight	17	7.87%	5	2.31%	24	11.11%
Obese	8	3.70%	4	1.85%	21	9.72%

Graph 5: The relationship between BMI and the occurrence of PCOS among AlMaarefa students. (Awareness and features of PCOS in students of AlMaarefa University)

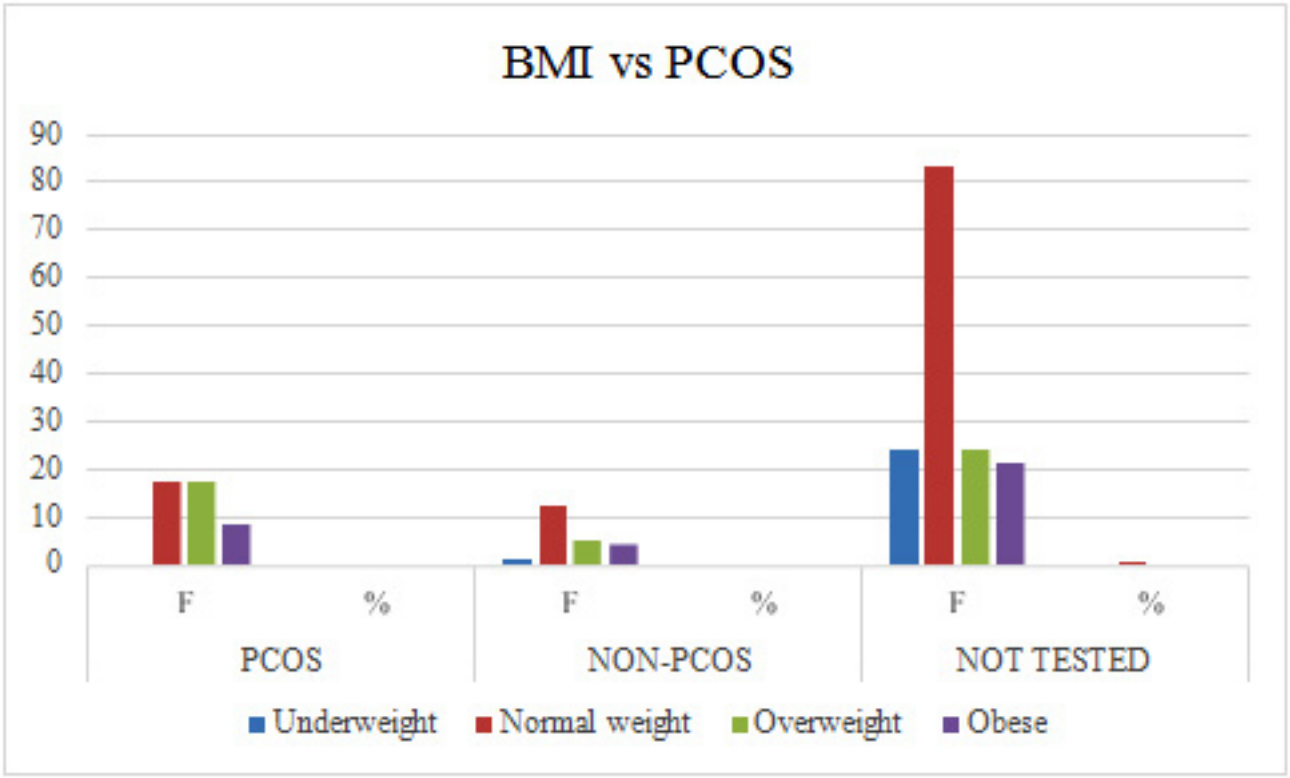


Table 6 shows the relationship between the level of knowledge of symptoms and the specialties of Almaarefa female students. It was found that (21%) of medical students have excellent knowledge of PCOS symptoms compared with (6.5%) of other specialties.

Moreover, (38%) of medical students showed poor knowledge of the symptoms compared to (60%) of other specialties. Considering these percentages among the respondents, the probability was statistically significant (P=0.0082).

Table 6: The relationship between the level of knowledge of symptoms with different specialties regarding PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

Knowledge Specialty	Excellent	Moderate	Poor	Total	P-value
Medicine	33	63	58	154	0.0082 (significant)
Pharmacy	3	11	17	31	
Nursing	1	1	5	7	
Resp therapy	0	4	11	15	
Anesthesia	0	4	5	9	
Total	37	83	96	216	

Graph 6: The relationship between the level of knowledge of symptoms with different specialties regarding PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

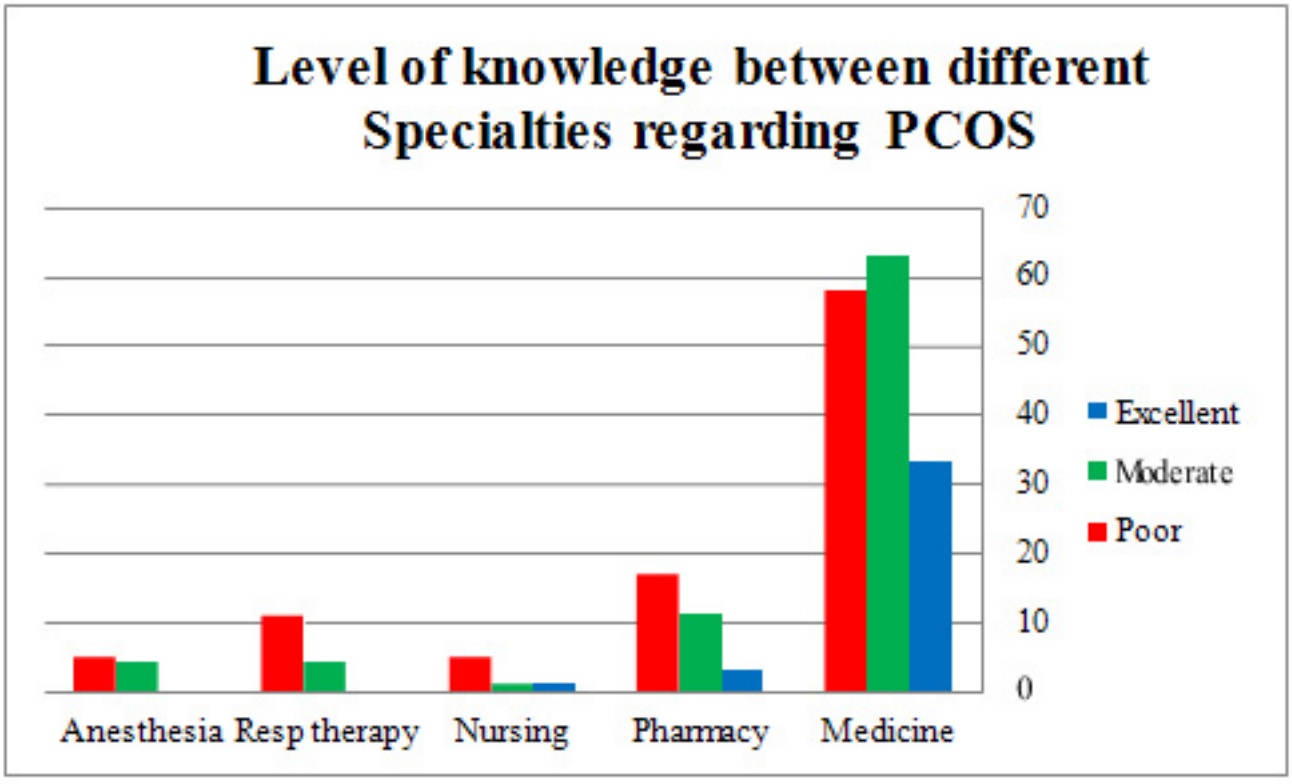


Table 7 shows the analysis of features distribution among students with PCOS, non- PCOS and not tested for PCOS. Of those with PCOS, hirsutism was positive for (35%), menstruation volume was abnormal in (41%), menstruation irregularities were observed in (31%), weight gain was in (30%), hair loss was in (28%), acne in (17%), depression in (23%) moodiness (19%), worried (21%), feeling angry (21%) and having anxiety (19%). Values for hirsutism (p-value= 0.0000), menstruation abnormalities (p-value= 0.0000) and irregularities (p-value= 0.0043), weight gain (p-value= 0.0002) and depression (p-value= 0.0034) in those with PCOS were significant.

Table 7: The relationship between different features of PCOS and the occurrence of PCOS among AlMaarefa students. (Awareness and features of PCOS in students of AlMaarefa University)

FEATURES	PCOS 42	NON-PCOS 22	NOT TESTED 152	Total	P-value
Hirsutism	30	8	48	86	0.0000 (significant)
Menstruation abnormality	21	4	26	51	0.0000 (significant)
Menstruation Irregularity	23	8	42	73	0.0043 (significant)
Weight gain	32	13	63	108	0.0002 (significant)
Hair loss (frontal balding)	19	8	41	68	0.0686 (Not significant)
Acne	33	22	130	185	0.0672 (Not significant)
Depression	36	20	99	155	0.0034 (significant)
Moody	39	21	146	206	0.183 (Notsignificant)
Worried	39	21	127	187	0.004 (Notsignificant)
Tense or feeling angry	40	19	134	193	0.345 (Notsignificant)
Anxiety	38	21	140	199	0.123 (Notsignificant)

Graph 7: The relationship between different features of PCOS and the occurrence of PCOS among AlMaarefa students. (Awareness and features of PCOS in students of AlMaarefa University)

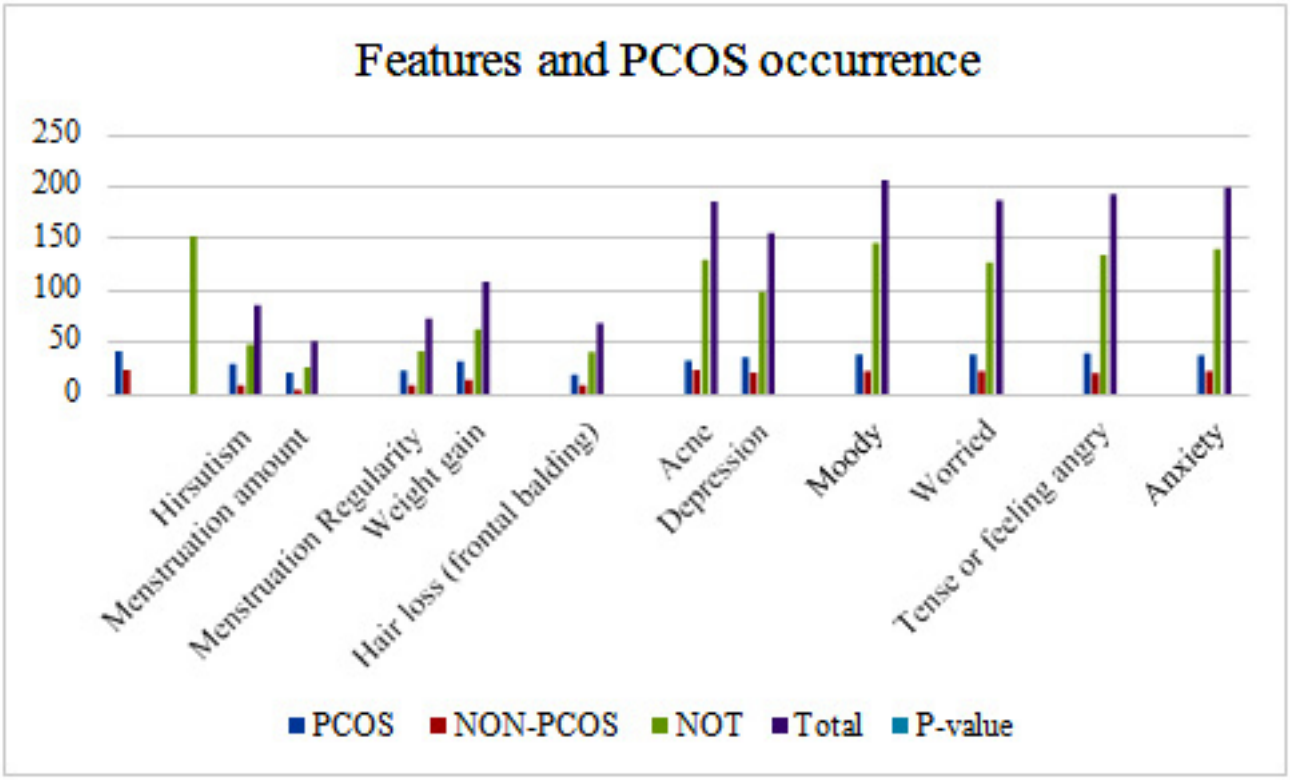


Table 8 shows the relationship between change in life style and occurrence of PCOS among female students in Almaarefa University. It was found that (90%) of PCOS cases exercise and (31%) have restricted their diet.

Table 8: Analysis table for lifestyle distribution among those with PCOS. (Awareness and features of PCOS in students of AlMaarefa University)

Lifestyle	PCOS (42)
Diet restrictions	13
Exercise	38
Do you go for facial hair laserremoval?	19
Do you visit clinics for acnetreatment?	23
Did you consult a dietitian to loseweight?	21
Embarrassed by facial hair	26

Table 9 shows the relationship between self-consciousness about appearance and occurrence of PCOS among female students in Almaarefa University. It was found that (25%) of PCOS cases are self- conscious about their appearance compared to (11%) of non PCOS and (64%) of those not tested for PCOS. This variation in the proportion of self- conscious about appearance and occurrence of PCOS among the respondents was statistically significant. (p= 0.022). The table revealed that the majority of PCOS students who responded were embarrassed about their weight (27%) and (11%) of the PCOS students were not. In comparison to the non PCOS students responders who were embarrassed by their weight numbered (11%) and the non-tested was (62%). This variation in the occurrence of PCOS and weight embarrassment among the respondents was statistically significant. (p= 0.0086).

Table 9 : Analysis table for quality of life distribution among those with PCOS, NON PCOS and not tested. (Awareness and features of PCOS in students of AlMaarefa University)

Quality of Life	PCOS	NON-PCOS	NOT TESTED	Total	P-value
Self-conscious about your appearance	33	14	84	131	0.022
Embarrassed about weight	30	12	68	110	0.0086

Graph 9 : Analysis table for quality of life distribution among those with PCOS, NON PCOS and not tested. (Awareness and features of PCOS in students of AlMaarefa University)

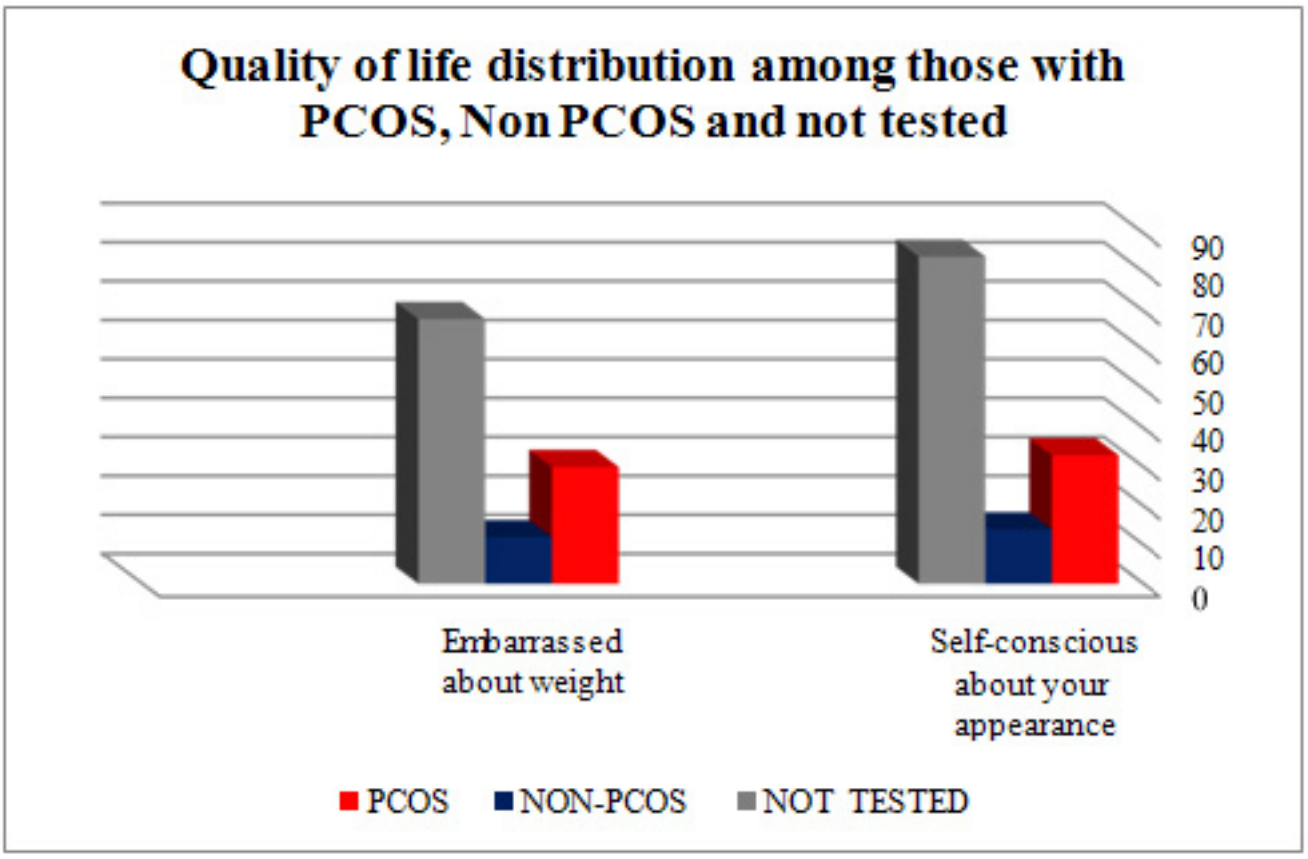
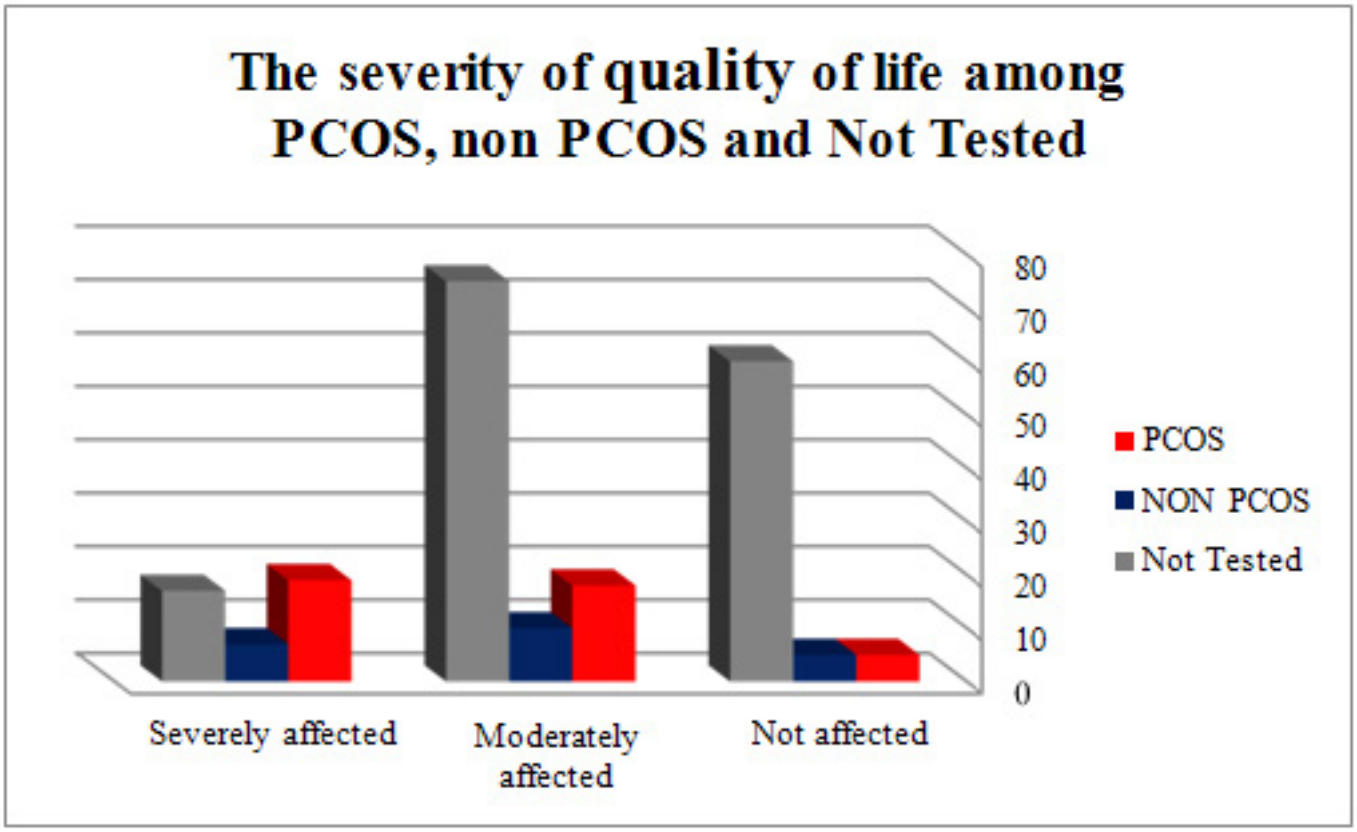


Table 10 illustrates affects on quality of life due to PCOS. The majority of PCOS participant were severely affected by (45%) while (12%) of PCOS participant were not affected by the occurrence of the disease. This is statistically significant. (p= 0.000).

Table 10: The severity of quality of life among PCOS, non PCOS and Not Tested. (Awareness and features of PCOS in students of AlMaarefa University)

Quality of Life	PCOS 42	NON PCOS22	Not Tested 152
Not affected	5	5	60
Moderately affected	18	10	75
Severely affected	19	7	17

Graph 10: The severity of quality of life among PCOS, non PCOS and Not Tested. (Awareness and features of PCOS in students of AlMaarefa University)



Discussion

Psychological well-being in the life of women with PCOS in relation to certain PCOS characteristics was explored. The significant higher portions of lower life quality among those with PCOS was expected. In fact, changes in outer appearance, particularly obesity and excessive body hair, but not the presence of acne, were significantly associated with specific aspects of quality-of-life and sexual satisfaction. Affection of quality of lifestyle can also be seen by another study done by Sedighi, Kumarapeli [4, 5]. Higher BMI scores were associated with lower scale scores, indicating decreased quality of life. Obesity as a result of bad lifestyle and food habits tends to be more in PCOS patients. This conclusion was also seen by another study by Silfen [6] The result showed all of the non-obese and the majority of the obese subjects with PCOS had polycystic-appearing ovaries (PAO) on pelvic sonography as shown by Yildez. [7]

Apridonidze concluded the study that the metabolic syndrome (MBS) and its components are common in women with PCOS, placing them at increased risk for cardiovascular disease. Women with PCOS and the MBS differ from their counterparts lacking the MBS in terms of increased hyperandrogenemia, lower serum SHBG, and higher prevalence of acanthosis nigricans, all features that may reflect more severe insulin resistance. [8]

The significantly higher proportion of student of age group 21 and above among those with PCOS was expected. This could reflect on the fact that as environmental stress occurs more with age and college studies, students were more likely to have the disease. Those not tested for PCOS was significantly higher in age group below 21. This shows that a large amount of girls before the age of 21 have not been to the clinic. Deeks in a study in 2010 found depression was increased among those who reported infertility compared with women who did not report infertility. [9] Most of the PCOS students were overweight. PCOS is proposed to be a genetic disease with hormonal imbalances that increase appetite, cause bloating and increase insulin resistance in some patients making it hard to lose to weight and easily gain weight. Despite the majority being in medicine a large number of girls are not tested for PCOS. This proves the lack of awareness of PCOS among young girls. This goes in line with other research was conducted by Joshi and Bhattacharya in India in 2014 [10, 11]. This could prove that the disease is a chronic genetic syndrome that occurs gradually under certain environmental factors and if controlled earlier can cause early prevention of the disease.

In a study done by Cinar in turkey who concluded similar results as our study that depression and anxiety are more common in patients with PCOS compared with healthy women. Depression in PCOS might be associated with obesity and metabolic abnormalities including insulin resistance and dyslipidemia. Understanding body image is important to specify the social and psychological experience of being PCOS. Our result goes in line with other research which was conducted by Barnard and Hahn. [12, 13, 14]

The significantly higher proportion of family history among those with PCOS was expected. In fact, family history is a known risk factor of PCOS. According to a study conducted by Musmar in Palestine in 2014, family history is one PCOS risk factor. It seems that the importance of family history of PCOS cannot be denied. This entails the girls with family history of PCOS should go early for the test. [15] Khomami [16] in his study found PCOS features had significant impact on patients with the disease, as found by our study as well.

The higher proportion of excellent knowledge of PCOS symptoms among medical students with PCOS was expected. According to a study was conducted by AlSibyani; level of awareness, not unexpectedly was related to the high educational level and being student or worker in health background. It seems that the medical students have greater knowledge due to relating their condition with their study. It is important for healthcare providers to know more about polycystic ovarian syndrome because it is a crucial condition in our society. Alessa concluded that there is a high level of awareness of PCOS among Saudi women. Educational level and to graduates of health colleges scored higher. Awareness of symptoms was higher than of complications in study done by AlRuthia. [1, 17, 18]

Conclusion

Students with a positive family history are more likely to get PCOS. Excellent level of knowledge regarding PCOS was highly associated with the medical field of the students. Students in medicine had a higher general score than those in pharmacy, nursing, respiratory therapy and anesthesia. There is no statistical relationship between age martial statues and the occurrence of PCOS. The results showed a significant difference between the BMI of those with PCOS in comparison to those without PCOS; PCOS participant were obese and overweight compared to non PCOS.

Recommendation

1. We recommend early screening programs in Saudi Arabia, to detect the syndrome among female teenagers with family history.
2. Healthcare providers should know more about polycystic ovarian syndrome because it is a crucial condition in our society
3. Future studies with hospital-based study and larger sample size on PCOS are needed for greater understanding of the manifestation of PCOS in the Saudi population.

Acknowledgement

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Knowledge, Attitude, and Practices Regarding Childhood Tuberculosis Screening and Management among Healthcare Providers in Al-Medinah Al-Munawara, Saudi Arabia

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Abstract

Among infectious illnesses, tuberculosis (TB) has the highest fatality rate. The likelihood of infection spreading from patients to healthcare providers is two times higher than in the general population. The primary risk factor for contracting TB is close proximity to an infected individual prior to diagnosis. The research assessed health workers' knowledge, attitude, and practice of TB infection control in Saudi Arabia. The study used a cross-sectional approach based on an online survey. The research was carried out throughout the months of May to July 2022 in Al Madinah Al-Munawara. The questionnaire included demographic's and work variables, knowledge regarding pediatric TB etiology, transmission, symptoms, lymph node characteristics, and diagnostic criteria. Also, the participants' perspectives and practice patterns on contact investigation, TB diagnostic tools, laboratory services, presumptive TB diagnostic referrals, and TB treatment were evaluated. The study included 558 healthcare workers (HCWs) from various specialists. HCWs exhibited sound knowledge, and positive attitudes in comparison to those with minimal experience in diagnosing TB in children TB as 31.2% had excellent knowledge, 22.6% good, 18.5% mediocre, and 27.8% bad. The majority of responders (49.1%) had a positive attitude, while only 33.2% had correct and full practice routines. Immediate action is required to increase HCW awareness, capacity, and skills to ensure an accurate diagnosis. In the identification of TB cases, certain crucial information gaps were discovered. This study also highlights the significance of clinical experience and frequent interactions with tuberculosis patients in clinical practice as a pathway to competency-based learning by practice.

Keywords: healthcare workers, knowledge, tuberculosis, diagnosis, practice, KSA.

Introduction

Over 600 children worldwide lose their lives to tuberculosis (TB) daily. Among one million children who had active TB in 2019, it is expected that 70% of those cases have been missed by doctors or misdiagnosed [1]. Due to the non-specific symptoms and challenging identification of TB in children under the age of 15, the treatment of this disease remains a problem. Children's TB is difficult to diagnose, despite recent breakthroughs in the field [2]. Diagnostics for pediatric tuberculosis using stool samples and the Xpert MTB/RIF test have been investigated [3]. Diagnoses of children's TB have been made using a variety of processes due to the difficulty of making an accurate diagnosis; however, none of these procedures are now regularly employed [4].

Saudi Arabia is the third-largest nation in the Middle East, occupying most of the Arabian Peninsula. Saudi Arabia, which the WHO classifies as having a moderate TB burden, reported an annual TB incidence rate of 18 per 100,000 people in 2012 [1].

Despite attempts by the Saudi Arabian government to eliminate tuberculosis, public statistics suggest that the illness is not entirely under control in the country. A directly observed therapy (DOTS) programme was launched as part of the national TB control programme (NTP) in the country in 1999, and although treatment success rates reached 62% they remain below the WHO objective (85%) [5]. As a result, the current case detection rate is similarly at 87%. TB mortality rates in Saudi Arabia have fallen from 7.2% to 6.1% in the recent decade, whereas they have remained stable for non-Saudis (5.4%) [6, 7].

Many countries have difficulties in recognizing instances of childhood tuberculosis. According to the WHO, most countries have incorporated contact investigation in their national recommendations for detecting children's TB infections. Despite this, several of these activities have yet to be consistently implemented or expanded [8]. Some studies have shown that healthcare workers' lack of understanding about children's tuberculosis (TB) diagnosis, treatment, and prevention is a problem [9-11]. HCWs working in Hajj have been shown to have inadequate knowledge and attitudes toward infection prevention and control, especially TB control [12]. According to several studies, healthcare workers (HCWs) have a lack of understanding and attitudes about tuberculosis (TB) diagnosis and treatment, as well as poor practices that increase their risk of infection and which have a detrimental effect on patients and the community [13-16]. This study intended to study healthcare workers' knowledge, attitudes, and practice regarding diagnosing and managing tuberculosis (TB) among children. The findings may be used to identify problems, constraints, opportunities for improvement, and allocate resources and efforts to the most effective initiatives.

Methods

1. Study Design, Setting and Sample Size

It is a quantitative cross-sectional study based on an online questionnaire sheet. The study was conducted at Al Madinah Al-Munawwarah from May 2022 to July 2022. The study included healthcare providers with various specialized services. The sample size was calculated using a web calculator as the proportions of questionnaire accuracy is 50%, and a margin of error of 5%, with a confidence interval of 95%; thus, about 378 records were enroled in the study. The Institutional Review Board (IRB) provided written approval regarding the aim of the study (22-051). Also, online consent was taken from the participants in the study.

2. Data Collection and Instrument:

The National Tuberculosis Program (NTP) in February 2020 and other previous studies led to the development of a structured questionnaire [9, 11] to assess the knowledge, attitude and practice (KAP) of healthcare providers regarding TB among children. The questionnaire included four parts. The Social factors included age, gender, education, years of experience, position, and training on pediatric TB. The second part included knowledge regarding pediatric TB as to the causes of TB, transmission pathways, symptoms, features of lymph nodes that indicate TB, and diagnostic criteria for childhood TB. Also, the participants' attitude was measured by studying their views on contact investigation, training on pediatric tuberculosis, TB diagnostic instruments, laboratory services, and human resources for childhood tuberculosis. Contact investigation performance, presumptive TB referrals for diagnostic work-ups, and TB treatment were all included in the information on practices.

3. Data Management and Analysis Plan:

The data was entered into the computer using the latest IBM SPSS software program (24.0) version. The use of numbers and percentages characterized the qualitative data. The Chi-square test was used to examine the degree of similarity between several groups concerning categorical variables. The significance test results are presented in the form of a two-tailed probability. At the 5% level, the significance of the findings was evaluated.

The scores for the KAP responses were determined. According to the most recent research, incorrect, improper, or unclear answers received a score of 0 points, while those that were right and appropriate were granted 1 point. For the multiple-choice questions that included more than one correct option, the score was determined by whether or not HCWs selected the correct response.

Results

Of the 589 collected questionnaires, a total of 558 sheets were completed. The demographics and characteristics of included subjects are shown in Table 1. More than half of the respondents (59.5%) were aged between 25-34 years followed by 26% in the age group of 35-44 years. The majority of respondents worked at hospitals (66.7%) while 33.3% worked at health centres. Additionally, 62% had fewer than 10 years experience and 38% had more than 10 years experience. As for the educational level, 56.8% had a bachelor's degree, 20.1% had a diploma, 14% had a master's degree, and 9.1% had a PhD degree. Physicians (36.2%), nurses, and paramedics (33.7%), followed by pharmacists (13.1%) were the major positions of most of the healthcare workers. Regarding the training on childhood TB status, only 25.1% of respondents had received previous TB training.

Table 1: Demographic and characteristic features of the HCWs.

Demographic and characteristic features of the HCWs	No	%
Age		
25-34	332	59.5
35-44	145	26.0
45-54	52	9.3
>55	29	5.2
Marital status		
Single	225	40.3
Married	302	54.1
Divorced	31	5.6
Experience		
Less than 10 years old	346	62.0
more than 10 years	212	38.0
Workplace		
Health center	186	33.3
Hospital	372	66.7
Have isolation in your work		
No	96	17.2
Yes	462	82.8
Isolation area is		
Ward	62	13.4
Room	400	86.6
Position		
Physician	202	36.2
Physician Dentist	7	1.3
Pharmacist	73	13.1
Nursing/Paramedic	188	33.7
Lab, Radiologist	53	9.5
Non-medical job	35	6.3
Education levels		
Bachelor	317	56.8
Consultant/ PhD	51	9.1
Diploma	112	20.1
Master/ Senior	78	14.0
Training on childhood TB		
No	418	74.9
Yes	140	25.1
Total	**558**	**100.0**

The questions relating to the knowledge of healthcare workers are presented in Table 2. The majority of respondents (62.5%, 65.4%) correctly answered the question that TB is a transmissible disease caused by bacteria, respectively. Also, more than half of healthcare workers had sound knowledge regarding the methods of transmission and the exact length of treatment for reducing transmission. The low level of knowledge was associated with the definition of high-risk groups of children, duration of cough, temperature, general symptoms, and the characteristics of enlarged lymph nodes and screening criteria.

The attitude of healthcare workers regarding TB diagnosis is illustrated in Table 3. The diagnostic criteria and laboratory services of childhood TB were evaluated as adequate among 57.6% of the participants. More than half of healthcare workers had a positive attitude toward the provision of proper training (62.9%), sufficient staff (52.9%), and sufficient drugs (51.4%). On the other hand, the negative attitudes were related to bringing close contact to smear + PTB to HF for TB screening and referring suspected TB cases to diagnostic workup.

The practice pattern for children's TB screening was improper among most participants, as only 25.4% always asked index TB patients to bring their close contacts to health facilities for TB screening, while 19.7% did this often. About 29.6% and 26% will always and often perform contact investigations in the community. Less than 50% of the respondents would always and often treat childhood TB. As for the protective measures, only 23.5% will always wear personal protective equipment before contact with children with TB or presumptive TB (Table 4).
Table (4): Practice pattern of TB diagnosis and screening.

Table 2: Questions related to HCWs' knowledge

Knowledge	Frequency	Percentage
TB is caused by bacteria		
Yes	351	62.9
No	207	37.1
TB is a transmissible disease		
Yes	365	65.4
No	193	34.6
TB is spread through expectorated droplet		
Yes	290	52.0
No	268	48.0
Transmission is reduced after a smear-positive PTB received treatment for two weeks		
Yes	305	54.7
No	253	45.3
Knew at least two out of three groups of children at high risk of developing TB below		
Age lessthan 1-year-old	205	36.7
Living with smear-positive PTB	165	29.6
Living with HIV	188	33.7
Knew at least four out of eight childhood TB symptoms/signs below		
Chronic cough	298	53.4
Persistent fever	214	38.4
Weight loss or no weight gain	102	18.3
Night sweats	144	25.8
Bone deformity	95	17.0
Enlarged lymph nodes	88	15.8
Arthralgia	98	17.6
Asthenia	80	14.3
Knew duration of cough that implies TB (≥2 weeks):		
1 week	240	43.0
2 weeks	166	29.7
More than 2 weeks	182	32.6
Knew level of fever that implies TB (>38.0 °C)		
37	201	36.0
38	196	35.1
More than 38	191	34.2
Knew at least three out of six characteristics of enlarged lymph nodes implying TB below		
Enlarged ≥2 cm	149	26.7
Painless	144	25.8
Asymmetric	136	24.4
Firm, matted or discreet	152	27.2
Persistent (>2 weeks)	121	21.7
Unresponsive to other treatments (such as antibiotics)	109	19.5
Knew at least four out of seven screening criteria for childhood TB below		
Enlarged lymph nodes	112	20.1
Persistent cough	298	53.4
Persistent wheezing	201	36.0
Weight loss or not gaining weight	142	25.4
Fever	214	38.4

Table 3: Distribution of the studied group regarding their attitude

	Strongly agree		Agree		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%
Diagnostic tools are adequate for diagnosis of childhood TB	165	29.6	156	28.0	85	15.2	152	27.2
Laboratory services are adequate for the diagnosis of childhood TB	204	36.6	142	25.4	95	17.0	117	21.0
Majority of staff in charge of TB have adequate training on childhood TB	241	43.2	110	19.7	103	18.5	104	18.6
Sufficient staff to treat childhood TB	165	29.6	130	23.3	122	21.9	141	25.3
Always sufficient drugs to treat childhood TB	145	26.0	142	25.4	110	19.7	161	28.9
Would ask to bring close contact to smear + PTB to HF for TB screening	149	26.7	122	21.9	163	29.2	124	22.2
Would refer children who might have TB for TB diagnostic workup	136	24.4	106	19.0	133	23.8	183	32.8

Table 4: Practice pattern of TB diagnosis and screening.

Practice	Frequency	Percentage
Ask index TB patients to bring their close contacts to health facilities for TB screening		
Always	142	25.4
Often	110	19.7
Sometimes	114	20.4
Never	192	34.4
Perform contact investigation in the community		
Always	165	29.6
Often	145	26.0
Sometimes	117	21.0
Never	131	23.5
Treat childhood TB		
Always	127	22.8
Often	149	26.7
Sometimes	132	23.7
Never	150	26.9
Do you wear personal protective equipment before contact with children with TB or presumptive TB?		
Always	131	23.5
Often	98	17.6
Sometimes	124	22.2
Never	205	36.7

Table 5 presents the KAP level of HCWs. The level of knowledge was excellent among 31.2%, good among 22.6%, fair among 18.5%, and poor among 27.8%. The attitude score was positive among the majority of respondents (49.1%) and the practice score was right and complete among 33.2% while about half had wrong practice patterns.

Table 5: KAP level of HCWs

KAP	No	%
Knowledge		
Excellent	174	31.2
Good	126	22.6
Fair	103	18.5
Poor	155	27.8
Attitude		
Positive	274	49.1
Neutral	152	27.2
Negative	132	23.7
Practice		
Right and complete	185	33.2
Right but not complete	92	16.5
Wrong	281	50.4

Table 6 showed the variables predicting good knowledge as physicians, educational levels, previous TB training, and having an isolation ward in the hospital were significantly associated with better knowledge scores

Table 6: Factors associated with HCWs' knowledge of childhood tuberculosis.

	Level of knowledge								Total	X^2 P value
	Excellent "n=174"		Good "n=126"		Faire "n=103"		Poor "n=155"			
Age	No.	%	No.	%	No.	%	No.	%		
25-34	105	60.3	88	69.8	52	50.5	87	56.1	332	
35-44	45	25.9	20	15.9	32	31.1	48	31.0	145	15.9
45-54	15	8.6	10	7.9	15	14.6	12	7.7	52	0.06N.S
>55	9	5.2	8	6.3	4	3.9	8	5.2	29	
Experience										
Less than 10 years old	102	58.6	85	67.5	65	63.1	94	60.6	346	2.61
More than 10 years	72	41.4	41	32.5	38	36.9	61	39.4	212	0.45N.S
Workplace										
Health center	62	35.6	44	34.9	36	35.0	44	28.4	186	2.38
Hospital	112	64.4	82	65.1	67	65.0	111	71.6	372	0.49N.S
Have isolation ward in your work										
No	10	5.7	8	6.3	9	8.7	69	44.5	96	112.8 0.001*
Yes	164	94.3	118	93.7	94	91.3	86	55.5	462	
Position										
Physician	152	87.4	50	39.7	0	0.0	0	0.0	202	
Physician Dentist	2	1.1	5	4.0	0	0.0	0	0.0	7	
Pharmacist	10	5.7	32	25.4	20	19.4	11	7.1	73	407.8 0.001*
Nursing/Paramedic	10	5.7	38	30.2	70	68.0	70	45.2	188	
Lab, Radiologist	0	0.0	1	0.8	12	11.7	40	25.8	53	
Non-medical job	0	0.0	0	0.0	1	1.0	34	21.9	35	
Education levels										
Bachelor	51	29.3	108	85.7	86	83.5	72	46.5	317	
Consultant/ PhD	51	29.3	0	0.0	0	0.0	0	0.0	51	414.7 0.001*
Diploma	0	0.0	12	9.5	17	16.5	83	53.5	112	
Master/ Senior	72	41.4	6	4.8	0	0.0	0	0.0	78	
Training on childhood TB										
No	42	24.1	118	93.7	103	100.0	155	100.0	418	341.6 0.001*
Yes	132	75.9	8	6.3	0	0.0	0	0.0	140	

The positive attitude was related to having an isolation room at hospital, being a younger age, being physicians, working at hospitals, having higher educational levels, and having received TB training (Table 7). The level of practice showed a significant correlation with younger age, physician, working at hospitals, higher educational levels, and TB

Table 7: Relation between basic demographic and characteristic feature of HCWs group with the level of attitude.

	Level of attitude						Total	X^2 P value
	Positive "n=274"		Neutral "n=152"		Negative "n=132"			
Age	No.	%	No.	%	No.	%		
25-34	178	65.0	112	73.7	42	31.8	332	60.3 0.001*
35-44	65	23.7	24	15.8	56	42.4	145	
45-54	20	7.3	12	7.9	20	15.2	52	
>55	11	4.0	4	2.6	14	10.6	29	
Experience								
Less than 10 years old	185	67.5	98	64.5	63	47.7	346	15.4 0.001*
more than 10 years	89	32.5	54	35.5	69	52.3	212	
Workplace								
Health center	60	21.9	40	26.3	86	65.2	186	79.6 0.001*
Hospital	214	78.1	112	73.7	46	34.8	372	
Have isolation in your work								
No	10	3.6	15	9.9	71	53.8	96	165.1 0.001*
Yes	264	96.4	137	90.1	61	46.2	462	
Position								
Physician	167	60.9	32	21.1	3	2.3	202	230.7 0.001*
Physician Dentist	4	1.5	3	2.0	0	0.0	7	
Pharmacist	36	13.1	28	18.4	9	6.8	73	
Nursing/Paramedic	62	22.6	66	43.4	60	45.5	188	
Lab, Radiologist	4	1.5	18	11.8	31	23.5	53	
Non-medical job	1	0.4	5	3.3	29	22.0	35	
Education levels								
Bachelor	210	76.6	65	42.8	42	31.8	317	279.9 0.001*
Consultant/ PhD	45	16.4	6	3.9	0	0.0	51	
Diploma	1	0.4	75	49.3	36	27.3	112	
Master/ Senior	18	6.6	6	3.9	54	40.9	78	
Training on childhood TB								
No	136	49.6	150	98.7	132	100.0	418	180.1 0.001*
Yes	138	50.4	2	1.3	0	0.0	140	

Table 8: Relation between characteristics of HCWs with the level of practice.

	Level of practice						Total	X^2 P value
	Right complete "n=185"		Right incomplete "n=92"		Wrong "n=281"			
Age	No.	%	No.	%	No.	%		
25-34	132	71.4	44	47.8	156	55.5	332	
35-44	42	22.7	26	28.3	77	27.4	145	133.5
45-54	10	5.4	20	21.7	22	7.8	52	0.001*
>55	1	0.5	2	2.2	26	9.3	29	
Experience								
Less than 10 years old	122	65.9	65	70.7	159	56.6	346	7.6
more than 10 years	63	34.1	27	29.3	122	43.4	212	0.021*
Workplace								
Health center	30	16.2	42	45.7	114	40.6	186	37.295
Hospital	155	83.8	50	54.3	167	59.4	372	0.001*
Have isolation in your work								
No	32	17.3	21	22.8	43	15.3	96	2.75
Yes	153	82.7	71	77.2	238	84.7	462	0.25N.S
Position								
Physician	171	92.4	31	33.7	0	0.0	202	
Physician Dentist	4	2.2	3	3.3	0	0.0	7	
Pharmacist	0	0.0	25	27.2	48	17.1	73	442.8
Nursing/Paramedic	10	5.4	25	27.2	153	54.4	188	0.001*
Lab, Radiologist	0	0.0	8	8.7	45	16.0	53	
Non-medical job	0	0.0	0	0.0	35	12.5	35	
Education levels								
Bachelor	48	25.9	56	60.9	213	75.8	317	
Consultant/ PhD	49	26.5	2	2.2	0	0.0	51	308.6
Diploma	12	6.5	32	34.8	68	24.2	112	0.001*
Master/ Senior	76	41.1	2	2.2	0	0.0	78	
Training on childhood TB								
No	52	28.1	86	93.5	280	99.6	418	323.9
Yes	133	71.9	6	6.5	1	0.4	140	0.001*

The association between knowledge score with attitude and practice is presented in Table 9. The better the knowledge score, the more significant impact on positive attitude and correct and complete practice.

Table 9: Relation between level of knowledge and both attitude and practice among health care workers.

	Level of knowledge								Total	X^2 P value
	Excellent "n=174"		Good "n=126"		Fair "n=103"		Poor "n=155"			
	No.	%	No.	%	No.	%	No.	%		
Attitude										
Positive	142	81.6	85	67.5	42	40.8	5	3.2	274	488.5
Neutral	30	17.2	40	31.7	61	59.2	21	13.5	152	0.001*
Negative	2	1.1	1	0.8	0	0.0	129	83.2	132	
Practice										
Right and complete	154	88.5	31	24.6	0	0.0	0	0.0	185	583.4
Right but not complete	20	11.5	65	51.6	7	6.8	0	0.0	92	0.001*
Wrong	0	0.0	30	23.8	96	93.2	155	100.0	281	

Discussion

The primary findings of the present study were that HCWs had proper knowledge of TB patient characteristics, diagnosis, and treatment. There was a positive attitude regarding diagnosis and screening while practice competencies were limited.

The level of knowledge was excellent and good among 53.8% of participants. This was also found in the results of investigations conducted in major African centres [16, 17]. This result is similar to the 52% median International Standards for Tuberculosis Care (ISTC) score seen among medical professionals during the 2016 Hajj [17], which is lower than the 67.3% shown in Lima, Peru [18], but higher than the 14 % seen in India and the 10.5 to 48 % seen in Pakistan [19, 20]. However, this conclusion contradicts the low levels of TB knowledge across all occupational groups [14].

The results of the knowledge portion showed that, as was to be expected, doctors had the greatest overall knowledge scores, while nurses and pharmacists had lower overall knowledge scores. Naidoo et al. also identified a knowledge gap amongst occupations. Since doctors create care plans that nurses follow, it is crucial that nurses have a firm grasp of the fundamentals underlying clinical decisions [21].

On the other hand, healthcare professionals in trials involving public hospitals or clinicians who merged public and private practices seemed to have higher knowledge ratings, maybe as a result of their greater exposure to training materials in the public sector. As was previously found [19], this shows that public physicians at hospitals have a deeper understanding of TB than their private counterparts.

Aside from Côte d'Ivoire, all nations scored somewhat higher than average on global knowledge. Results improved dramatically when HCWs provided direct care for tuberculosis [22]. These results are consistent with previous research showing that frontline HCWs (physicians, nurses) know more about tuberculosis than other HCWs [17, 23].

The majority of responders (49.1%) had a positive attitude, while only 33.2% had correct and full practice routines. It is consistent with the results of a recent study Surveying the Knowledge and Practices of Health Professionals in China, India, Iran, and Mexico on Treating Tuberculosis [15] that found some problematic behaviours among HCWs. However, HCWs globally had generally positive attitudes; a good indicator that they were ready and able to identify and treat pediatric tuberculosis [22]. Also, the overall mean score for practice was greater than the scores for knowledge and attitude [14, 24]. Of the HCWs, almost 62% were given passing marks for their overall practice, while only 1% were given failing marks. In this study, we found that HCWs' TB knowledge increased with age, employment in hospitals, years of experience, and experience with TB patients. Similar factors affecting TB awareness among HCWs were observed across global studies [14, 18, 24]. Attitude ratings were substantially correlated with both age and profession. Researchers in Peru discovered that healthcare workers' attitudes regarding tuberculosis varied by the position of HCW [13], while in Thailand, researchers found that HCWs age was substantially correlated to their attitude toward the disease [25]. There was a statistically significant difference in practice scores according to education level, and there were also significant differences relating to the length of work experience and by occupation. Mozambican research indicated that HCWs TB practice ratings were significantly correlated to their educational attainment, profession, and years of experience caring for TB patients [14, 16]. However, work experience with TB, TB training, and education level were found to be independent predictors of excellent TB infection control practice among HCWs in Ethiopia [24]. There was a favourable association between knowledge and attitude, as well as between attitude and practice [17]. Nonetheless, the connection was tenuous, nd results on either the knowledge or practice quizzes did not show any statistically significant correlation among previous studies. There is no straightforward correlation between HCWs' knowledge, attitudes, and behaviors in regards to TB management, as suggested by reports in the literature [14, 16, 24].

There were some limitations in this survey. In the context of a prospective project launch and group KAP questionnaire-filling sessions, social desirability may influence results. Some participants may have answered questions as if they were factual or policy-based. Good practices among HCWs may have been overstated since they were self-reported and not observed.

This study has several strength factors including a proper sample size that could provide a base for the KAP of HCWs in KSA. Also, the survey results reveal the essential next stages in the decentralization of child TB diagnosis, including the continuous improvement of HCW capabilities and skills to identify, diagnose, and treat TB in children; and the improvement of availability of simple, rapid, and effective diagnostic equipment.

Conclusion

Overall, HCWs exhibited proper knowledge and positive attitudes in comparison with minimal experience in diagnosing children TB. Immediate action is required to increase HCW awareness, capacity, and skills, as well as access to an accurate diagnosis. In the fields of TB case identification and management, certain crucial information gaps were discovered. This study also highlights the significance of clinical experience and frequent interactions with tuberculosis patients in clinical practice as a pathway to competency-based learning by practice.

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Prevalence, knowledge, attitude, and preventive behaviours of Saudi university students with symptomatic undiagnosed Irritable Bowel Syndrome

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Abstract

Objectives: This study aimed to investigate the prevalence, knowledge, attitude, and preventive behaviours towards symptomatic undiagnosed irritable bowel syndrome (IBS) in Saudi university students. In addition, this study also aimed to determine the factors that influence Saudi university students' practice of preventive behaviours against IBS symptoms.

Methods: A cross sectional observational study was carried out to assess the prevalence, knowledge, attitude, and preventive behaviours of a group of Saudi university students with symptomatic undiagnosed irritable bowel syndrome in Riyadh, Saudi Arabia from 2021 to 2022. The sample size included 384 Saudi university students of both genders aged 18-30 years old.

Results: Among 384 Saudi university students, the prevalence rate of IBS, according to the Rome IV criteria used in this study, was statistically significant with a percentage of (39.6%). 152 symptomatic undiagnosed IBS Saudi university students were identified, with the majority female with a percentage of (53.9%) (82) compared to (44.3%) (70) symptomatic male counterparts.

Conclusion: Irritable bowel syndrome is a prevalent, chronic gastrointestinal disorder, it affects patients' quality of life and has a significant adverse effect and impacts on work, lifestyle and social well-being. The prevalence among our targeted sample according to IBS Rome IV diagnostic criteria was (39.6%) 152. Therefore, screening of IBS is recommended.

Keywords: IBS, Saudi University students, Symptomatic patients, Undiagnosed, Stress.

Introduction

Irritable bowel syndrome (IBS) is a common disorder that affects the large intestine (colon) causing cramping and abdominal bloating. In addition it can change the pattern of movement in the intestinal cavity and can affect all ages. Symptoms are sometimes different among those infected and are classified as functional digestive disorders. Symptoms can be controlled with medication, diet and dealing with stress and anxiety. Lifestyle changes can also help to manage IBS symptoms (1).

IBS diagnosis should be clinical and symptom-based, due to the lack of specific diagnostic tests available. The exact pathological mechanism of IBS is still unknown, and there is no specific investigation for its identification. IBS is not usually easily diagnosed, this is due to the symptom's variations and uncertainties; it is mainly a diagnosis of exclusion. Functional gastrointestinal disorders including IBS are commonly diagnosed by the using the ROME-III criteria that have been widely used for the diagnosis of this type of disease. IBS symptoms are well known and have a significant negative impact which affects patients' quality of life. Uncontrolled IBS symptoms, as well as its chronic nature, commonly result in patients seeking constant medical care. Symptomatic undiagnosed patients who are unaware of having IBS, are known to initially self-treat with over-the-counter medications (2).

A cross sectional study discussed the prevalence of irritable bowel syndrome and metabolic syndrome among 1040 young adults in an annual health check-up. It was conducted between 2015 and 2017 in the executive annual check-up at the outpatient department of a multispecialty tertiary care hospital. It was aimed to examine the association between newly diagnosed metabolic syndrome and IBS. Among all the participants who were involved in the Rome III questionnaire for the diagnosis of IBS, out of 1040 patients, 29.5% were found to have metabolic syndrome while 3.2% had IBS. IBS and metabolic syndrome are disorders that are complex, multifactorial, deceptive in their presentation, and which have far-reaching consequences. The prevalence of IBS was low based on Rome III criteria, and there was no significant association between metabolic syndrome and IBS. On the contrary, a population-based study of 1096 participants in Japan using the Rome III questionnaire found that IBS was indeed positively associated with metabolic syndrome. Moreover, a case–control study from South Korea reported a significantly higher prevalence of metabolic syndrome in patients with IBS than those without IBS using the Rome III criteria (3).

IBS is a common functional gastrointestinal disorder which can have a significant negative impact on patients' quality of life affecting their work, social interaction, learning activities,student's academic performance and future career development. Symptoms of irritable bowel syndrome include intermittent complaints of abdominal pain and abnormal bowel movements, and these are common in the general population. Daily diaries show that patients can be divided into the four distinct subtypes based upon different bowel patterns, namely IBS with diarrhea (IBS-D), IBS with constipation (IBS-C), IBS with mixed bowel pattern (IBS-M) (the most prevalent) and the rarely unclassifiable IBS (IBS-U). A research study discussed the impact of diet on the symptoms of irritable bowel syndrome and identified that reduced fibre intake is associated with an increased risk of constipation in the general population. A population-based survey in Norway reported that on average, IBS patients avoided 2.5 food items that triggered their symptoms, this included 35% who avoided milk, 14% cheese, 16% pulses, 24% onions, 10% wheat flour and 26% coffee. Wheat has consistently been identified as aggravating IBS symptoms. A recent survey in Australia reported that 14.9% of the general population reported wheat intolerance, however, only 1.2% had celiac disease, suggesting that 92% of those with wheat intolerance do not have celiac disease (4).

Another cross-sectional study conducted in Saudi Arabia with total of 173 medical students showed that IBS was significantly higher among students who experience emotional stress with a percentage of (25.4%) and was higher among students with a positive family history of IBS (5).

Methodology

This cross-sectional study was conducted between November 2021 and December 2022. 384 Saudi university students of both genders aged 18-30 years old were enrolled in the study. Prior to data collection, institutional review board approval was obtained from the Imam Muhammad bin Saud Research Ethics Committee in Riyadh City. We explained the study objectives to the participants and obtained their voluntary consent before enrolling them in the study. The data were collected via an online questionnaire distribued randomly through online platforms. Participants younger than 18 years or older than 30 years, non-Saudi individuals, and those diagnosed with IBS or those who did not provide informed consent were excluded. Participants were asked to complete a questionnaire that included demographic variables (eg, age, sex, marital status, education, and job). The participants also answered questions about their physical health, comorbidities, and past medical history.

The diagnosis and severity assessment of IBS was based on the Rome IV diagnostic questionnaire, a well-developed validated tool to assess IBS. This questionnaire is a reliable tool for diagnosing IBS based on the presence of abdominal pain or discomfort that occurred at least once a week for at least 3 months in the past 6 months, in combination with two or more incidents of pain or discomfort with defecation, change in stool frequency or appearance. Statistical analysis was done using a statistical package for social sciences (SPSS). We used the Chi-square test to attain a p-value between categorical dependent and independent data to estimate the association where $p \leq 0.05$ is considered significant.

Ethics and human subjects' protection:
The confidentiality of the data of the participants was maintained. Names and other identifying information was anonymous, and an informed consent was provided by participants before they completed the questionnaire. Ensuring privacy and the adequate level of confidentiality implies that the information is strictly used for research purposes only. The questionnaire contained an introduction explaining the purpose of the study, and required the participants' permission to use their responses in our study.

Results

In this study, data was collected from 384 participants. Female gender represented the majority of the sample with a percentage of 55.7% (214) compared to 44.3% (170) male. Most of the participants were aged between 18-30 years old. Results of the study revealed that the participants were in different academic years and the majority were fourth year university students. Around 43.8% of the participants were medical students. With respect to the academic year, 6.5%, 12.8%, 13%, 19%, 20.8%, and 18.2% of the students were in the preparatory, first, second, third, fourth, and fifth academic year, respectively. Most of the participants were single, with a percentage of 95.1%. A Grade point average (GPA) was reported for 48.4% (186) of the participants and the majority of our targeted sample had a GPA of 3.5-4.49 out of 5.0. More details are presented in Table 1.

Regarding the symptoms, abdominal pain was the most reported symptom in our study population with a percentage of 50.5%, followed by 41.7% with constipation and 27.3% with diarrhoea. However, 33.1% of the sample showed no symptoms.

Regarding the methods used to relieve their IBS symptoms, results of the present study showed that university students take regular medication, adhere to a specific diet, and try to reduce stress in order not to aggravate the condition. Table 2 contains more details.

When comparing the results among symptomatic undiagnosed Saudi university students and those with no symptoms, the prevalence of symptomatic undiagnosed IBS according to IBS Rome IV diagnostic criteria is 39.6% (152) among our targeted sample. Females represented the majority with a percentage of 53.9% (82) symptomatic prevalence compared to 44.3% (70) symptomatic males (p value = 0.569). Table 3 presents more details according to the Rome IV diagnostic criteria questionnaire.

Table 1: Demographic and clinical characteristics

		Count (n)	Percent (%)
Age (years)	Less than 18	4	1%
	18-30	370	96.4%
	31-40	3	0.8%
	More than 40	7	1.8%
Sex	Male	170	44.3%
	Female	214	55.7%
Nationality	Saudi	375	97.7%
	Non-Saudi	9	2.3%
Marital status	Married	19	4.97%
	Not married	365	95.1%
Occupation	Student	347	90.4%
	Employee	28	7.3%
	Not employee	9	2.3%
Academic year	Preparatory year	25	6.5%
	First year	49	12.8%
	Second year	50	13%
	Third year	73	19%
	Fourth year	80	20.8%
	Fifth year	70	18.2%
	Graduate	37	9.6%
	Medical Student	168	43.8%
GPA out of 5	2.49 or less	8	2.1%
	2.50 to 3.49	41	10.7%
	3.50 to 4.49	186	48.4%
	4.50 or more	149	38.8%

Table 1: Demographic and clinical characteristics (continued)

Weight (kg)	40-50	48	12.5%
	51-60	77	20.1%
	61-70	83	21.6%
	71-80	112	29.2%
	81-90	44	11.5%
	90 or more	20	5.2%
Height (cm)	140 or less	1	0.3%
	141-150	6	1.6%
	151-160	110	28.6%
	161-170	139	36.2%
	171-180	122	31.8%
	180 or more	6	1.6%
Sleeping hours per day	Less than 8 hours	159	41.4%
	8 hours or more	225	58.6%
	Smoking	37	9.6%
	History of abdominal surgery	10	2.6%
Type of surgery	Gastric sleeve	5	50%
	Appendectomy	1	10%
	Hernia repair	3	30%
	Resection and re-anastomosis	1	10%
History of gastrointestinal diseases	Irritable bowel syndrome	57	14.8%
	Peptic ulcer disease	6	1.6%
	Gastroesophageal reflux disease	29	7.6%
	Enteritis	6	1.6%
	Nothing	308	80.2%

Table 2: Symptoms and methods to relieve them

		Count (n)	Percent (%)
Symptoms	Constipation	160	41.7%
	Abdominal pain	194	50.5%
	Diarrhea	105	27.3%
	Vomiting	49	12.8%
	Rectal bleeding	16	4.2%
	Unintentional weight loss	30	7.8%
	No symptoms	127	33.1%
Methods to relieve IBS symptoms	Stress reduction	101	26.3%
	Diet	82	21.4%
	Exercise	52	13.5%
	Medication	90	23.4%
	Nothing	224	58.3%
IBS Rome IV diagnostic criteria	Positive	152	39.6%
	Negative	232	60.4%

Table 3: Comparison regarding the presence of IBS symptoms with ROME IV diagnostic criteria

		Positive n (%)	Negative n (%)	P Value*
Sex	Male	70 (46.1%)	100 (43.1%)	0.569
	Female	82 (53.9%)	132 (56.9%)	
Abdominal pain in the past 3 months	Never	5 (3.3%)	111 (47.8%)	0.000
	One day a month	14 (9.2%)	39 (16.8%)	
	Two to three days a month	29 (19.1%)	40 (17.2%)	
	Once a week	20 (13.2%)	15 (6.5%)	
	Two to three days a week	28 (18.4%)	11 (4.7%)	
	Most days	40 (26.3%)	9 (3.9%)	
	Every day	14 (9.2%)	6 (2.6%)	
	Multiple times per day or all the time	2 (1.3%)	1 (0.4%)	
Percentage of abdominal pain with bowel change	0% Never	10 (6.6%)	135 (58.8%)	
	10% - 30%	30 (19.7%)	53 (22.8%)	0.000
	40% - 60%	66 (43.4%)	33 (14.2%)	
	70% - 90%	41 (72%)	9 (3.9%)	
	100% Always	5 (3.3%)	2 (0.9%	
Percentage of abdominal pain with stool change either softer or harder than usual	0% Never	10 (6.6%)	137 (59.1%)	0.000
	10% - 30%	19 (12.5%)	42 (18.1%)	
	40% - 60%	51 (33.6%)	33 (14.2%)	
	70% - 90%	60 (39.5%)	17 (7.3%)	
	100% Always	12 (7.9%)	3 (1.3%)	
Percentage of abdominal pain with a need to defecate more or less than usual	0% Never	10 (6.6%)	128 (55.2%)	0.000
	10% - 30%	19 (12.5%)	49 (21.1%)	
	40% - 60%	46 (30.3%)	34 (14.7%)	
	70% - 90%	60 (39.5%)	19 (8.2%)	
	100% Always	17 (11.2%)	2 (0.9%)	

Table 3: Comparison regarding the presence of IBS symptoms with ROME IV diagnostic criteria (continued)

Symptom duration 6 months or more	Yes	117 (77%)	54 (23.3%)	0.000
	No	35 (23%)	178 (76.7%)	
Type of abnormal stool in past 3 months	Diarrhea	33 (21.7%)	18 (7.8%)	0.000
	Constipation	66 (43.4%)	32 (13.8%)	
	Diarrhea and constipation	53 (34.9%)	21 (9.1%)	

*Chi square test

Discussion

This study investigates IBS prevalence, knowledge, attitude and preventive behaviours among Saudi university students with symptomatic undiagnosed irritable bowel syndrome. The results show a high prevalence of IBS in the study population. The prevalence rate of IBS according to Rome IV criteria in this study was statistically significant with the percentage of 39.6% (152) among symptomatic undiagnosed IBS Saudi university students. Females represented the majority with a percentage of 53.9% (82) who were symptomatic and showed a higher prevalence compared to 44.3% (70) symptomatic males. A previous study by Alsuwailm et al.(5) in Saudi Arabia showed that the prevalence of IBS among medical students was 44.5%. Another study was also carried out in Saudi Arabia by Alzahrani et al.(6) which estimated that the prevalence of IBS among medical students was around 17.5%. Similarly, a study carried out by Alaqeel et al.(7) revealed that the overall prevalence of IBS in Saudi Arabia was 21%. However, globally, the prevalence of IBS in different countries among medical students varies; the percentages from Africa, Japan, Korea, Pakistan, Canada, and China were 43.5%, 35.5%, 29.2%, 28.3%, 19.1%, 9.3%, respectively (8). Several investigations were conducted to evaluate the relationship between gender and increased IBS prevalence. According to research by Elhosseiny et al (9), the male percentage was higher at 67%. Another similar study revealed a male predominance with a percentage of 18.6% (8). Nevertheless, a study carried out by Alzahrani et al6 revealed that females were associated with IBS more than males, with a percentage of 19.6%. Various research studies have shown that IBS is associated with educational level, with senior year students having a higher incidence of IBS. A study carried out by Elhosseiny et al (9), showed that most IBS patients were senior-year students, with a prevalence of 43.3%. Another study carried out by Alsuwailm et al (5), estimated that 11% of IBS patients were from the 6th year while 7% were from the 5th year. However, our investigations revealed that the majority of IBS were 4th-year Saudi University students with a percentage of 21.1%. While several papers attempted to relate IBS to increased BMI, research carried out by Alsuwailm et al (5) showed that most students with IBS had a BMI within the normal range of 28.3%. According to the Elhosseiny et al (9) study, it was found that the majority of IBS students had a normal BMI of 62.4%. This agrees with the result of this study as most of the symptomatic undiagnosed IBS Saudi University students have a BMI within the normal range of 34.9%.

In Saudi Arabia, a study conducted in Riyadh estimated the prevalence of IBS among all academic year students from both genders, at the Imam Mohammad Ibn Saud Islamic University (IMSIU) to be 12.6% as their responses were consistent with a diagnosis of IBS (10). Another similar study conducted in Taiwan estimated the prevalence of IBS among female university students with a percentage of 10.1%(11). A cross-sectional study was carried out among medical students and interns in Jeddah, Saudi Arabia, measuring the prevalence of IBS to be 31.8% (12). Another similar localised study, estimated the prevalence of IBS and its association with anxiety among medical students at King Saud bin Abdulaziz University for Health Sciences in Riyadh to be 21% (n=57)(8). Similarly, this study supports these findings. Our results indicated that students in the College of Medicine had a higher risk of IBS compared to those in other colleges. Highly diverse findings regarding the prevalence of IBS have been obtained in different studies. The variations in the rate of the prevalence of IBS might be due to differing diagnostic criteria, lack of knowledge about IBS and the geographical area.

With respect to the academic year, the current study demonstrated that IBS was most prevalent among final year university students, followed by third year university students. These high rates could be correlated with an increasing workload and anxiety. Many studies also demonstrated that there was a statistical significance between the prevalence of IBS among university students and anxiety; this indicates that university students with IBS symptoms have significantly greater stress compared with those without IBS. Those patients tend to experience anxiety due to abdominal discomfort and abnormal bowel movements, which could affect their work, social interaction, learning activities, and quality of life. Therefore, IBS may influence students' academic performance and future career development.

Regarding preventive habits, the results of the present study showed that university students take regular medication, adhere to a specific diet and try to reduce stress to prevent exaggerating their IBS symptoms. Similar results were also reported from many other studies15 .

Conclusion

Irritable bowel syndrome is a prevalent, chronic gastrointestinal disorder which affects patients' quality of life and has significant adverse effects which impact on work, lifestyle and social well-being. The prevalence among our targeted sample of symptomatic undiagnosed IBS according to IBS Rome IV diagnostic criteria was 39.6%. Therefore, screening of IBS is recommended. Future studies need to perform more focused evaluation to identify the underlying etiology of IBS, and how to reduce its incidence if applicable.

List of Abbreviations

IBS: Irritable bowel syndrome
IMSIU: Imam Mohammad Ibn Saud Islamic University
BMI: Body mass index

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Consent for publication

Informed consent was obtained from all individual participants included in the study.

Ethical approval

Ethical approval was granted by the Institutional Review Board via reference number: 181-2022, dated:15/02/2022.

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Knowledge and awareness of intestinal parasitic infections among students at King Abdulaziz University in Jeddah, Saudi Arabia

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Abstract

Objective: Intestinal parasite illnesses are one of the most significant public health concerns in both developing and many developed countries, increasing morbidity and mortality. Various researchers have suggested that illness awareness and knowledge are beneficial in avoiding and limiting the spread of numerous diseases.

The current study aims to examine information on knowledge and awareness on intestinal parasite illnesses among university students attending King Abdulaziz University (KAU) in Jeddah, Saudi Arabia.

Methods: Students were given a self-administered questionnaire to complete in order to collect information on their demographics as well as their KAP toward intestinal helminth infections. Simple random sampling was used to conduct this cross-sectional investigation. 213 volunteers from various KAU faculties were included in the study, and the participants were informed and consented to the study's purposes. A questionnaire was made available online for students to complete. The gathered data underwent additional statistical analysis.

Results: The study included 213 students from various disciplines. Male participation was 22.53% and female participation 77.46%. Bachelor degree students made up 89.2%, diploma students 7.04%, master degree students 3.29%, and one PhD student 0.47%. Knowledge assessment on intestinal parasite illnesses revealed that overall, 53.52% of respondents were aware of these infections while 46.48% were not, which was a statistically significant difference.

Conclusion: Students, particularly those majoring in fields other than health sciences, have a poor grasp of and awareness of intestinal parasite diseases; hence, there is a need for more initiatives to implement change.

Key words: Knowledge, Awareness, Intestinal Parasitic Infection, Students, Jeddah

Introduction

Parasites are eukaryotic organisms that can spread a variety of human diseases. Intestinal parasite infections (IPIs) are one of the primary public health problems, as they are the leading cause of illness, morbidity, and mortality in certain developing and wealthy nations. It is estimated that around 3.5 billion people globally are afflicted (1). Ascaris lumbricoides, hookworms, Trichuris trichiura, Giardia lamblia, Entamoeba histolytica, Cryptosporidium parvum, Taenia species, and Schistosoma spp. are human-important parasites. Common parasitic symptoms include gastrointestinal disturbances, indigestion, nausea, and vomiting. Certain parasites can also cause ulcers, intestinal bleeding, destruction of cells and tissues, malabsorption of nutrients, nutritional deficiency, and growth retardation in children (2), which can have a negative impact on their academic performance (2). Parasite transmission may be influenced by numerous circumstances. Inadequate sanitation, contaminated water resources, failure to restrict the spread of vectors, a lack of sanitary habits, and inadequate health education are among these factors (3).

Knowledge and awareness of disease are effective, targeted, and straightforward prevention and control techniques that are required in a population (4). This can be accomplished through health education through increasing awareness, understanding, and behavioral changes (5). Health education is critical in reducing and preventing the spread of parasite illnesses. For health education to be effective, many entities must be identified so that a clear message can be provided, and so knowledge and awareness must be interpreted (6). According to recent research, people's beliefs and attitudes toward parasitic infections, as well as their prevention and control, are critical (7). Infections may rise and spread due to a lack of awareness and knowledge about transmission routes, treatment, prevention, and control measures for intestinal parasites. Successful parasitic infection prevention and control necessitates not only an understanding of the parasites but also better understanding of the interactions between the hosts and the parasites

Although many studies have looked at the prevalence of intestinal parasitic infection in Saudi Arabian cities like Jeddah (8-11), few have examined Saudis' knowledge, awareness, and practice with regard to parasitic infections. As a result, the current study seeks to learn more about KAU Jeddah students' familiarity with IPIs and response to parasitic illnesses. Data from this study can be used as a starting point for future research on students' understanding of intestinal parasite disorders and the effectiveness of various strategies for limiting their spread.

Materials and Methods

A self-administered questionnaire was distributed and aimed to collect information on Knowledge and awareness of IPI among students towards intestinal helminth infections, in addition to their demographic information.

Ethical statement:

Ethical approval was applied and obtained from the Unit of biomedical & ethics research committee, Faculty of Medicine, KAU in Jeddah, (reference no: 684-20).

Study design:

Students were given a self-administered questionnaire to complete in order to gather data on their demographics as well as their KAP toward intestinal helminth infections. Simple random sampling was used to conduct this cross-sectional investigation. The inquiry involved 213 participants in total, all of whom were 17 years of age or older from various KAU faculties. Participants were informed of the study's objectives. After reading and giving their consent, students were required to complete an online questionnaire. The gathered data underwent additional statistical analysis.

Data analysis:

Statistical analysis was performed by using the statistical program SAS (version 9.4). Data are presented as frequency with a percentage for categorical variables.

Fisher's exact test for association between categorical variables was used. All statistical tests were considered significant if P value ≤ 0.05.

Results

The purpose of this research was to assess the knowledge and awareness of IP illnesses among university students. Following approval of their agreement to participate, a total of 213 male and female students responded to the questionnaire. Surprisingly, female responses were greater than male responses (female = 77.46%, male = 22.53%).

Students were divided into two groups based on their field of study: medical/health sciences students and non-medical/health sciences students. Students from non-medical fields made up 58.69% of the participants (125/213), while medical/health sciences students comprised 41.31% (88/213).

In terms of educational level, bachelor degree students accounted for 89.2% (190/213), followed by diploma students 7.04% (15/213), master degree students 3.29%, and only one PhD student 0.47% (Table 1).

The sociodemographic analysis in association with educational level (P value = 0.0021) was statistically significant, as was the field of study variable (P value = 0.0013). Academic achievement (bachelor or master and other degrees) did not exhibit any significance (P value= 0.5085). Regarding the ages of the participants, 52.5%

(112/213) were between the ages of 17-20, 36.15 % (77/213) were between the ages of 21 and 24, 6. 10 % (13/213) were between the ages of 25 and 30, and only 5.16% (11/213) were over 30 (Table 1).

Participants' response scores were divided into four categories: 0–6 was regarded as poor scores, 7–12 were deemed good, 13–20 were considered very good, and 21–29 were deemed excellent. The response scores of participants was statistically significant (P <0.0001) where medical/health sciences discipline participants were higher than those from non-medical/health specialties; 88.8% of non-medical/health specialties scored poorly, whereas 76.79% of medical/health sciences specialties scored excellently (Figure 1).

A total of 26.29% of participants (56/213) obtained an excellent score, followed by 40.38% (86/213) who received a very good score, 20.66% (44/213) who received a good score, and 12.68% (27/213) who had a poor response rate (Table 1).

Students at KAU were invited to respond to questions about their knowledge and awareness of IP infections (Table 2). The first question asked if they had heard of IPIs, to which the overall response was 53.52% who said yes and 46.48% who said no, and was of significance (P <.0001) (Tables 2, 3). Furthermore, the majority who answered yes were from medical/health specialities 72.3% (Table 3). The most likely form they learned about IP infections was through university (26.29%) in which 55.68% were from medical/health areas and this was of significance (P value < 0.0001), followed by the internet (24.41%), which showed no significance (P= 0.51174) and both non-medical and medical specialties scored a similar percentage response (26.4% non-medical/health field, 21.59% medical/health sciences) (Tables 2, 3).

The overall response rate for whether they had ever encountered any parasitic infection was 93.9% no, with only 6.1% answering yes (Table 2). Looking further into the specialty background, medical/health sciences participants answered no (94.3%) and a similar percentage from non-medical/health sciences specialties (93.6%), though this was not statistically significant (P value= 1.00). (Table 3). Participants were questioned about their perceptions of the effects of intestinal parasitic infections on humans, and the result was statistically significant (P< 0.0001): 56.34 % selected harmful to humans (120/213) (Table 2), with the majority of respondents coming from a medical/health background (80.68 %) (Table 3). In addition, 42.25 percent of respondents (90/213) were unaware of the effect of IP on humans, with the majority of respondents coming from non-medical/health disciplines (60.8%) compared to medical/health sciences (15.91%), and only 1.4% selected beneficial, with all responses coming from medical/health specialties (Tables 2, 3).

Students were prompted to choose from a list of diseases to assess their knowledge of intestinal parasitic infections; only 22.54% (48/213) correctly identified giardiasis, of which 44.32% were from a medical/health sciences background (39/213) and only 7.2% were from a non-medical/health sciences background (9/213); 51.6% selected "don't know" (Table 2). In addition, the outcomes were statistically significant (P< 0.0001) (Tables 2, 3).

Students' knowledge of the modes of transmission of IPIs was assessed by selecting the correct answer from a list of options (Tables 2, 3). Students from the medical and health sciences correctly answered the questions on drinking polluted water and eating contaminated food, with significant results (P= 0.0002 and 0.0038, respectively) (Tables 2, 3). The table's other choices demonstrate that medical and health science students responded more favorably than those who are not majoring in medicine/ health sciences (Tables 2, 3).

Participants were requested to select common signs and symptoms of parasite infections from a list; both medical and non-medical/health sciences participants selected the majority of accurate answers, which was statistically significant (Tables 2, 3).

The participants were also questioned what they believed to be the most appropriate treatment for an IP infection. A total of 79.34% (169/213) selected consult a doctor with significant findings (P= 0.032) and correct scoring in both fields (Question 14, Tables 2, 3).

Finally, students were then invited to select what they believed to be the most effective means of preventing and controlling IP infections. Except for the proper cooking of meat, which was non-significant (P= 0.1646), correct answers were statistically significant (Q 15, Tables 2, 3).

Figure 1: Field of study (specialty) score responses between medical/ health sciences participants and non-health disciplines.

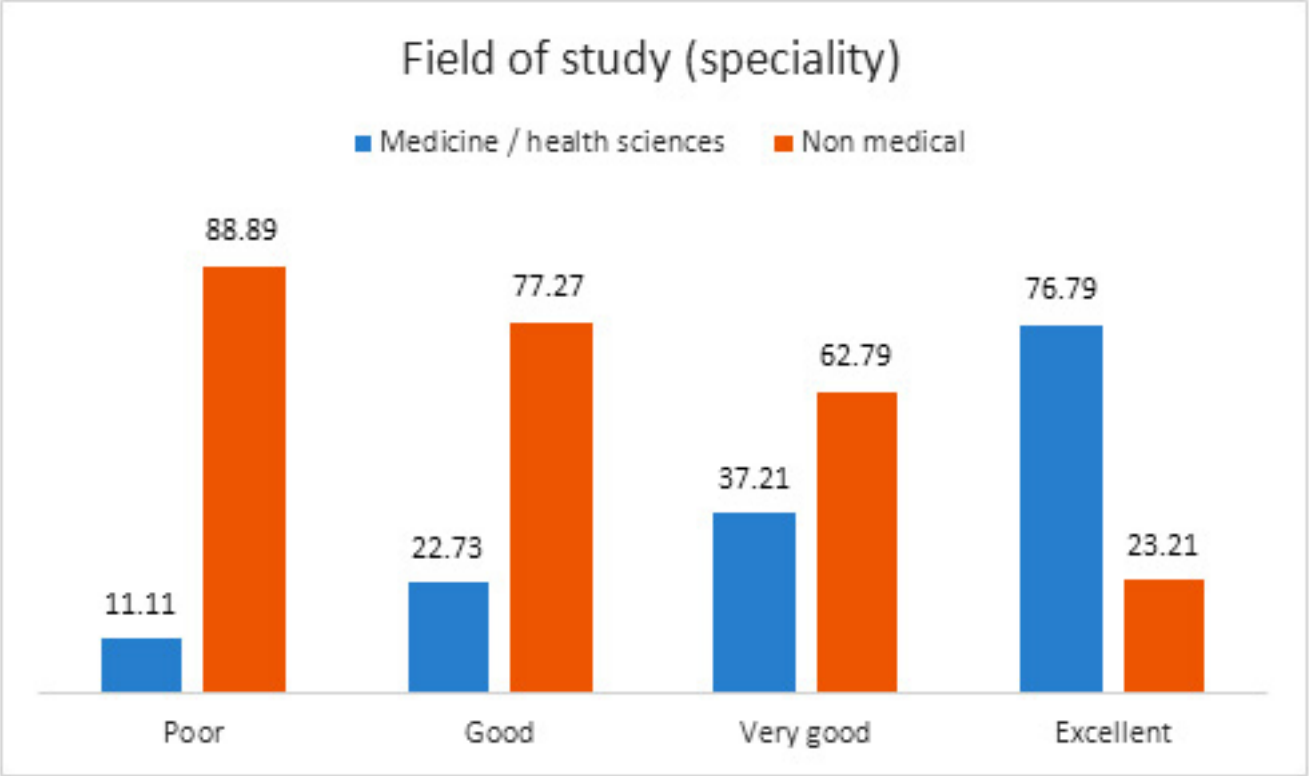

Table 1: Demographic characteristics of KAU student's participants

Variables	Total	Percentage (N %)
Score		
Poor	27	12.68%
Good	44	20.66%
Very good	86	40.38%
Excellent	56	26.29%
Age		
17-20 years	112	52.58%
21-24years	77	36.15%
25-30 years	13	6.1%
> 30 years	11	5.16%
Age_1		
17-20 years	112	52.58%
> 20 years	101	47.42%
Gender		
Female	165	77.46%
Male	48	22.54%
Educational level		
Bachelor	190	89.2%
Diploma	15	7.04%
Master	7	3.29%
PhD	1	0.47%
Educational level_1		
Bachelor	190	89.2%
Other	23	10.8%
Field of study (specialty)		
Medicine / health sciences	88	41.31%
Non-medical/ health sciences	125	58.69%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students

Variables	Total	Percentage (N %)
1- Have you heard about intestinal parasitic (IP) infections?		
No	99	46.48%
Yes	114	53.52%
2- How did you hear about it?		
Internet		
No	161	75.59%
Yes	52	24.41%
Television		
No	203	95.31%
Yes	10	4.69%
School		
No	180	84.51%
Yes	33	15.49%
University		
No	157	73.71%
Yes	57	26.29%
Newspaper		
No	209	98.12%
Yes	4	1.88%
Friends / Family		
No	186	87.32%
Yes	27	12.68%
Clinic/ hospital		
No	200	93.9%
Yes	13	6.1%
3- Have you ever been infected with intestinal parasites?		
No	200	93.9%
Yes	13	6.1%
4- What are the effects of intestinal parasitic infections?		
Beneficial to peoples' health	3	1.41%
Don't Know	90	42.25%
Harmful to peoples' health	120	56.34%
5- Which of the following diseases is an intestinal parasitic infection?		
Aids	6	2.82%
Cholera	30	14.08%
Don't know	110	51.64%
Giardiasis	48	22.54%
Hepatitis	19	8.92%
1- Eating contaminated vegetables and fruits		
Don't know	50	23.47%
No	12	5.63%
Yes	151	70.89%
2- Drinking contaminated water		
Don't know	50	23.47%
No	20	9.39%
Yes	143	67.14%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

3- Eating raw or undercooked meat		
Don't know	57	26.76%
No	12	5.63%
Yes	144	67.61%
4- Coughing and sneezing		
Don't know	97	45.54%
No	89	41.78%
Yes	27	12.68%
5- Poor hygiene (not washing hands)		
Don't know	76	35.68%
No	29	13.62%
Yes	108	50.7%
6- Walking without shoes outside		
Don't know	77	36.15%
No	45	21.13%
Yes	91	42.72%
7- Soil contact		
Don't know	84	39.44%
No	43	20.19%
Yes	86	40.38%
8- Sexual contact		
Don't know	100	46.95%
No	68	31.92%
Yes	45	21.13%
9- Animal contact		
Don't know	88	41.31%
No	34	15.96%
Yes	91	42.72%
10- Faeces are considered a source of parasitic infection?		
Don't Know	97	45.54%
No	23	10.8%
Yes	93	43.66%
11- Do you think food handlers could be a source of transmission (cooks, waiters)		
Don't know	70	32.86%
No	15	7.04%
Yes	128	60.09%
12- Do you think flies & cockroaches could transmit parasites?		
Don't know	74	34.74%
No	19	8.92%
Yes	120	56.34%
13- Which are common symptoms of intestinal parasitic diseases? (Choose one or more options)		
Diarrhoea		
No	60	28.17%
Yes	153	71.83%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

Dysentery (blood with stool)		
No	112	52.58%
Yes	101	47.42%
Abdominal pain		
No	77	36.15%
Yes	136	63.85%
Anaemia		
No	169	79.34%
Yes	44	20.66%
Nausea/ vomiting		
No	77	36.15%
Yes	136	63.85%
Fever		
No	126	59.15%
Yes	87	40.85%
Weight loss		
No	123	57.75%
Yes	90	42.25%
Muscle pain		
No	175	82.16%
Yes	38	17.84%
Sore throat		
No	199	93.43%
Yes	14	6.57%
14- If you were infected with a parasitic disease, which one would you choose for treatment?		
Consult with a doctor	169	79.34%
Don't know	25	11.74%
Don't take it seriously	5	2.35%
Self-medication	4	1.88%
Traditional medicine	10	4.69%
15- Which of the following methods prevent intestinal parasitic diseases? (Choose one or more options)		
Proper washing fruits and vegetables		
No	34	15.96%
Yes	179	84.04%
Washing hands before eating and after defecation		
No	59	26.29%
Yes	157	73.71%
Boiling untreated water		
No	101	47.42%
Yes	112	52.58%
Cover mouth when sneezing		
No	149	69.95%
Yes	64	30.05%
Using bed nets when sleeping		
No	155	72.77%
Yes	58	27.23%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

Proper cooking of meat		
No	60	28.17%
Yes	153	71.83%
Cutting finger nails regularly		
No	117	54.93%
Yes	96	45.07%
Treatment of pets		
No	128	60.09%
Yes	85	39.91%
Avoid swimming in contaminated water		
No	83	38.97%
Yes	130	61.03%
Wearing a face mask in public		
No	171	80.28%
Yes	42	19.72%
Avoid sexual contact with infected partner		
No	124	58.22%
Yes	89	41.78%

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline

Variables	Medicine/health sciences	Non-medical/health sciences	P value
1- Have you heard about intestinal parasitic (IP) infections?			<.0001
No	24 27.27	75 60.00	
Yes	64 72.73	50 40.00	
2- How did you hear about it?			
Internet			0.5174
No	69 78.41	92 73.60	
Yes	19 21.59	33 26.40	
Television			0.5292
No	85 96.59	118 94.40	
Yes	3 3.41	7 5.60	
School			0.0536
No	69 78.41	111 88.80	
Yes	19 21.59	14 11.20	
University			<.0001
No	39 44.32	118 94.40	
Yes	49 55.68	7 5.60	
Newspaper			0.6441
No	87 98.86	122 97.60	
Yes	1 1.14	3 2.40	
Friends / Family			0.8348
No	76 86.36	110 88.00	
Yes	12 13.64	15 12.00	
Clinic/ hospital			0.1516
No	80 90.91	120 96.00	
Yes	8 9.09	5 4.00	
3- Have you ever been infected with intestinal parasites?			1.0000
No	83 94.32	117 93.60	
Yes	5 5.68	8 6.40	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

4- What are the effects of intestinal parasitic infections?			<.0001
Beneficial to peoples' health	3 3.41	0 0.00	
Don't Know	14 15.91	76 60.80	
Harmful to peoples' health	71 80.68	49 39.20	
5- Which of the following diseases is an intestinal parasitic infection?			<.0001
Aids	1 1.14	5 4.00	
Cholera	18 20.45	12 9.60	
Don't know	26 29.55	84 67.20	
Giardiasis	39 44.32	9 7.20	
Hepatitis	4 4.55	15 12.00	
1- Eating contaminated vegetables and fruits			0 .0002
Don't know	9 10.23	41 32.80	
No	4 4.55	8 6.40	
Yes	75 85.23	76 60.80	
2- Drinking contaminated water			0.0038
Don't know	11 12.50	39 31.20	
No	8 9.09	12 9.60	
Yes	69 78.41	74 59.20	
3- Eating raw or undercooked meat			0.0076
Don't know	15 17.05	42 33.60	
No	3 3.41	9 7.20	
Yes	70 79.55	74 59.20	
4- Coughing and sneezing			0.0067
Don't know	31 35.23	66 52.80	
No	48 54.55	41 32.80	
Yes	9 10.23	18 14.40	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

5- Poor hygiene (not washing hands)			0.0015
Don't know	20 22.73	56 44.80	
No	11 12.50	18 14.40	
Yes	57 64.77	51 40.80	
6- Walking without shoes outside			0.0009
Don't know	23 26.14	54 43.20	
No	14 15.91	31 24.80	
Yes	51 57.95	40 32.00	
7- Soil contact			<.0001
Don't know	20 22.73	64 51.20	
No	13 14.77	30 24.00	
Yes	55 62.50	31 24.80	
8- Sexual contact			0 .1081
Don't know	34 38.64	66 52.80	
No	34 38.64	34 27.20	
Yes	20 22.73	25 20.00	
9- Animal contact			<.0001
Don't know	23 26.14	65 52.00	
No	12 13.64	22 17.60	
Yes	53 60.23	38 30.40	
10- Faeces are considered a source of parasitic infection?			<.0001
Don't Know	18 20.45	79 63.20	
No	9 10.23	14 11.20	
Yes	61 69.32	32 25.60	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

11- Do you think food handlers could be a source of transmission (cooks, waiters)			0.0608
Don't know	21 23.86	49 39.20	
No	7 7.95	8 6.40	
Yes	60 68.18	68 54.40	
12- Do you think flies & cockroaches could transmit parasites?			0.1023
Don't know	24 27.27	50 40.00	
No	7 7.95	12 9.60	
Yes	57 64.77	63 50.40	
13- Which are common symptoms of intestinal parasitic diseases? (Choose one or more options)			
Diarrhoea			<.0001
No	12 13.64	48 38.40	
Yes	76 86.36	77 61.60	
Dysentery (blood with stool)			<.0001
No	27 30.68	85 68.00	
Yes	61 69.32	40 32.00	
Abdominal pain			<.0001
No	15 17.05	62 49.60	
Yes	73 82.95	63 50.40	
Anaemia			0.0096
No	62 70.45	107 85.60	
Yes	26 29.55	18 14.40	
Nausea/ vomiting			0.0597
No	25 28.41	52 41.60	
Yes	63 71.59	73 58.40	
Fever			0.0019
No	41 46.59	85 68.00	
Yes	47 53.41	40 32.00	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

Weight loss			0.0030
No	40 45.45	83 66.40	
Yes	48 54.55	42 33.60	
Muscle pain			0.2762
No	69 78.41	106 84.80	
Yes	19 21.59	19 15.20	
Sore throat			0.4059
No	84 95.45	115 92.00	
Yes	4 4.55	10 8.00	
14- If you were infected with a parasitic disease, which one would you choose for treatment?			0.0323
Consult with a doctor	78 88.64	91 72.80	
Don't know	5 5.68	20 16.00	
Don't take it seriously	1 1.14	4 3.20	
Self-medication	0 0.00	4 3.20	
Traditional medicine	4 4.55	6 4.80	
15- Which of the following methods prevent intestinal parasitic diseases? (Choose one or more options)			
Proper washing fruits and vegetables			0.0232
No	8 9.09	26 20.80	
Yes	80 90.91	99 79.20	
Washing hands before eating and after defecation			0.0015
No	13 14.77	43 34.40	
Yes	75 85.23	82 65.60	
Boiling untreated water			0.0034
No	31 35.23	70 56.00	
Yes	57 64.77	55 44.00	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

Cover mouth when sneezing			1.0000
No	62 70.45	87 69.60	
Yes	26 29.55	38 30.40	
Using bed nets when sleeping			0.0629
No	58 65.91	97 77.60	
Yes	30 34.09	28 22.40	
Proper cooking of meat			0.1646
No	20 22.73	40 32.00	
Yes	68 77.27	85 68.00	
Cutting finger nails regularly			0.0502
No	41 46.59	76 60.80	
Yes	47 53.41	49 39.20	
Treatment of pets			0.0068
No	43 48.86	85 68.00	
Yes	45 51.14	40 32.00	
Avoid swimming in contaminated water			0.0002
No	21 23.86	62 49.60	
Yes	67 76.14	63 50.40	
Wearing a face mask in public			0.2949
No	74 84.09	97 77.60	
Yes	14 15.91	28 22.40	
Avoid sexual contact with infected partner			0.6730
No	53 60.23	71 56.80	
Yes	35 39.77	54 43.20	

Discussion

With a fluctuating prevalence and geographic distribution, intestinal parasitic infections are neglected diseases brought on by helminths and protozoa (12). They can also impair adult productivity and cause significant morbidity and death in susceptible areas (13), leading to worldwide annual loss of 39 million disability-adjusted life years (DALYs) (14).

To date, limited studies have been conducted in Jeddah, Saudi Arabia on the knowledge and awareness of intestinal parasite infections among university students. The purpose of this study was to assess the knowledge and awareness of intestinal parasite infection among KAU students from various academic disciplines. This will serve as initial information to assist in the prevention and spread awareness of IPIs.

Overall, non-medical/health sciences students had less knowledge and awareness of intestinal parasite illnesses, the mode of transmission, symptoms, and preventive strategies. This is comparable with a 2007 survey among KAU students, which demonstrated that two-thirds of the respondents had a low level of knowledge on parasites and parasitic illnesses (15).

Data from educational level perspectives were found to be poor among bachelor level students, with 92.5% scoring poorly in terms of knowledge and awareness of IPIs compared to students from other educational levels (diploma, master, and PhD). Despite this, the majority of participants held bachelor's degrees. Furthermore, those that scored exceptionally well had a bachelor's degree background.

In order to examine students' knowledge of IPIs, they were separated into medical/health sciences specialties and non-medical/health sciences specializations. Medical/health sciences participants received the highest scores (excellent), as expected, with 76.79%.

In a study conducted on the population in Ahvaz County, southwestern Iran, 49.5% of the participants were female and 50.5% were male (16), whereas in our study, female participants comprised the majority with 77.46% of the sample while male students comprised 22.53 %, where age, specialty, and educational level were all significant sociodemographic factors.

As predicted, medical/health sciences students had the highest total response score, while non-medical health students had the lowest. Moreover, 53.5% of participants reported acquaintance with IPIs, with the majority coming from the medical/health sciences and 46.48 % from non-medical backgrounds. This was in line with the outcomes of a survey among university students in Selangor, Malaysia (17). More than half of the respondents in similar research conducted in Nigeria reported knowledge of gastrointestinal parasites, which was consistent with these findings (18). A larger percentage was reported in Rio de Janeiro, Brazil, among their respondents (19), as well as in a study of adult residents of Selangor, Malaysia, where the level of knowledge about parasite infection was 76.3% (3), and an investigation on IP infection conducted on students in Asmara, Eritrea, where 73% of them had prior knowledge of IPIs (20).

Surprisingly, the primary source of information about intestinal parasitic infections was mostly through the university, followed by the internet. This concurs with past research that discovered the internet to be the primary source of information on parasitic illnesses (6). Internet and media provide critical roles in educating the public about parasite diseases and are essential components of efficient health communication (7). However another study in Pahang discovered that the major reference for gaining knowledge of parasites is from health clinics or hospitals, which was less in our study (21).

This highlights the critical importance of increasing IPI information and awareness among students in non-health disciplines. Despite the fact that fewer respondents had a history of parasitic infection, the majority were able to identify significant parasitic symptoms such as diarrhea and abdominal pain. This finding is consistent with a study in Selangor, Malaysia, where they predominantly identified diarrhea as a symptom of parasitic infection (6), and in Iran (16). Also, in Côte d'Ivoire (5), applicants were able to recognize symptoms of fatigue, loss of appetite, diarrhea, and blood in stool (5, 6). Compared to our investigation, a larger proportion of respondents in a study on underprivileged border inhabitants of Thailand and Myanmar 71.3% were unaware of IPI-risk signs (21). Despite the high prevalence of IPIs in animal and water samples, 32.3% of respondents claimed to be unaware of their household's animal waste management or water treatment. These factors may contribute to the high incidence of infectious diseases in the Tha Song Yang District (21). Though not significant, a study on impoverished border residents of Thailand and Myanmar, educational level and understanding about IPIs was significant (21).

According to the results, 6.1% of participants had IPI infections, which is consistent with a study conducted in Iran, where 9.9% of individuals reported having an infection with a parasitic disease (16).

In the current study, only 22.54% of respondents correctly identified an example of intestinal parasite infection. This was in line with the results of a survey of Orang Asli residents of Malaysia (21). Meanwhile, in a study conducted in Iran, about 42.8% of participants correctly classified malaria as a parasitic disease (4). The likelihood of parasitic disease transmission through dirty hands and direct contact with animals was also known to over half of the (22) respondents, which was consistent with our findings (16).

The majority of students (60.09%) had a solid understanding of the role of food handlers in the transmission of IP disease. In contrast, a recent study of university students in Selangor, Malaysia (17) and another survey of Malaysian food handlers (22) revealed low levels of understanding.

People acknowledged wearing shoes as a worm prevention measure in a 2010 survey conducted in western Côte d'Ivoire, however they failed to explain that soil contact is required for worm transmission. Therefore, there was a reasonable level of information regarding the methods of worm infection transmission and prevention (5).

In compliance with past studies (5), (21), the majority of participants selected consulting with a physician as the most beneficial method for treating parasitic worms (5), (21). This demonstrated that students had a solid understanding of treatment recommendations for IPIs.

Participants gave favorable responses to IPI prevention and control strategies such as thoroughly cooking meat and periodically boiling water before consuming it. This finding was reinforced by a study conducted in Lusaka, Zambia, which indicated that proper meat processing and hygiene inspection provide the cornerstone for preventing human taeniasis (23), as well as in Selangor, Malaysia (3). A survey of university students in southern Brazil indicated that 93.9% were aware that eating raw meat poses a health risk (24). This is significant since meat intake is a potential source of parasite transmission.

The number of female sample respondents was larger than the number of male participants, which was consistent with a study conducted in Selangor, Malaysia (5). There may be gender bias in the data, but this has no effect on the awareness pattern; the key issue is to evaluate adult awareness of parasite infection.

The study's findings revealed a large gap among KAU students that requires immediate intervention. Regardless of the individual's expertise in each area, it is possible to state that 46.4% of respondents lack fundamental IPI knowledge. This percentage is big enough to warrant an awareness-raising effort, which is compliant with prior research (25-27).

Conclusion

To effectively control parasitic diseases, better participatory strategies are needed like the necessity for community-based interventions in high-endemicity areas for educational initiatives (5) .

IPIs remain a global public health issue, highlighting the need for more financing, and health and education professional training to control these diseases in vulnerable communities. It also advocates for more funds to provide high-quality public health services. Thus, IPIs and socioeconomic determinants of health must be understood (24).

This study demonstrated the need for more efforts to raise awareness of intestinal parasite illnesses' routes of transmission and prevention and control among non-medical/health sciences university students.

Furthermore, they offer an intriguing perspective on the disease, which is critical for the effective execution of any preventive measures (28).

Conflict of Interest: Author declares no conflicts of interest in this paper.

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Knowledge and Practices of Female Teachers about Gestational Diabetes in Jizan Province, Saudi Arabia

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Abstract

Aim of Study: To assess the knowledge and practices of female teachers in Jizan Province about gestational diabetes (GD), and to identify factors associated with poor knowledge and practices related to the prevention of GD.

Methods: This study followed an analytical cross-sectional research design conducted in Jizan Province, Saudi Arabia. A total of 300 female teachers were included. The inclusion criteria were being a married, Saudi female teacher, aged 20-52 years, who has at least one-year experience in Jizan Province at the start of data collection, with at least one child. An electronic on-line questionnaire was developed by the researchers. The study questionnaire included participants' personal characteristics, past and family histories of GD and/or diabetes mellitus, in addition to questions to assess their knowledge and practices regarding GD.

Results: The study included 300 female teachers. Their main knowledge gaps about GD were related to timing for screening (58.3%), necessary investigations (50%), its management (31.7%) and repeated pregnancies as a risk factor (24.3%). Participants' healthy practices were physical exercise (53.3%), maintaining a healthy diet (66.7%) and following a diet to prevent being overweight (66.7%). Healthy practices during pregnancy included checking blood sugar (71%), watching body weight gain (74.7%) and keeping on healthy diets (83.7%). More than one-quarter of participants (29.7%) had poor knowledge, while 34% had poor practices. Participants' knowledge levels differed significantly according to their qualification levels (p=0.048), having a family member working in the healthcare field (p=0.035), being currently diabetic (p=0.006), having a past history of GD (p<0.001), and having a positive family history of GD (p=0.005). Participants' practice levels differed significantly according to their residence (p=0.012), experience in teaching (p=0.028), and having a family member in the healthcare field (p=0.002). Participants' practice levels differed significantly according to being currently diabetic (p=0.011).

Conclusions: Female teachers' knowledge and practices about GD in Jizan Province are suboptimal. Female teachers' knowledge is better among more experienced teachers, those with a higher level of education, in addition to diabetic teachers and those with a family history of diabetes. More experienced teachers, and those with a family history of the GD have the highest level of good practices. The most frequent sources for teachers of information about GD are relatives/friends.

Key Words: Gestational diabetes, diabetes mellitus, knowledge, practices, teachers

Introduction

Gestational diabetes mellitus (GD) is a pregnancy-related disorder characterized by glucose intolerance of variable severity that starts during pregnancy (1, 2). Worldwide, the prevalence of GD ranges between 1% and 28% according to the common screening methods and population characteristics (3). The prevalence of GD showed an increasing trend in several regions of the world, and most prominently in south East Asia (4).

Numerous factors stand behind the increased prevalence of GD, including maternal age, obesity and ethnicity. It has been shown that the increased incidence of GD accompanies the high incidence of type 2 diabetes mellitus in some populations (5). Among the most common risk factors of GD are family history of both GD and being type 2 diabetic (6-8). Moreover, pregnancy-associated weight gain is one of the common modifiable risk factors for GD (9).

In Saudi Arabia, reported prevalence of GD varied from 8% to 19%. A large-scale study in Riyadh City estimated that Saudi Arabia had the highest prevalence of GD (24%) worldwide (10-12). Numerous adverse maternal and neonatal outcomes were reported in association with GD. The Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study revealed significant associations between adverse pregnancy outcomes and elevated levels of maternal glucose. However, the defined levels beyond which the risk increased have not yet been determined (13, 14). Therefore, early diagnosis of GD is essential to reduce maternal and neonatal morbidity and to aid in the prevention of the development of type 2 diabetes.

Most of the accessible literature relates to the awareness of GD among women in the general population. However, there is an obvious lack of studies concerned with the awareness of GD among female teachers whose influence positively affects their students' personal health care behaviours (15, 16).

Gestational diabetes mellitus screening helps to establish a perfect window for the prevention of DM in two generations. The assessment of knowledge about GD among all women including teachers will help identify the gaps and will enable implementation of strategic interventions for prevention of the disease.

To the best of the researchers' knowledge, no study has been carried out concerning knowledge and practice of female teachers regarding GD in Jizan Province, Saudi Arabia. Therefore, this study aimed to assess knowledge and practices of female teachers in Jizan Province about GD, and to identify factors associated with poor knowledge and practices related to the prevention of GD.

Materials and Methods

This study followed an analytical cross-sectional research design in Jizan Province, Saudi Arabia. Using the Raosoft web-based sample size calculator (Raosoft.com), with a 5% margin of error, 95% confidence level, and 75% response, the minimum sample size was calculated to be 285. However, following a convenience sampling, the sample size for the present study was increased to 300 female teachers in the study setting to increase the power and to compensate for possible missing data.

The inclusion criteria for the present study were being a married Saudi female teacher, aged 20-52 years, who had at least one-year experience in Jizan Province at the start of data collection, and who had at least one child.

Based on a thorough review of relevant literature, an electronic on-line questionnaire was developed by the researchers. It was face-validated by experts in the field of Family Medicine, Diabetology and Obstetrics. Potential participants were invited to participate through social media, such as WhatsAppTM and FacebookTM. The study questionnaire included participants' personal characteristics, past and family histories of GD and/or diabetes mellitus as well as questions to assess their knowledge and practices regarding GD.

Data were analysed using the Statistical Package for Social Sciences (IBM, SPSS, version 25.0). Frequencies and percentages were used to summarize study variables. The Chi-square test was used for the bivariate analysis of categorical outcomes. P-values less than 0.05 were considered as statistically significant.

Prior to data collection, ethical approval for this study was obtained from the Jazan Health Ethics Committee (Ethical Approval # 2298). Moreover, permission had been granted by the school managers who were asked to inform teachers about the survey and coordinate the electronic distribution of the questionnaire. A statement explaining the nature and the purpose of the study was included on the first page to obtain participants' informed consent before proceeding to fill out the questionnaire. All data were handled anonymously, were securely saved, and were used for research purposes only.

Results

Table (1) shows that the majority of participants were aged 30-49 years. Most participants were married (77.3%), with 2-3 children (39.3%) or 4-5 children (28.7%). Almost half of participants (49.3%) were living in a city. Three-quarters of participants (75%) were university graduates with a Bachelor Degree, 2.3% had a Masters Degree, while 22.7% had other qualifications (e.g., Diploma, or training certificate after Secondary school). Almost half of participants (48%) had more than 10 years' experience in teaching, while 40.7% had a family member working the healthcare field.

Table 1: Personal characteristics of female teachers in Jizan Province (n=300)

Personal Characteristics	No.	%
Age (in years)		
• 20-29	29	9.7
• 30-39	125	41.7
• 40-49	122	40.7
• 50+	24	8.0
Marital status		
• Single	48	16.0
• Married	232	77.3
• Divorced	14	4.7
• Widow	6	2.0
No. of children		
• 1	71	23.7
• 2-3	118	39.3
• 4-5	86	28.7
• >5	25	8.3
Residence		
• City	148	49.3
• Village	152	50.7
Qualification		
• Bachelor Degree	225	75.0
• Masters Degree	7	2.3
• Others	68	22.7
Experience in teaching		
• 1-5 years	97	32.3
• 6-10 years	59	19.7
• >10 years	144	48.0
A family member working in healthcare field	122	40.7

Table (2) shows that 13.7% of participant female teachers were diabetic, while 15.3% had a past history of gestational diabetes, and 40.3% had a positive family history of gestational diabetes. The majority of participants (95.7%) were aware about gestational diabetes, with their main sources of knowledge being from their relatives or friends (55.3%) The source of knowledge for 16.7% was healthcare providers, and for 8.3% was health education campaigns.

Table 2: Participants' history and knowledge about diabetes (n=300)

Characteristics	No.	%
Current history of diabetes	41	13.7
Past history of gestational diabetes	46	15.3
Family history of gestational diabetes	121	40.3
Awareness about gestational diabetes	287	95.7
Sources of knowledge about gestational diabetes		
• Relatives/Friends	166	55.3
• Physicians	50	16.7
• Social media	44	14.7
• Health education campaigns	25	8.3

Table (3) shows that the main knowledge gaps about gestational diabetes among participants were related to the timing for screening (58.3%), necessary investigations (50%), management of the condition(31.7%) and repeated pregnancies as a risk factor (24.3%).

Knowledge items about gestational diabetes	Incorrect		Correct	
	No.	%	No.	%
Repeated pregnancies is a risk factor for GD	73	24.3	227	75.7
Regular antenatal care visits are important for detecting GD	5	1.7	295	98.3
Obesity is a risk factor for GD	15	5.0	285	95.0
Positive family history is a risk factor for GD	40	13.3	260	86.7
Rapid weight gain during pregnancy is a risk factor for GD	24	8.0	276	92.0
Untreated GD affects a pregnant woman's health?	4	1.3	296	98.7
GD a risk factor for type 2 diabetes	13	4.3	287	95.7
GD disappears after delivery?	24	8.0	276	92.0
Untreated GD affects baby's health?	17	5.7	283	94.3
GD can be prevented by healthy diets and exercise	4	1.3	296	98.7
Best timing for screening GD	175	58.3	125	41.7
Investigations done to detect GD	150	50.0	150	50.0
Plan for management of GD	95	31.7	205	68.3

Table (4) shows that participants' healthy practices related to the prevention of gestational diabetes were physical exercise (53.3%), maintaining a healthy diet (66.7%) and following a diet to prevent being overweight (66.7%). Healthy practices during pregnancy included checking blood sugar levels(71%), monitoring body weight gain (74.7%) and maintaining a healthy diet (83.7%).

Table 4: Participants' healthy practices regarding prevention of gestational diabetes (GD)

Practices	No.	%
Practice of regular physical exercise	160	53.3
Keeping on healthy diets	200	66.7
Following a diet to prevent overweight	200	66.7
Keeping on healthy diets during pregnancy	251	83.7
Checking blood sugar during pregnancy	213	71.0
Watching body weight gain during pregnancy	224	74.7

Table (5) and Figure (1) show that 29.7% of participants had poor knowledge regarding gestational diabetes, while 34% had poor practices regarding its prevention.

Table 5: Participants' knowledge and practice levels regarding gestational diabetes (GD)

Levels	No.	%
Knowledge		
• Poor	89	29.7
• Good	211	70.3
Practice		
• Poor	102	34.0
• Good	198	66.0

Figure 1: Participants' knowledge and practice levels regarding gestational diabetes

Table (6) shows that participants' knowledge levels differed significantly according to their qualification levels (p=0.048), with the highest percentage of poor knowledge among those with other qualifications (58.8%). Moreover, participants with a family member working in the healthcare field had a significantly higher knowledge level than those with no family member working in the healthcare field (77% and 65.7%, respectively, p=0.035). However, participants' knowledge levels did not differ significantly according to their age group, marital status, number of children, residence or their experience in teaching.

Table 6: Participants' knowledge levels about gestational diabetes according to their personal characteristics

Personal Characteristics	Poor (n=89)	Good (n=211)	P-value
Age (in years)			
• 20-29	9 (31.0%)	20 (69.0%)	
• 30-39	37 (29.6%)	88 (70.4%)	
• 40-49	33 (27.0%)	89 (73.0%)	0.555
• 50+	10 (41.7%)	14 (58.3%)	
Marital status			
• Single	17 (35.4%)	31 (64.6%)	
• Married	66 (28.4%)	166 (71.6%)	
• Divorced	4 (28.6%)	10 (71.4%)	0.808
• Widow	2 (33.3%)	4 (66.7%)	
No. of children			
• 1	26 (36.6%)	45 (63.4%)	
• 2-3	29 (24.6%)	89 (75.4%)	
• 4-5	27 (31.4%)	59 (68.6%)	0.352
• >5	7 (28.0%)	18 (72.0%)	
Residence			
• City	43 (29.1%)	105 (70.9%)	
• Village	46 (30.3%)	106 (69.7%)	0.819
Qualification			
• Bachelor Degree	60 (26.7%)	165 (73.3%)	
• Masters Degree	1 (14.3%)	6 (85.7%)	0.048†
• Others	28 (41.2%)	40 (58.8%)	
Experience in teaching			
• 1-5 years	33 (34.0%)	64 (66.0%)	
• 6-10 years	21 (35.6%)	38 (64.4%)	0.145
• >10 years	35 (24.3%)	109 (75.7%)	
A family member working in healthcare field			
• No	61 (34.3%)	117 (65.7%)	
• Yes	28 (23.0%)	94 (77.0%)	0.035†

† Statistically significant

Table (7) shows that participants' knowledge levels about gestational diabetes differed significantly according to whether they were currently diabetic (p=0.006), had a past history of gestational diabetes (p<0.001), and had a positive family history of gestational diabetes (p=0.005). However, participants' knowledge about gestational diabetes did not differ significantly according to their sources of knowledge about gestational diabetes.

Table 7: Participants' knowledge levels about gestational diabetes according to their history, and sources of knowledge about diabetes

Characteristics	Poor (n=89)	Good (n=211)	P-value
Current history of diabetes			
• No	85 (32.4%)	177 (67.6%)	
• Yes	4 (30.3%)	34 (89.5%)	0.006†
Past history of GD			
• No	87 (34.3%)	167 (65.7%)	
• Yes	2 (4.3%)	44 (95.7%)	<0.001†
Family history of GD			
• No	64 (35.8%)	115 (64.2%)	
• Yes	25 (20.7%)	96 (79.3%)	0.005†
Sources of personal knowledge about GD			
• Relatives/Friends	51 (30.7%)	115 (69.3%)	
• Physician	9 (18.0%)	41 (82.0%)	
• Social media	14 (31.8%)	30 (68.2%)	0.308
• Health education campaign	6 (24.0%)	19 (76.0%)	

† Statistically significant

Table (8) shows that participants' practice levels differed significantly according to their residence, with higher percentage of poor knowledge living in villages compared to those living in cities (40.8% and 27%, respectively, p=0.012). Moreover, participants with the highest experience in teaching had significantly the highest good practices (p=0.028). In addition, participants with a family member in the healthcare field had significantly higher good practice than those with no family member in the healthcare field (76.2% and 59%, respectively, p=0.002). However, participants' practice levels did not differ significantly according to their age group, marital status, number of children, or their qualification levels.

Table 8: Participants' practice levels according to their personal characteristics

Personal Characteristics	Poor (n=102)	Good (n=198)	P-value
Age (in years)			
• 20-29	11 (37.9%)	18 (62.1%)	
• 30-39	50 (40.0%)	75 (60.0%)	
• 40-49	35 (28.7%)	87 (71.3%)	0.203
• 50+	6 (25.0%)	18 (75.0%)	
Marital status			
• Single	17 (35.4%)	31 (64.6%)	
• Married	80 (34.5%)	152 (65.5%)	
• Divorced	4 (28.6%)	10 (71.4%)	0.788
• Widow	1 (16.7%)	5 (83.3%)	
No. of children			
• 1	24 (33.8%)	47 (63.4%)	
• 2-3	39 (33.1%)	79 (66.9%)	
• 4-5	31 (36.0%)	55 (64.0%)	0.968
• >5	8 (32.0%)	17 (68.0%)	
Residence			
• City	40 (27.0%)	108 (73.0%)	
• Village	62 (40.8%)	90 (59.2%)	0.012†
Qualification			
• Postgraduate	1 (14.3%)	6 (85.7%)	
• Others	28 (41.2%)	40 (58.8%)	0.221
• University	73 (32.4%)	152 (67.6%)	
Experience in teaching			
• 1-5 years	40 (41.2%)	57 (58.8%)	
• 6-10 years	24 (40.7%)	35 (59.3%)	0.028†
• >10 years	38 (26.4%)	106 (73.6%)	
Healthcare field member at home			
• No	73 (41.0%)	105 (59.0%)	
• Yes	29 (23.8%)	93 (76.2%)	0.002†

† Statistically significant

Table (9) shows that participants' practice levels about gestational diabetes differed significantly according to being currently diabetic (p=0.011). However, participants' practices related to gestational diabetes did not differ significantly according to their past history of gestational diabetes, family history of gestational diabetes or their sources of knowledge about gestational diabetes.

Table 9: Participants' practice levels about gestational diabetes according to their history, and sources of knowledge about diabetes

Characteristics	Poor (n=102)	Good (n=198)	%
Current history of diabetes			
• No	96 (36.6%)	166 (63.4%)	
• Yes	6 (15.8%)	32 (84.2%)	0.011†
Past history of GD			
• No	91 (35.8%)	163 (64.2%)	
• Yes	11 (23.9%)	35 (76.1%)	0.117
Family history of GD			
• No	64 (35.8%)	115 (64.2%)	
• Yes	38 (31.4%)	83 (68.6%)	0.435
Sources of personal knowledge about GD			
• Relatives/Friends	53 (31.9%)	113 (68.1%)	
• Physician	16 (32.0%)	34 (82.0%)	
• Social media	16 (36.3%)	28 (63.6%)	0.933
• Health education campaign	9 (36.0%)	16 (64.0%)	

† Statistically significant

Discussion

Teachers are the cornerstone of the next generation and they constitute an important source of health information for students about diabetes. Implementing a public health approach to diabetes prevention in a specific group of the community such as school teachers, requires assessing their knowledge, and practice and identifying the associated factors (17).

The present study showed that almost all female teachers in Jazan City, included in the study group, were aware about GD. However, more than one-quarter had poor knowledge, with knowledge gaps related to the timing for screening, the necessary investigations, management of the condition and risk factors, such as repeated pregnancies. Predictors of good knowledge levels about GD included having a Bachelor or Masters Degree, having a family member working in the healthcare field, being currently diabetic, and having a past, or a family history of GD.

These findings are in accordance with those reported by several studies. Ogu et al. (18) reported that about two-thirds of women of reproductive age in Southern Nigeria had poor knowledge about GD, in terms of its risk factors, screening, diagnosis and treatment, and potential complications.

In Spain, Gutierrez-Manzanedo et al. (19) reported that 36.9% of the surveyed teachers had sufficient basic knowledge about diabetes.

In Saudi Arabia, Aldekhayel (17) reported more than half of teachers in Riyadh City were knowledgeable about diabetes mellitus. However, knowledge gaps were reported in some important aspects of the disease, such as fasting blood glucose cut-off level to diagnose diabetes, its complications and risk factors. In Al-Jouf Region, Duraywish (20) a study reported that school teachers had adequate general knowledge about diabetes mellitus.

Moreover, Aldekhayel et al. (17) reported that more educated and more experienced teachers expressed a higher level of knowledge than other less educated or experienced teachers. The study of Salem et al. (21) in Riyadh, Saudi Arabia showed that knowledge about diabetes was significantly higher among diabetics than non-diabetics.

Our study revealed that friends and relatives were their main source of knowledge about GD for more than half of participants, while healthcare providers were the source of knowledge for only 16.7%, and health education campaigns were the source of knowledge for 8.3% of participants. Similarly, Ogu et al. (18) in Nigeria, reported that the main sources of knowledge of GD among participant women of reproductive age were their friends, healthcare workers, and mass media. Aldekhayel et al. (17), noted in Saudi Arabia that the highest level of knowledge was shown in teachers who reported that their source of information was medical book/scientific journals, health educators, and physicians. However, Salem et al. (21) observed that the role of healthcare professionals represented a minimal contribution toward diabetes-relevant knowledge.

Aldekhayel et al. (17) argued that knowing the source of the participants' information is useful in specifying the most appropriate method for health education to increase the teachers' knowledge and improve their healthy practices. The most frequent sources of information about diabetes were relatives/friends, social media, the internet, physicians, and awareness campaigns. This shows how important it is to obtain health-related information from scientific literature and healthcare professionals. Also this stresses the importance of having a reliable trusted source of information for teachers, which will help improve their knowledge levels as well as make teachers more confident to share and apply their knowledge. Healthcare professionals should be encouraged to have more active roles in raising the level of health-related knowledge in the community.

The good knowledge levels about GD among almost three-quarters of our study sample may be attributed to the high prevalence of diabetes in the Saudi community, as well as the high educational level of the study population, where most participants were university graduates, and some had attained a Masters Degree. However, the comparison between different studies may not be applicable due to use of different tools and cut-off levels in assessing participants' knowledge. Nevertheless, because of the generally observed low to moderate levels of knowledge levels about diabetes, several studies strongly recommended that it is necessary to provide training programmes for teachers to increase their knowledge about different types of diabetes (22-23).

The present study showed more than one-third of participants had poor practices regarding GD prevention. Predictors of good practices included urban residence, more experience in teaching and having a family member in the healthcare field, in addition to being currently diabetic.

These findings are in accordance with those of Aldekhayel et al. (17), who found that diabetic teachers and those with a family history of diabetes performed more healthy practices than non-diabetic teachers, and those with no family history of diabetes. Moreover, Ogu et al. (18) reported that urban residence predicted good overall knowledge and practices of GD. They explained that residence in an urban community likely provides more exposure to information about GD, in addition to access to higher levels of health care.

Aldekhayel (17) added that teachers who reported practicing healthy eating habits, were non-smokers, and regularly measured their weight and height. The factors associated with good practice were having longer teaching experience, having a family history of diabetes, and being diabetic. They also reported that those with less teaching experience had the least practice level. Therefore, targeting newly appointed teachers should be a high priority when developing a diabetes education programme for teachers. Moreover, new young teachers should be targeted because they are usually keener to learn, and they have a longer time before reaching their retirement age to use the knowledge in their work.

Gutierrez-Manzanedo et al. (19) emphasized that focusing on increasing diabetes-related knowledge among teachers will help them lead healthy lifestyles, and will enforce their role in supporting diabetics. Therefore, there should be a continuous education and counselling activities for Saudi teachers to encourage them to have a higher level of knowledge.

Study Strengths and Limitations

Our findings provide the impetus for a largescale community mobilization and education activities to ensure improved knowledge among women of reproductive age, and their partners, as an important first step toward creating demand for GD screening services at the health facilities serving these women. However, this study is limited by its cross-sectional design, which just proves association but not causality between the studied dependent and independent variables. Another limitation is the subjective nature of participants' responses.

Conclusions

Female teachers' knowledge and practices about GD in Jizan Province are suboptimal. About one-quarter of teachers have poor knowledge about GD. Female teachers' knowledge is better among more experienced teachers, those with a higher level of education, in addition to diabetic teachers and those with a family history of diabetes. About two-thirds of teachers have good diabetes-related practice toward prevention of GD. In addition, more experienced teachers and those with a family history of the GD have the highest level of good practices. Therefore, targeting new teachers should be a priority in order to raise their knowledge and practice levels regarding GD. The most frequent sources of information for teachers about GD are their relatives/friends. Therefore, having a reliable trusted source of information about GD for teachers will be beneficial to improve their knowledge. Finally, healthcare workers should be encouraged to participate and play a higher role in raising the level of teachers' knowledge about diabetes in general and GD in particular.

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Health-Related Quality of Life among Jazan University Students during COVID-19 Pandemic, KSA: A Cross-Sectional Study

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Abstract

Background: With the rapid spread of the latest coronavirus pandemic (COVID-19) since late 2019 and its transformation into a global epidemic requiring governments to take strict measures and implement quarantine, closures, and restrictions on almost all aspects of the population's life, quality of life has been affected in all aspects. Given the importance of an individual's healthy quality of life, this study aims to assess the health-related quality of life during the COVID-19 pandemic.

Participants and Methods: A cross-sectional study was adopted, using an online survey of health-related quality of life with the involvement of 425 participants (male and female) from Jazan University students. They were chosen by convenience sampling.

Results: In this study, 54% of students reported that they have negative feelings, and female students more often have these negative feelings than male students. Our finding is that those who live in cities and student housing are more satisfied with the QoL than students who live in villages. The findings revealed that 52% of students who get support from friends have higher satisfaction with QoL, which indicates that higher family and friend support will increase QoL for students.

Conclusion: The COVID-19 pandemic affected the health-related quality of life for Jazan University students in some domains (such as living place, friends support, and having negative feelings). The study recommends that universities should organize some recreational activities to enhance the sense of academic satisfaction and arrange counselling or psychotherapy for students needing these services.

Keywords: Quality of life, Health-related quality of life, University Students, Jazan, COVID-19 pandemic.

Introduction

The outbreak of severe acute respiratory syndrome-coronavirus2 (SARS-CoV2) pneumonia was reported in Wuhan, China, in late December 2019. Within weeks, the infection spread across China and other countries worldwide. The WHO announced this global outbreak on January 30 as a public and international emergency, and on March 11, it announced it as a pandemic coronavirus disease 2019 (1). The total number of cases has exceeded 30.2 million (2). The symptoms caused by COVID 19 vary from mild signs to severe ARDS hypoxia (3). The respiratory system is mainly affected, and other organs are also involved (4, 5). In the original case series, lower respiratory tract-related symptoms of fever, dry cough, and dyspnea were reported. Headaches, dizziness, generalized exhaustion, vomiting, and diarrhea were also observed (4, 6).

Due to the lack of vaccination trials and population immunization, governments placed limits on travel and ordered social distancing measures to reduce the risk of infection spreading during the pandemic outbreak process (7). Due to that, the quality of life has been changed. QoL refers to the perception by individuals of their role in life within the framework of value systems and culture as related to their priorities, aspirations, norms, and concerns. It includes these following dimensions; social, environmental, financial, and economi., Health-related quality of life focuses on the impact of health, either mental or physical, on the life of individuals. HRQoL represents a broad physical and psychological concept with social functioning and well-being. HRQoL is very important, as the state of health and the quality of life have a significant impact on each other. When a person is exposed to disease, it may affect the quality of their life, which may have either a negative or positive effect on the health of the individual. Quality of life can be affected by the COVID-19 pandemic, which has serious impacts on the population and the individual (8).

To the best of our knowledge, no published studies regarding this topic have been conducted in Jazan, which reflects the importance of this work. This study aimed to assess the health-related quality of life during the COVID-19 pandemic among Jazan university students.

Participants and Methods

Study design

A cross-sectional online survey of health-related quality of life among Jazan University students during the COVID-19 pandemic was conducted from October 16, 2020, to March 13, 2022.

Study setting

This study was concluded at Jazan University in Jazan, a coastal city and the capital of the Jazan region, which is located in the southwestern corner of the Kingdom of Saudi Arabia. Jazan University is a public university with 49,000 students during 2020 to 2021.

Study population

Male and female students aged 18-24 years in Jazan University, Jazan, Saudi Arabia.

Sample size

A convenient sampling method was employed to select the participants. The minimum sample size was 384, as calculated by the following equation: n = Z2 X P X Q / D2 assuming that the proportion was 50% with a 95% confidence interval (CI) and 0.05 margin of error (9). Inclusion criteria was participants who registered as students at Jazan University.Students who agree to participate, Students between 18-24 years. Exclusion criteria was students who refused to participate, students over 24 years old and under 18 years, and students who presented with physical or psychiatric problems.

Data collection tools

The participants were given a self-reporting questionnaire (10). The participants completed the surveys using an online survey platform (Google Forms). A total of 448 students took part in the online survey. We excluded 23 participants (4 participants who refused to participate, and 19 participants who were not between 18 and 24). The final sample size was 425 participants. The questionnaire consisted of 26 questions comprised of 4 domains: demographic and personal characteristics, medical history, and the effects of COVID-19 on QoL. In our research, the QoL measure demonstrated good internal consistency (Cronbach's alpha = 0.81).

Demographic characteristics

Data on participants' demographic characteristics included age, gender, marital status, and living place.

Medical history

Participants were also asked if they suffered from any of the medical disorders indicated, such as diabetes, depression, hypercholesterolemia, migraines, etc.

Quality of life

The WHOQoL-BREF was used to assess the individuals' quality of life. The WHO Quality of Life Index is a self-administered tool used to assess QoL that may be used to compare health-related QoL across a wide range of disorders and illnesses and determines the effectiveness of various QoL interventions, (10). It has 26 items, the first of which is a general question on quality of life, while the rest are divided into four domains (physical health, psychological, social relationship, and environmental QoL). Each item is rated on a range of 1 to 5 on a Likert scale. Table 1 shows the list of items adapted to assess QoL.

Table 1: The list of items adapted to assess QoL in the context of the COVID-19 pandemic

1	How would you rate your quality of life?	14	To what extent do you have the opportunity for leisure activities?
2	How satisfied are you with your health?	15	How well are you able to get around?
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	16	How satisfied are you with your sleep?
4	How much do you need any medical treatment to function in your daily life?	17	How satisfied are you with your ability to perform your daily living activities?
5	How much do you enjoy your life?	18	How satisfied are you with your work capacity?
6	To what extent do you feel your life to be meaningful?	19	How satisfied are you with yourself?
7	How well are you able to concentrate?	20	How satisfied are you with your relationships?
8	How safe do you feel in your daily life?	21	How satisfied are you with the support you get from your friends?
9	How healthy is your physical environment?	22	How satisfied are you with the conditions of your living place?
10	Do you have enough energy for everyday life?	23	How satisfied are you with your access to health services?
11	Are you able to accept your bodily appearance?	24	How satisfied are you with your transport?
12	Have you enough money to meet your needs?	25	How often do you have negative feelings such as blue mood, despair, anxiety, or depression
13	How available to you is the information you need in your day-to-day life?	26	How satisfied are you with your sex life?

Data analysis

Statistical analysis was performed using SPSS Statistical Program V.26. Participants' demographic, personal, and clinical characteristics and the effects of COVID-19 on QoL were described using descriptive statistics. Continuous variables were reported as mean and standard deviation, whereas categorical variables were provided as frequencies and percentages. The Kruskal-Wallis H test and the Mann-Whitney U test were utilized. The relationship between QoL score and demographic factors was investigated using ordinal logistic regression. The significance level was set at a p-value < 0.05. There were some missing values, and we imputed them by multiple imputations (simple linear regression) and mode imputations. One variable (How satisfied are you with your sex life?) contains 114 missing values, so we excluded it from the analysis because it was not helpful for analysis.

Ethical consideration

Ethical approval was obtained from Jazan University ethical committee for scientific research (HAPO-10-Z-001; Reference No. REC-43/05/101) and official approvals were obtained from the university campus. All participants gave informed, verbal, and written agreement and they were told that the information gathered would only be used for scientific purposes and that they may leave or rejoin the research at any moment. The confidentiality of the collected data is maintained.

Results

A total of 425 took part in the survey. Response rates were 71.5% female and 28.5% male students. Students' ages ranged from 18 to 24 years, with an overall mean ± SD of 20.77 ± 1.476 years. More than half of the students (54.4%) live in a village. Most of the students (84%) were single. In this study, 17.9% of the students reported suffering from medical conditions. Details about the types of health conditions are described previously.

Table 2 show the percentages of students who self-reported how they were satisfied with their quality of life on a scale from 1 to 5 in some factors (physical and psychological health, social relationship, and environmental); it is clear that most of the students are satisfied with all factors except psychological health, were more than half of students (54.4%) reported that they have negative feelings such as blue mood, despair, anxiety, and depression.

Table 2: Percentages of students who self-reported satisfaction about their quality of life.

Satisfaction with quality of life	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
How would you rate your quality of life?	2.4%	8%	25.6%	32.5%	31.5%
How satisfied are you with your health?	3.5%	7.8%	21.9%	28.2%	38.6%
How well are you able to get around?	7.8%	17.9%	24.5%	24.2%	25.6%
How satisfied are you with your sleep?	14.4%	18.6%	25.4%	20.9%	20.7%
How satisfied are you with your ability to perform your daily living activities?	6.4%	10.1%	32.0%	31.1%	20.5%
How satisfied are you with your work capacity?	4.5%	11.3%	23.1%	36.0%	25.2%
How satisfied are you with yourself?	3.5%	7.8%	22.1%	25.2%	41.4%
How satisfied are you with your relationships?	7.1%	13.4%	23.3%	24.5%	31.8%
How satisfied are you with the support you get from your friends?	7.5%	12.7%	24.9%	24.0%	30.8%
How satisfied are you with the conditions of your living place?	5.9%	8.5%	17.9%	20.5%	47.3%
How satisfied are you with your access to health services?	7.8%	8.5%	18.8%	23.5%	41.4%
How satisfied are you with your transport?	9.6%	9.6%	19.8%	19.1%	41.9%
How often do you have negative feelings such as blue mood, despair, anxiety, depression	2.8%	13.4%	29.4%	31.1%	23.3%

On a scale of 1 to 5, students scored how they feel about their QoL in terms of physical health, financial situation, activities, and how they feel about themselves. Almost all students reported positive answers about their feelings about the quality of life factors. The percentages are shown in Table 3.

Table 4 shows that male students are less satisfied with their quality of life than females (B = -0.247). Single students and married students were more satisfied with the QoL than divorced students, with an estimate (B = 0.08 and B = 1.237). The ordinal regression model illustrated that students who lived in a city were significantly more satisfied with QoL than students who lived in a village (B = 0.493, p = 0.004), and the difference betweenthe male and female students in satisfaction of QoL is not significant (p = 0.198). Also, the difference between single, married and divorced students in satisfaction of QoL is not significant (p > 0.05). The results are summarized in Table 4.

Table 3: Percentages of QoL in physical health, financial status, activity, and how they feel about themselves.

Feeling about quality of life	Not at all	Slightly	Moderately	Very	Extremely
To what extent do you feel that physical pain prevents you from doing what you need to do?	37.2%	16.5%	25.2%	13.9%	7.3%
How much do you need any medical treatment to function in your daily life?	61.6%	16.9%	13.6%	5.9%	1.9%
How much do you enjoy your life	4.5%	8.5%	32.7%	30.1%	24.2%
To what extent do you feel your life to be meaningful?	3.1%	8.7%	20.5%	23.8%	44%
How well are you able to concentrate?	4%	11.1%	32.7%	37.4%	14.8%
How safe do you feel in your daily life?	3.1%	7.1%	14.1%	21.2%	54.6%
How healthy is your physical environment?	6.6%	19.8%	36.2%	25.4%	12.0%
Do you have enough energy for everyday life?	2.4%	9.9%	28.0%	29.2%	30.6%
Are you able to accept your bodily appearance?	3.3%	6.4%	14.1%	20.2%	56.0%
Have you enough money to meet your needs?	7.5%	14.6%	24.2%	22.6%	31.1%
How available to you is the information that you need in your day-to-day life?	1.6%	7.5%	28.7%	36.0%	26.1%
To what extent do you have the opportunity for leisure activities?	11.3%	19.5%	34.8%	20.9%	13.4%

Table 4: Parameter Estimates ordinal regression model. SE = standard error.

Charcteristic		Estimate	SE	Wald	df	P	95% Confidence Interval	
							Lower Bound	Upper Bound
Age		-0.085-	0.058	2.110	1	0.146	-0.199	0.030
Gender	Male	-0.247	0.192	1.654	1	0.198	-0.624	0.130
	Female	Reference						
Social statutes	Single	0.208	0.670	0.096	1	0.756	-1.105	1.521
	Married	1.237	0.697	3.154	1	0.076	-0.128	2.603
	Divorced	Reference						
Living place	Student housing	-0.062	0.786	0.006	1	0.937	-1.604	1.479
	City	0.493	0.172	8.225	1	0.004	0.156	0.830
	Village	Reference						

Table 5 shows that female students more often have negative feelings than male students, with a mean rank satisfaction score of 196.16 for males and 219.70 for females. The Mann-Whitney U test shows that the difference between male and female students in how often they have negative feelings is not significant, with p = 0.064.

Table 5: Mean rank satisfaction score for gender

	Gender	N	Mean Rank
How often do you have negative feelings such as blue mood, despair, anxiety, depression?	Male	121	196.16
	Female	304	219.70

A Kruskal-Wallis H test showed that there was a significant difference between living place in satisfaction about transport, p = 0.00, with a mean rank satisfaction score of 251.70 for students who live in students' housing, 242.13 for students who live in the city, and 188.33 for students who live in a village (Table 6). This indicates that students who live in cities and student housing are more satisfied than students who live in villages.

Table 6: Mean ranks satisfaction score for living place

	Living place	N	Mean Rank
How satisfied are you with your transport?	Students housing	5	251.70
	City	189	242.13
	Village	231	188.33

Discussion

This study investigated the QoL of Jazan university students during the pandemic in association with the specific effects of the COVID-19 pandemic on the various dimensions of QoL. Social distancing and lockdown were implemented between February and June 2020 to reduce the spread of coronavirus. However, the prolonged lockdown has likely had psychological repercussions, as COVID-19 significantly changed many individuals' daily lives. So, it is important to identify the factors that affected health-related QoL during the COVID-19 pandemic.

In this study, the response rates of students' negative feelings like (blue mood, despair, anxiety, and depression) were 54%, which may have led to lower the QoL. These findings agree with those of another study (11) which reported that QoL levels were relatively low, whereas the physical health and environmental QoL levels were comparable with those in population in non pandemic status (12). This finding was not surprising as the prevalence rates of depression, anxiety and stress among participants in another study were remarkable, which may have led to lower psychological QoL in the COVID-19 pandemic status (11, 13), also the loss of students' daily academic routines during the pandemic, including their customary courses and clinical sessions, might cause these negative feelings. .

Regarding the social relationship QoL, the present study findings revealed that the students were satisfied with their social life, in contrast with the finding of another study which repored that, social distancing and restrictions on organising and attending social activities as preventive measures to curb the spread of COVID-19 may have contributed to lower social relationship QoL (11). Furthermore, it was found in several studies that only a greater number of hours of online classes attended per week and higher family and friend support significantly predicted an increase in physical health QoL among the participants. The literature points out that chronic absenteeism from class is associated with a higher risk of engaging in health risk behaviours, such as cigarette smoking, chronic alcohol use and risky sexual behaviours. In contrast, a sense of academic achievement is associated with a higher level of general health (14, 15).

The descriptive statistics show that female students more often have negative feelings than male students and although male students are less satisfied with their QoL than female students, we found that this difference had no significant effect on QoL. These findings disagree with those of other study which concluded that there are gender differences related to better QOL. Females with good physical and psychosocial health are more likely to have a better QOL. For males, the best QOL was associated with high socioeconomic conditions and good physical and psychosocial health (16).

Regarding the residence area, our finding reveaed that students who live in cities and student housing are more satisfied with their QoL than students who live in villages, probably because there are difficulties in transportation, and that is consistent with the finding of another study which repoted that Quality of life scores in subjects vary between areas. Psychological distress in subjects in rural areas may account for the poorer scores of quality of life in rural areas (17).

We found that students who get support from friends have higher satisfaction with QoL. This indicates that higher family and friend support will increase QoL for students. A study of 316 students in Malaysian universities reported that supporting family and friends increases students' QoL (11).

Limitations of the study:
We cannot fully represent the results for the Jazan university student community since there was a group of students who live in areas that do not have internet, and we had difficulty providing the questionnaire to them.

Conclusion

The COVID-19 pandemic affected the health-related quality of life for Jazan University students in some domains. The domains that affected QoL during COVID-19 are living place, friends support and having negative feelings. Our study was able to clarify some of the positive and negative factors that affected the quality of life of Jazan university students during the pandemic. It is not possible to generalize our results to all students in Jazan. However, future studies should investigate attitudes among other Saudi universities to determine the generalizability of the study's results. Based on the study findings we may highlight a few self-founded recommendations to enhance the QoL of Jazan University students. To improve academic satisfaction and eliminate negative attitudes among university students, the institution should focus on attempts to organize certain leisure events. Also, if university students require counselling or psychotherapy, these services can be arranged. The transportation problem should be solved for students who live in villages and have transportation difficulties.

Conflicts of Interest
The authors declared no conflict of interests.
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The Association between Sleep Quality and the Psychological Domain of Health-Related Quality of Life among Adults in Jazan region, Saudi Arabia, A Cross-Sectional Study

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Abstract

Background: Sleep is an essential physiological process that accounts for about one-third of human life. Poor sleep quality is associated with many adverse effects, and can negatively affect the psychological domain of health-related quality of life. So, this study aimed to investigate the association between sleep quality and the psychological domain of health-related quality of life among adults in Jazan region, Saudi Arabia.

Participants and Method: A descriptive cross-sectional type of epidemiological study was carried out through an online web-based survey using a convenient type of sampling. A snowball sampling technique was used to collect data from 406 adults between 18-60 years old living in Jazan region. The data was collected using semi-structured questionnaire containing demographic data, Pittsburgh Sleep Quality Index (PSQI), and WHOQOL-BREF the short form.

Results: The age range of the participants was from 18 to 60, with mean, median, and mode of 30.92, 27, and 21 years, respectively (SD ± 11.402). Females constituted 230 (56.7%) of the study population, while males accounted for 176 (43.3%). The age of the participants was highly correlated with their psychological domain scores ($r = 0.197$; $p < 0.0001$). According to PSQI results, the majority of participants 279 (68.7%) reported poor sleep quality. Females were more correlated with higher PSQI scores reflecting their poorer sleep quality compared to males ($r= 0.115$; $p = 0.020$). Sleep quality and the psychological domain were significantly negatively correlated ($r = -0.280$; $p < 0.0001$).

Conclusion: Poor sleep quality has a significant negative correlation with the psychological domain of health-related quality of life among adults living in Jazan region. Future health educational programs are needed to improve the quality of sleep and psychological domain of health-related quality of life among adults in Jazan region.

Keywords: Sleep quality, Pittsburgh Sleep Quality Index, Psychological domain, HRL, Jazan.

Introduction

Sleep is an essential physiological process which accounts for about one third of human life (1). Sleep consists of two phases: rapid eye movement (REM), that is associated with active dreams, and non-rapid eye movement (NREM) (2). Sleep quality was found to be a strong independent predictor of physical and psychological health (3). Getting sufficient sleep is crucial for cognitive, mood, and memory maintenance (4).

Sleep plays a role in stimulating several activities in different parts of the brain enabling better thinking, learning, and memory during each stage of sleep (5). Furthermore, emotional brain activity is dependent on the normal sleep-wake regulation. Accordingly, poor sleep quality can affect moods and emotional reactivity (6). Patients with insomnia are more susceptible to have depression. In addition, anxiety is another common disorder in patients with insomnia (7, 8). It has been reported that increased anxiety levels are one of the most serious consequences of sleep deprivation (9). On the other hand, excessive fear or worry can make falling asleep difficult. So, the relationship between sleep deprivation and psychiatric disorders is a two-way direction (5). The psychological domain of health-related quality of life of an individual with a poor quality of sleep can be affected.

Quality of life is a multidimensional concept. It includes subjective assessments of both positive and negative aspects of an individual's life. According to WHOQOL-BREF, quality of life is measured by four specific domains; physical health, psychological wellbeing, social relationships and environmental factors (10). On the other hand, an individual's health-related quality of life (HRQOL) refers to their appreciation of their own physical and mental health while responding to changes in the physical and social environment under the effect of life experience, beliefs, and expectations (11). The psychological domain of health-related quality of life which will be measured in this study includes six items assessing areas such as; positive and negative feelings, cognitive functions, self-esteem, body image and physical appearance (10). Studies have found that assessing HRQOL is useful when discussing policies designed to improve health and reduce inequalities within the population (11).

According to the current evidence, poor sleep quality resulted from sleep disorders is prevalent among Saudis, including Jazan's population. Many studies have been published in Saudi Arabia including Jazan region showing the relationship between sleep and depression, stress and anxiety among students and their academic performance (12-14). However, there was a bias towards college students. This bias creates a knowledge gap, so there is still a lot to be learned. We think that poor sleep quality is negatively affecting the psychological domain of HRQOL among adults in Jazan region. As far as we know, there is no relevant study that has been published concerning this subject among the general adult population in Jazan region. This study aimed to assess the prevalence of poor sleep quality and to determine the association of sleep quality with the psychological domain of health-related quality of life among adults in Jazan region.

Participants and Methods

Study setting, Design, and Population:
This study was a descriptive cross-sectional design of epidemiological studies carried out from September 2021 to April 2022 and was conducted in Jazan region. Jazan is a coastal city on the Red Sea coast and the capital of it is called Jizan. It is located in the southwest corner of the Kingdom of Saudi Arabia and has a population of 1.6 million as per the 2020 census. The study targeted Jazan resident adults between 18-60 years old during the year 2021-2022 using an online web-based survey addressing different social media (WhatsApp, Twitter, Facebook, Instagram, and Snapchat) distributed in Jazan region.

Sampling Procedure:
A total of 406 adults were selected using the sample size formula for cross-sectional studies (15). The study used the parameters of p = 50% to compute the maximum sample size, 95% confidence interval, and an error not exceeding 5%. Additionally, a refusal rate of 20% was assumed in this study. The sampling design used was convenience, and non-random sampling. Also, Snowball sampling technique was used. The participants were selected through an electronic questionnaire that was sent to all residents of Jazan region.

Data Collection:
The study team distributed the study questionnaire to the participants. Adults living in the Jazan population between 18–60 years old, who were mentally healthy, and who agreed to participate were included. While those residents who refused to participate or complained of any mental illness, physical problem, used any psychotic medications, or were under 18 or older than 60 years old were excluded. Data in this study were collected through a self-administered electronic questionnaire requiring participant admission, using the Pittsburgh Sleep Quality Index (PSQI), and the WHOQOL-BREF questionnaire which is an abbreviated version of WHOQOL-100. The first section of the questionnaire started with an explanation of the study objectives and informed consent as a prerequisite for participation. The second section contained questions about social and demographic characteristics: Gender, age, education level, marital status, housing, occupation, and monthly income. The third and fourth sections contained questions regarding sleep quality during the past month using PSQI. The final part involved questions assessing the psychological domain of health-related quality of life using WHOQOL-BREF.

The Demographic Characteristics of All Participants
The gender of the study participants was analyzed and correlated with the other demographic variables with their percentages by using the cross-tabulation method. Gender was coded as (1 = Male), and (2 = Female). Age groups of the participants was coded as (1 = 18-25 years

old), (2 = 26-35 years old), (3 = 36-45 years old), (4 = 46-55 years old), and (5 = 56-60 years old). The marital status coding was (1 = Single), (2 = Married), (3 = Separated), (4 = Divorced), and (5 = Widowed). Level of education was coded as (1 = None at all), (2 = Secondary school), (3 = High school), (4 = University or college), and (5 = Post-graduate). The occupation of the participants was coded as (1 = Student), (2 = Employee), (3 = Unemployed), (4 = Retired), and (5 = Others including; freelancers and housewives). Monthly income (Saudi Riyals; SAR) of the participants was coded as (1 = < 5000 SAR), (2 = 5000 – 10,000 SAR), (3 = 10,000 – 20,000 SAR), and (4 = > 20,000 SAR). The residency of the participants was coded as (1 = City), and (2 = Village). The housing was coded as (1 = Owned house), (2 = Rented house), and (3 = Others such as; family house).

PSQI and WHOQOL-BREF

The Pittsburgh Sleep Quality Index (PSQI) consists of 19 self-reported questions, as well as five questions rated by a roommate or bed partner (if applicable). It measures the 7 components which are: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, the use of sleeping medication, and daytime dysfunction. However, only self-rated questions were included in the score, which ranges from 0 to 3 points. A score of 0 does not represent any difficulty, while a score of 3 represents extreme difficulty. The overall score can range from 0 to 21 giving the global PSQI score, where lower scores represent good sleep quality. A global score of 5 or more indicates poor sleep quality, the higher the score, the poorer the sleep. The overall reliability of Cronbach's alpha coefficient of the Arabic version of PSOI's seven component scores was 0.77 (16). On the other hand, the WHOQOL-BREF questionnaire contains 6 questions that are included in the psychological domain concerning positive and negative feelings, spirituality and personal belief, cognitive functions, self-esteem, and body image and appearance (17). Each question is rated from 1 (very dissatisfied/very poor) to 5 (very satisfied/very good) points. The five questions assessing the positive feelings, spirituality and personal belief, cognitive functions, self-esteem, and body image and appearance were scored as (1=1), (2=2), (3=3), (4=4), and (5=5), while the question that assessed the negative feelings was negatively framed so we transformed it to be positively framed and scored it as (1=5), (2=4), (3=3), (4=2), and (5=1). The mean score of these questions within the psychological domain was multiplied by 4 to calculate the domain score. The first transformation method converts the raw scores to a range between 4-20, to be comparable with the WHOQOL-100 scale. The second transformation method converts domain scores to a 0-100 scale (18).

The scores of the psychological domain are scaled in a positive direction where higher scores indicate a higher quality of life. The psychological domain score of the Arabic version of WHOQOL-BREF Cronbach's alpha was 0.77 (19). In our semi-structured questionnaire, Cronbach's alpha of PSQI score was 0.81, while for the psychological domain, WHOQOL-BREF was 0.66. The Cronbach's alpha value for the full questionnaire was 0.74. A pilot study was conducted on 20 participants. The results of the pilot study analysis were not included in the final results.

Data Presentation and Analysis:

The statistical data entry and analysis were performed using the Statistical Package for Social Science (SPSS) version 24. Continuous variables are expressed as means, and respective standard deviations and categorical variables are expressed as frequencies and percentages. The association between sleep quality and the psychological domain of health-related quality of life scores was evaluated using Spearman's correlation coefficient; 2-tailed. P-values of < 0.05 were considered statistically significance. Finally, there were no missed data.

Ethical Consideration:

Ethical approval was obtained from Jazan University Ethical Committee (REC-43/05/103). The first page of the study's questionnaire contained a statement about the study's importance and objectives and was used to get an acceptance to informed consent as a prerequisite to participate in the study. All data provided by the participants were used only for research purposes and a written guarantee for keeping confidentiality was provided. All team members agree to be held accountable for any scientific or ethical breaching in this study.

Results

Characteristics of All Participants

A total of four hundred and six participants completed the questionnaire, giving a response rate of 100% (406 out of 406). The age range of the participants was from 18 to 60, with mean, median, and mode of 30.92, 27, and 21 years, respectively (SD ± 11.402). An overview of the characteristics of the 406 of the study population is given in Table 1. Among the participants, there were 230 females (56.7%) and 176 males (43.3%). Half of the participants were single 203 (50%), while 188 (46.3%) of them were currently married. A total of 221 (54.4%) from the study population have completed a high school education, followed by 175 (43.1%) who had a bachelor's degree or higher.

Table 1: Characteristics of Participants (n = 406).

Variables		Males (n = 176)		Females (n = 230)		Total (n = 406)	
		No.	%	No.	%	No.	%
Age Groups	18-25	80	45.5%	111	48.3%	191	47.0%
	26-35	32	18.2%	51	22.2%	83	20.4%
	36-45	27	15.3%	42	18.3%	69	17%
	46-55	35	18.8%	20	9.6%	55	13.5%
	56-60	4	2.3%	4	1.7%	8	2%
Marital Status	Single	95	54%	108	47%	203	50%
	Married	76	43.2%	112	48.7%	188	46.3%
	Separated	3	1.7%	3	1.3%	6	1.5%
	Divorced	1	0.6%	7	3.0%	8	2%
	Widowed	1	0.6%	0	0.0%	2	0.2%
Level of Education	Illiterate	1	0.6%	0	0.0%	1	0.2%
	Secondary school	2	1.1%	7	3.0%	9	2.2%
	High school	101	57.4%	120	52.2%	221	54.4%
	University or college	28	15.9%	54	32.5%	82	20.2%
	Post-graduate	44	25.0%	49	21.3%	93	20.9%
Occupation	Student	72	40.9%	109	47.4%	181	44.6%
	Employee	87	49.4%	55	23.9%	142	35.0%
	Unemployed	7	4.0%	49	21.3%	56	13.8%
	Retired	10	5.7%	10	4.3%	20	4.9%
	Others (Freelancer, Housewife)	0	0.0%	7	3.0%	7	1.7%
Monthly Income (Saudi Riyals; SAR)	<5000 SAR	72	40.9%	139	60.6%	211	52.0%
	5000 – 10,000 SAR	43	24.4%	52	22.6%	95	23.4%
	10,000 – 20,000 SAR	43	24.4%	34	14.8%	77	19.0%
	>20,000 SAR	18	10.2%	5	2.2%	23	5.7%
Residency	City	116	65.9%	134	58.3%	250	61.6%
	Village	60	34.1%	96	41.7%	156	38.4%
Housing	Owned house	145	82.4%	186	80.9%	331	81.5%
	Rented house	28	15.9%	43	18.7%	71	17.5%
	Others (Family house)	3	1.7%	1	0.4%	4	1.0%

The Prevalence of Poor Sleep Quality among the Study Population

The prevalence of poor sleep quality according to gender among the study population is shown in Table 2. The majority of the adult population in Jazan region had poor sleep quality (68.7%), while only (31.3%) of the participants reported good sleep quality. However, female participants had higher PSQI scores (72.6%) than male participants (63.6%), which indicate that females have poorer sleep quality compared to males.

Table 2: Sleep Quality According to Gender among Study Participants (n = 406). PSQI = Pittsburg Sleep Quality Index.

Sleep Quality	Male (n = 176)		Female (n = 230)		Total (n = 406)	
	No.	%	No.	%	No.	%
Good PSQI < 5	64	36.4%	63	27.4%	127	31.3%
Poor PSQI ≥ 5	112	63.6%	167	72.6%	279	68.7%

The Correlation of the Demographic Variables with the Psychological Domain of Health-Related Quality of Life

As shown in Table 3 gender had no significant difference when it is correlated with the psychological domain of health-related quality of life ($r = 0.021$; $p = 0.680$), whereas as one gets older the psychological domain significantly improves ($r = 0.197$; $p < 0.0001$). There was a correlation between a higher educational level and better psychological domain scores ($r = 0.164$; $p = 0.001$). Also, higher monthly income is correlated with higher psychological domain scores ($r = 0.129$; $p = 0.009$). A correlation was also found between marital status, occupation, and the psychological domain of health-related quality of life. The psychological domain scores were higher in singles and married participants ($r = 0.159$; $p = 0.001$), as well as in those who were students and employed ($r = 0.132$; $p = 0.008$).

Table 3: Correlation between World Health Organization Quality of Life-Brief (WHOQOL-BREF) psychological domain of health-related quality of life (HRQOL) and the demographic variables among study participants (n = 406).

Variables	The Psychological Domain of HRQOL	
	r	P
Age (years)	0.197	< 0.0001
Gender (Male/Female)	0.021	0.680
Marital Status (Single, Married, Separated, Divorced or Widowed)	0.159	0.001
Level of Education (None at all, Secondary school, High school, University or college, or Post-graduate)	0.164	0.001
Occupation (Student, Employee, Unemployed, Retired or Others)	0.132	0.008
Monthly Income (Saudi Riyals)	0.129	0.009

The Correlation of the Demographic Variables with Sleep Quality

The demographic variables that correlated with sleep quality among the study population are shown in Table 4. Participant's sleep quality differed significantly based on their gender ($r = 0.115$; $p = 0.020$). Female participants were highly correlated with higher global PSQI scores which indicate their poor sleep quality. Aside from that, monthly income demonstrates a significant negative correlation with sleep quality. The lesser the monthly income of an individual the higher the global PSQI score, indicating their poor sleep quality ($r = -0.106$; $p = 0.033$) compared to individuals with higher monthly income. Other demographic variables show no significant correlation between them and sleep quality among these study participants.

Table 4: Correlation between sleep quality measured by Pittsburg Sleep Quality Index (PSQI) and the demographic variables among study participants (n = 406).

Variables	PSQI: Global Score	
	r	P
Age (years)	-0.070	0.161
Gender (Male/Female)	0.115	0.020
Marital Status (Single, Married, Separated, Divorced, or Widowed)	-0.81	0.105
Level of Education (None at all, Secondary school, High school, University or college, or Post-graduate)	-0.070	0.157
Occupation (Student/Employee/Unemployed/Retired/other)	-0.036	0.469
Monthly Income (Saudi Riyals)	-0.106	0.033

The Correlation between Sleep Quality and the Psychological Domain of Health-Related Quality of Life

Based on Table 5, each of the seven PSQI components is shown with their correlation values. A negative correlation was found between the psychological domain of health-related quality of life and the global score of PSQI of the participants ($r = -0.280$; $p < 0.0001$). All components of the PSQI show a significant value except two of them; sleep disturbance and the use of sleep medication. However, higher scores were found in the subjective sleep quality of participants with lower scores in the psychological domain, indicating a negative correlation between them ($r = -0.271$; $p < 0.0001$), as well as for the 7th component which is the daytime dysfunction giving the result ($r = -0.288$; $p < 0.0001$).

Table 5: Correlation between World Health Organization Quality of Life-Brief (WHOQOL-BREF) the psychological domain of health-related quality of life (HRQOL) and quality of sleep (measured by Pittsburg Sleep Quality Index; PSQI) variables among study participants (n = 406).

Variables	The Psychological Domain of HRQOL	
	r	P
C1: Subjective sleep quality	-0.271	< 0.0001
C2: Sleep latency	-0.162	0.001
C3: Sleep duration	-0.154	0.002
C4: Habitual sleep efficiency	-0.155	0.021
C5: Sleep disturbances	-0.054	0.282
C6: Use of sleep medication	-0.064	0.199
C7: Daytime dysfunction	-0.288	< 0.0001
PSQI: Global score	-0.280	< 0.0001

Discussion

This study included 406 of the adult population living in Jazan region, to investigate the association between sleep quality and the psychological domain of health-related quality of life among them. The prevalence of poor sleep quality of adults living in Jazan region was (68.7%). Our study found that sleep quality has a statistically negative correlation with the psychological health-related quality of life among adult participants. Additionally, these two variables were also correlated with the demographic characteristics of the study population. According to the results shown in Table 3, most of the demographic variables including age, gender, marital status, level of education, and monthly income were significantly correlated with the psychological domain scores. The older the age, the higher the level of education, and the higher the monthly income, the better and greater the psychological domain scores. Thus, indicating the interference of those variables with the psychological domain scores in the WHOQOL-BREF questionnaire. Further, sleep was correlated with those variables as well, especially gender and monthly income. The results in Table 2 show us that the majority of those participants had poor sleep quality (68.7%) and more predominantly were females participants who reported higher PSQI scores (72.6%) indicating their poor sleep quality compared to males (63.6%) with a statistical correlation between sleep quality and gender ($r = 0.115$; $p = 0.020$) as it's represented in Table 4. Similar findings have been found in another study among Saudi adults in Riyadh that focused on the duration rather than the quality of sleep which reported a reduction in sleep duration by 22 minutes in the female gender (20). Moreover, a study that analyzed the sleep quality association with quality of life among the nurse population mentioned that females were more associated with sleep disturbance than males (OR = 3.40; 95%CI 1.37; 8.40; $p = 0.008$) (21). However, a study was conducted on Saudi adolescents in Riyadh which found that sleep scores were significantly lower for adolescents and even lower among girls ($p = 0.002$) than boys ($p = 0.19$) indicating that severe stress was negatively associated with sleep in girls but not in boys (22). Another paper revealed that nearly half (46%) of adolescent participants have sleep deprivation (less than 7 hours of sleep per day) highlighting that puberty has a major role in biological circadian change (23). Despite the fact that these studies were conducted on a different population, medical students, and adolescents who may have a different set of influencing factors, our study revealed similar results that pointed out the correlation between sleep quality and gender differences in this study population as well.

Also, those participants with a monthly income less than 5000 Riyals were found to have higher PSQI scores indicating their poor sleep quality compared to others with higher monthly income. This elaborates the negative correlation between sleep quality and the monthly income of participants. A recent study conducted on the German community demonstrated that sleep quality was strongly influenced by socioeconomic status and employment situation, and the poorest sleep quality was found in unemployed people (24). Based on the correlations between employment status, monthly income, sleep quality, and psychological domain scores, this may suggest that employment status and income played an important role in influencing the sleep quality and the psychological domain scores among the participants. This might explain why females tend to have poorer sleep quality in our results. However, in our study, we found that psychological domain scores have a strong correlation with most of the demographic characteristics of participants, unlike sleep quality which was significantly correlated with only two of the demographic variables; gender and the monthly income of the study population as is shown in Table 4.

Additionally, the psychological domain of health-related quality of life was found to be strongly correlated with the global score of the PSQI of the participants with a strong statistically significant result ($r = -0.280$; $p < 0.0001$) among this study participants. The psychological domain scores of the participants were found to be negatively influenced by their sleep quality. Those who have higher global PSQI scores suffering from poor sleep quality were found to score less in the psychological domain. This reflects the negative correlation between these two variables. Our results show that five of the seven components that are included in The PSQI questionnaire were correlated negatively with the psychological domain scores. Subjective sleep quality

(r = -0.271; p < 0.0001), and daytime dysfunction (r = -0.288; p < 0.0001) were the most influenced categories among those seven components, followed by sleep latency (r = -0.162; p = 0.001), sleep duration (r = -0.154; p = 0.002), and habitual sleep efficiency (r = -0.155; p = 0.021) as documented in Table 5. Similar results were found in a study conducted about the association between sleep quality and quality of life among patients with first-episode psychosis which stated that participants with higher scores in subjective sleep quality, sleep latency, and daytime dysfunction were associated with lower scores in the psychological domain of quality of life (25). Furthermore, this correlation has also been reported in a different paper which revealed that sleep alteration is associated with impaired quality of life domains including the psychological domain (r = -0.51; p < 0.0001) (21). Also, a study among medical students in Jeddah shows an association between stress and poor sleep quality, where the PSQI score (total PSQI score *5) was 76.4%. These studies indicate a strong link between stressful environment and poor sleep quality (value of Cramer's V = 0.371, P < 0.001) (26).

Nevertheless, in our research, we found that the other two components included in the PSQI which are; sleep disturbance and the use of sleep medications show no significant value when they were correlated with the psychological domain scores. In contrast, studies have assessed the effect of psychiatric illnesses on the quality of sleep. According to one study on patients with delusions and hallucinations, they frequently experience sleeping difficulties, difficulty staying asleep, excessive sleeping, and nightmares. In turn, these problems result in low productivity, fatigue, emotional distress, and poor sleep quality

Conclusion

This study revealed that the majority of adults living in Jazan reported poor sleep quality, especially females. Additionally, poor sleep quality was significantly negatively correlated with the psychological domain of health-related quality of life among adults living in Jazan region. In comparison to individuals with higher psychological domain scores, those with lower psychological domain scores were found to have higher PSQI global scores indicating their poor sleep quality. The demographic variables were also significantly correlated with both sleep quality and the psychological domain scores among this study population. The findings of this present study could be used as a basis for future health education programs to improve the quality of sleep and psychological domain of health-related quality of life among adults in Jazan region. Future research on other populations could potentially benefit from a qualitative approach to understand why these correlations exist.

Limitations of the Study

This study relied on descriptive findings derived from a cross-sectional design, which restricted us from drawing any definitive conclusions about the direction of the association between sleep quality and the psychological domain of health-related quality of life among study participants. Consequently, the causal relationships between these two variables couldn't be concluded.

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Knowledge and behavior of postmenopausal women regarding osteoporosis and its screening in Al-Baha region, Saudi Arabia

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Abstract

Background: The risk of osteoporosis and functional deterioration is challenging for Saudi women with increased disease cases. However, recent analysis has shown that Saudi women were unaware of the risk of osteoporosis, so their knowledge and attitudes toward osteoporosis risk and prevention are necessary. We aimed to assess the knowledge and attitudes of Saudi women regarding osteoporosis and its screening in Al-Baha region, Saudi Arabia.

Methods: About 464 participants (post-menopausal women) in Al-Baha region were recruited for the study to participate in the online survey. A modified osteoporosis knowledge assessment tool questionnaire was distributed online to collect data on participants' responses regarding knowledge, attitudes, and practices (KAP) of osteoporosis. Then data was transferred to apply descriptive statistics to measure the frequency and percentage of KAP factors.

Results: Most participants had good knowledge of osteoporosis and were 40-50 years old. White women are at higher risk of osteoporosis, but responses were quite uncertain. In addition, the frequency of knowledge of risk and symptoms was 89.7% and 76.3%, respectively. The percentage of knowledge and attitudes was higher for some aspects of risk and symptoms. The perceived knowledge about osteoporosis screening was positive, but actual knowledge remained uncertain. In addition, although knowledge and attitude gave significant results for some aspects of KAP factors, most participants' overall knowledge was poor.

Conclusion: The study concluded that the overall knowledge and attitudes of Saudi post-menopausal women in Al-Baha region regarding osteoporosis was poor, and therefore standard interventions must be recommended to enhance knowledge and practices.

Keywords: postmenopausal, osteoporosis, knowledge, Al-Baha, Saudi Arabia

Introduction

A skeletal illness known as osteoporosis is defined by the reduction of bone strength and microstructural degradation of articular cartilage (1). Osteoporosis is the most prevalent bone disease which affects approximately 200 million males and females around the globe, especially those who are above 60 years of age (2). Moreover, it is known that osteoporosis occurs predominantly in postmenopausal women. It affects bone density and microarchitecture, making it more fragile, less resistant, and more prone to fracture (3). Menopause occurs when ovarian follicular activity declines, lowering estrogen and progesterone levels while increasing FSH and LH levels (4). It is usually confirmed after twelve months of amenorrhea with no other pathological or physiological cause (4). By preventing bone degradation and encouraging bone development, hormones including estrogen, testosterone, and parathyroid hormone (PTH) are important in bone remodeling (2). In women, the maximal bone density is obtained between the ages of 25 and 30. The diminished synthesis of estrogen in postmenopausal women produces considerable bone degradation (2). During menopause, estrogen deficiency impairs the bone remodeling cycle by increasing osteoclastic activity without increasing osteoblastic activity, resulting in osteoporosis. (5). Postmenopausal women with a poor understanding of osteoporosis and the screening guidelines are prone to fractures and other complications. Osteoporosis will cause fractures in approximately 50% of postmenopausal women over their lifetime (6).

Hip fractures occur in 50% of women over 50, equaling the risk of breast, uterine, and ovarian cancers combined (7). Hip fractures increase mortality by 10% to 20% within a year. The previous literature suggested that women with osteoporosis are unaware of their skeletal status (8). With the increasing aged population around the world, the significance of controlling and preventing osteoporotic fragility fractures has also increased (1). Additionally, it is estimated that by the age of 50, the chance of having osteoporosis climbs to one-third in females (9). Only 12% of postmenopausal Palestinian women have a 70% knowledge regarding osteoporosis and its risk factors (10).

Thousands of women over 50 have crippling musculoskeletal injuries yearly, and many more get pelvic, spinal, shoulder, and wrist injuries. However, these injuries are not accidental; osteoporosis is probably the reason behind them. The most prevalent form of degenerative disease, osteoporosis, is defined by reduced bone density and loss of tissue in bones, which can result in fragile and brittle bones. It is indicated that women with osteoporosis are more likely to experience injuries and fractured bones (11). Osteoporosis causes major malaise in postmenopausal women and aged people, increasing morbidity and mortality rates and the financial burden on them and their households. Knowing the populace's degree of awareness and screening of the disease is essential before beginning to work on the scope of medical problems. For this, postmenopausal women must be aware of screening procedures and learn how to deal with osteoporosis if it is to be prevented (12).

Information on the prevention of osteoporosis is essential in controlling it. Numerous research on women's perceptions and awareness of osteoporosis have been undertaken. Previous research in the United States showed that adult and aged women had an inadequate awareness of osteoporosis (13). Moreover, it has been discovered in Israel that Jewish women who have osteoporosis are more knowledgeable about osteoporosis than women living in Arab countries. So, this study tries to evaluate the knowledge of postmenopausal women, especially the women of Al-Baha region, Saudi Arabia, regarding osteoporosis and its screening procedure (14).

Osteoporosis is a fair representation of the physiologic illness of bone deformity that has become more common as the aging population increases worldwide. It is primarily brought on by a decline in bone mass, which is then influenced by several endocrinological factors. For instance, the mass of the bone in women quickly declines after menopause due to the reduction in estrogen levels. Older women have disproportionately greater harm from bone fractures due to the estimated bone mass decline, which occurs at a rate of 4% to 5% each year within the first 3 years following menopause and 1% to 2% each year afterwards (15). Osteoporosis resulting in bone deformation has been disclosed to be the primary cause of limited physical abilities in older women. It significantly increases social and economic pressures that lead to limitations on leisure events, poor life quality, and musculoskeletal injuries. Osteoporosis also raises the risk of bone fractures, and it is estimated that about 20% of people with hip injuries die within one year. Consequently, there is a pressing necessity to create efficient osteoporosis behavioral interventions to manage bone injuries to reduce individual and societal damage in older women (16).

Managing the lowering of the bone density process is the main goal of managing osteoporosis because it is known to be a significant risk factor for injury. Research studies have found that management intervention programs involving strength exercises and other physical activities successfully managed osteoporosis in older women (17). Additionally, nutritional patterns like calcium intake or calcium in conjunction with vitamin D were successful in lowering the harm of bone injury, especially in women who are equal to or above 40 years of age. In this regard, this study aims to evaluate postmenopausal women's knowledge and behavior regarding osteoporosis and its screening in Al-Baha region, Saudi Arabia.

Methods

Study design and period

A cross-sectional survey was conducted in Al-Baha region, Saudi Arabia. This study was carried out from January 2022 to June 2022.

Study population
The population of this study was women aged above 40 years and residents of Al-Baha region, Saudi Arabia. They have been used for drawing the sample of this study and assessing the knowledge and behavior of menopausal women regarding osteoporosis and its screening.

Ethical approval
This study was approved by the Research Ethics Committee in Faculty of Medicine, Al-Baha University with the ethical approval number (REC/PAT/BU-FM/2020/2).

Data collection and management
Data were collected in this study using an anonymous self-administered, reliable, pre-validated, and modified questionnaire from a previous study, Osteoporosis Knowledge Assessment Tool (OKAT) (10). The tool was used to assess study participants. The questionnaire consisted of questions on four main topics: understanding osteoporosis symptoms / risk of fracture, risk factors for osteoporosis, preventative factors against osteoporosis, and the last one treatment availability. The questionnaire was in English and was translated into Arabic for the ease of the study subjects. It comprises queries with three possible answers, such as "correct," "incorrect," and "I do not know," with the comment "I do not know" and queries with no response being regarded as erroneous. One point was given for correct responses, while 0 points were given for incorrect ones. The questionnaire was distributed among women in Al-Baha region. All participating women were informed in detail about the study aims and data confidentiality. The questionnaire required consent from the participant to participate in this study. Women who agreed to participate in the study were asked to complete the questionnaire regarding their knowledge, attitude, and practices (KAP) about postmenopausal osteoporosis. The questionnaire was designed in Arabic and contained three parts: sociodemographic data of participants, knowledge assessment questions, and screening questions. All researchers in this study performed data entry. After verification, data was transferred to the statistical database directly.

Inclusion criteria
Women aged equal to or above 40 years old and residents of Al-Baha region were included. Participants who agreed to participate in the current survey study and their ability to understand the questionnaire were included.

Exclusion criteria
Women less than 40 years of age were excluded from the study. Women who were equal to or above 40 years but were not residents of Al-Baha region were also excluded from the study. All participants who did not agree to participate were also not included in the study. Additionally, those women who gave incomplete questionnaire responses were also excluded.

Results

Demographic Characteristics
An overview of the female participants' demographic characteristics is shown in Table 1. It shows that nearly half of the participants (50.2%) belong to the age group 40 to 45 years old, whereas 27% of the participants belong to the age group of 45-50 years old, and 22% of the participants were older than 50 years. Moreover, most participants were Saudi, while only 2.4% were non-Saudi. More than half of the female respondents (57.3%) have university degrees, while 24.8% have high school degrees. Most female respondents (88.8%) were married, while 4.5% were widows, 3.9% were divorced, and 2.8% were single.

Knowledge of postmenopausal women regarding osteoporosis and its screening
The frequency analysis of the knowledge of postmenopausal women regarding osteoporosis and its screening is shown in Table 2. It contains percentages and frequency for correct answers. Most female participants (89.7%) correctly answered the first question (Bone fractures are more likely to occur as a result of osteoporosis). Consequently, 78.2% of female respondents correctly answered the fifteenth question (Alcohol in moderation has little effect on osteoporosis), followed by 76.3% of the female respondents who correctly answered the second question (Osteoporosis often manifests as symptoms (such as discomfort) prior to fractures).

However, the minimum percentage of the correct is found for the nineteenth statement (There is a small amount of bone loss in the ten years following menopause, 3.4%), followed by the fifth statement (Compared to women of other races, white women had the greatest risk of fracture, 17.2%), and consequently for the eighth statement (From age 50, most women can expect at least one fracture before they die, 26.7%).

The levels of knowledge among postmenopausal women are shown in Table 3. It shows that 57.98% of females have poor general knowledge about osteoporosis, whereas 38.24% of the female respondents have good knowledge, and 36.31% have excellent knowledge about osteoporosis.

Table 1: Sociodemographic characteristic of the participants

	Variables	Frequency	Percent
Age	40-45	233	50.2
	46-50	129	27.8
	Older than 50	102	22.0
Nationality	Non-Saudi	11	2.4
	Saudi	453	97.6
Educational level	Elementary	48	10.3
	High School	115	24.8
	Intermediate	35	7.5
	University	266	57.3
Marriage status	Divorced	18	3.9
	Married	412	88.8
	Single	13	2.8
	Widow	21	4.5

Table 2: Frequency distribution of the participants' correct answers

Questions (correct answer)	Frequency	Percent
Bone fractures are more likely to occur as a result of osteoporosis. (Yes)	416	89.7
Osteoporosis often manifests as symptoms (such as discomfort) prior to fractures. (Yes)	354	76.3
Men are more likely to have osteoporosis (No)	287	61.9
Smoking cigarettes may increase the risk of osteoporosis (Yes)	199	42.9
Compared to women of other races, white women have the greatest risk of fracture (Yes)	80	17.2
A fall is just as important as low bone strength in causing fractures (Yes)	284	61.2
The majority of women get osteoporosis by the age of 80. (Yes)	263	56.7
From age 50, most women can expect at least one fracture before they die (Yes).	124	26.7
Physical exercise of any kind is helpful for osteoporosis (No).	103	22.2
It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors (Yes).	203	43.8
A person is more likely to get osteoporosis if their family has the disease (Yes).	194	41.8
Two glasses of milk each day may provide an adequate amount of calcium (Yes)	263	56.7
Sardines and broccoli are good sources of calcium for people who cannot take dairy products (Yes).	265	57.1
Calcium supplements alone can prevent bone loss (No)	186	40.1
Alcohol in moderation has little effect on osteoporosis (Yes).	363	78.2
High salt consumption raises the risk of osteoporosis (Yes).	218	47.0
There is a small amount of bone loss in the ten years following menopause (No).	16	3.4
After menopause, hormone treatment reduces bone loss at any age (Yes)	116	25.0
In KSA, there are no effective treatments for osteoporosis (No).	112	24.1

Table 3: Level of knowledge among participants

Knowledge level	Percentage
Poor	57.98
Good	38.24
Excellent	36.31

Furthermore, the questions regarding osteoporosis and its screening are divided into four subgroups. The descriptive statistic of the subgroups is shown in Table 4.

Table 4: Descriptive statistics of the subcategories of knowledge among participants.

	Min	Max	Mean	Std. Dev
Knowledge regarding osteoporosis risk factors (total possible score 7 points)	0	7	3.502	0.500
Knowledge regarding the symptoms and fracture risk in osteoporosis (total possible score 5 points)	0	5	2.931	0.492
Knowledge level regarding the treatment availability (total possible score 2 points)	0	2	0.491	0.431
Knowledge level regarding the preventive factors as physical activity and diet relating to osteoporosis (total possible score 5 points)	0	5	1.795	0.479

Table 5: Knowledge of postmenopausal women regarding osteoporosis using OKAT tool.

Question	Percentage of correct answers
Knowledge regarding osteoporosis risk factors	
Osteoporosis is more common in men.	61.9%
Cigarette smoking can contribute to osteoporosis.	42.9%
White women are at highest risk of fracture as compared to other races.	17.2%
A fall is just as important as low bone strength in causing fractures.	61.2%
Family history of osteoporosis strongly predisposes a person to osteoporosis.	41.8%
Alcohol in moderation has little effect on osteoporosis.	78.2%
A high salt intake is a risk factor for osteoporosis.	47.0%
Overall Average Percentage	50.0%
Knowledge regarding the symptoms and fracture risk in osteoporosis	
Osteoporosis leads to an increased risk of bone fractures.	89.7%
Osteoporosis usually causes symptoms (e.g., pain) before fractures occur.	76.3%
White women are at highest risk of fracture as compared to other races.	56.7%
By age 80, the majority of women have osteoporosis	26.7%
It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors.	43.8%
Overall Average Percentage	58.6%
Knowledge level regarding the treatment availability.	
Hormone therapy prevents further bone loss at any age after menopause.	25.0%
There is 1 effective treatment for osteoporosis available in KSA.	24.1%
Overall Average Percentage	24.6%
Knowledge level regarding the preventive factors as physical activity and diet relating to osteoporosis	
Any type of physical activity is beneficial for osteoporosis.	22.2%
An adequate calcium intake can be achieved from two glasses of milk a day.	56.7%
Sardines and broccoli are good sources of calcium for people who cannot take dairy products.	57.1%
Calcium supplements alone can prevent bone loss.	40.1%
There is a small amount of bone loss in the ten years following menopause.	3.4%
Overall Average Percentage	**35.9%**

From Table 4, it is found that most respondent females have knowledge regarding the osteoporosis risk factors (mean=3.5021). Moreover, the standard deviation value indicates less variation in the responses. Followed by this, the second highest value of the mean (mean=2.931) is found for the second criterion (knowledge regarding the symptoms and fracture risk in osteoporosis). Consequently, the fourth criterion has the third highest mean value (1.795). Finally, the third criteria (Knowledge level regarding the treatment availability), has the lowest mean value (0.493). The overall result shows that respondent women have more knowledge regarding the osteoporosis risk factors, followed by knowledge regarding the symptoms and fracture risk in osteoporosis.

Also, the percentages of the responses in each subgroup have been found and shown in the table below (Table 5). It shows that 50.0% of participants have correct knowledge regarding osteoporosis risk factors, and the overall average percentage regarding symptoms and incidence of osteoporosis was 58.6%. In addition, the overall percentage regarding preventive factors of osteoporosis was 35.9% among participants.

The assessment of knowledge on the sub-level was also assessed. The results showed more knowledge of osteoporosis, risk factors, symptoms, treatment, and preventive factors in adult's aged between 40 to 50 years old compared to adults over 50 years. The mean values of knowledge were greater in the respected age group (40-50 years) (Table 6).

Table 6: Knowledge of osteoporosis in the subcategories among different age groups.

Osteoporosis Knowledge On sub level						
	Age	N	Mean	Std. Dev.	t	P-Value
Knowledge regarding osteoporosis risk factors	40-50 Years	362	0.513	0.239	2.116	0.035
	More than 50 Years	102	0.457	0.225		
Knowledge regarding the symptoms and fracture risk in osteoporosis	40-50 Years	362	0.598	0.264	1.888	0.06
	More than 50 Years	102	0.543	0.249		
Knowledge level regarding the treatment availability.	40-50 Years	362	0.265	0.320	2.54	0.011
	More than 50 Years	102	0.176	0.278		
Knowledge level regarding the preventive factors such as physical activity and diet relating to osteoporosis.	40-50 Years	362	0.359	0.217	0.012	0.99
	More than 50 Years	102	0.359	0.217		

Also, the assessment of correct knowledge regarding osteoporosis showed different percentages of correct knowledge. About 59.9% of participants responded correctly to the knowledge of vitamin supplementation for preventing osteoporosis, and 93.1% of the participants responded to the knowledge of screening via bone mineral density, indicating their positive knowledge and attitudes toward the screening test for osteoporosis (Table 7).

Table 7: Attitude of postmenopausal women towards osteoporosis and its screeding.

Question	Yes
Have you ever been diagnosed with osteoporosis by a specialist	19.0%
Do you take Vitamin D or Calcium supplementation to prevent osteoporosis	59.9%
Have you ever fractured a bone after the age of 40 while doing light work	5.8%
Do you take estrogen-containing pills (such as birth control pills)	19.6%
Have you ever heard of Bone Mineral Density screening test	36.2%
Have you ever done Bone Mineral Density test	13.4%
Do you think screening with Bone Mineral Density test helps early detection of osteoporosis and prevents fractures	93.1%

Discussion

The objective of the current study was to evaluate the knowledge and attitudes of postmenopausal women participants in the Al-Baha region toward osteoporosis. In this regard, the knowledge regarding symptoms, risk factors, preventive factors, and perceptions toward screening was assessed. The results have therefore shown some interesting findings. Most participants were in the age group of 40-45 years (50%), followed by 45-50 years and older than 50 years of age. Studies in the literature have shown the knowledge of women in the age group 40-50 years have higher knowledge of osteoporosis risks (18). The main findings have focused on correct knowledge regarding risk factors and screening. Most of the participant's responded correctly to the related risks of osteoporosis, such as bone fractures were higher, and there is also a study found that osteoporosis entails the risk of bone fragility and fractures (12). Also, the frequency of knowledge regarding risk factors such as moderation of alcohol and cigarette smoking, leading toward osteoporosis and associated symptoms of pain, was higher. These findings were in relation to the research findings in another region of Saudi Arabia, whereby knowledge levels were found to be fair to good (19). However, the women were not certain about the amount of bone loss. Also, women's lack of knowledge of the risk of disease in relation to age and race was found to be uncertain regarding the fact that white women are at higher risk of disease incidence and fragility in their lifetime. Literature significantly measured the low bone density in white women to determine the risks of bone fractures (20). The overall knowledge levels were found to be poor (57%).

Apart from this, screening knowledge was assessed by dividing knowledge into four sub-categories: knowledge of risk, symptoms, treatment, and preventive factors. Based on the mean value, the knowledge regarding risk factors was higher, followed by symptoms, followed by the third highest knowledge level regarding preventive factors, followed by availability of treatment. Literature has shown that women undergoing densitometry have fairly sufficient knowledge regarding the prevention of osteoporosis (21). These findings are helpful in the face of the increasing prevalence of osteoporosis in Saudi Arabia. A comparatively higher prevalence among postmenopausal women was reported compared to the earlier years (22). Hence, adequate knowledge of the factors of screening is imperative in contemporary practices. Also, the values of standard deviation were lower, indicating a difference between the responses of the participants.

Additionally, besides frequency, the percentages of correct knowledge were assessed. The average percentages of knowledge regarding risk factors and symptoms were >50% and 38% for the knowledge of preventive factors, such as physical activity and diet-related factors, respectively. Our findings were contrasted with earlier studies in the KSA, which found a high perceptibility and low knowledge of preventive factors (23). However, the changing perceptions and evolution of women's knowledge over the years show the positive attitudes of women toward the prevention and care of osteoporosis. Moreover, the percentages over the sub-level categories were also reported, indicating the age-related knowledge variations among participants. It was found that females in the age range 40-50 years have the best knowledge of risk factors, symptoms, availability of treatment, and prevention of osteoporosis. The Saudi Ministry of Health reported that women's risk and prevalence of osteopenia and osteoporosis are higher in the age above 50 years . The knowledge of these risks and symptoms development is therefore necessary for the respective group at the risk of susceptibility (25). In this regard, the present findings showing good knowledge in women younger than the target period of developing osteoporotic symptoms may show positive signs of adopting preventive behaviors and availing treatment.

Relating to the previous assessment of good knowledge about risk and symptoms, it would have an effect on the knowledge and attitudes toward screening and prevention. For instance, 59.9% of women have appropriate knowledge of vitamin supplementation, and 93% of women agreed to the fact that bone mineral density can effectively detect the risk of osteoporosis. The current literature has emphasized that the measurement of bone mineral density is a proper diagnosis of osteoporosis (25). Also, this measure has been used to assess bone fragility in patients with other comorbidities, such as arthritis and celiac disease (26). In Saudi Arabia, the gold standard for determining bone mineral density (BMD) in the case of osteoporosis is a dual x-ray absorptiometry test. This approach can also be used to find age-related changes in BMD, which would further facilitate the assessment of osteoporosis in the target group vs. Saudi's reference data (27). However, despite the positive responses of participants toward the efficacy of bone mineral density as screening test for osteoporosis, a low percentage of participants have heard of the screening test. This indicates concerns regarding barriers or lack of availability of the screening test. Overall, the current research found that postmenopausal women had sufficient knowledge about osteoporosis. However, the knowledge of screening and practices remained uncertain to date and necessitates increased attention of researchers and clinical practices to incorporate this component into the practical setting.

However, the study has some limitations in terms of generalizability and quality of findings (28). First, the study was specifically conducted in the region of Al-Baha, where the findings cannot be interpreted for the whole context of the KSA, such that a more generalized population must be assessed for knowledge and practices to develop standards that can be applied in general practice settings. Second, the findings have considered risk, symptoms, screening tests, and preventive factors as measures for assessing knowledge and attitudes. For the demographic factors, age and race were specifically focused on. However, there is a possibility of certain barriers that can affect women's knowledge and attitudes toward osteoporosis risk and screening. For instance, women's perceived barriers to

participating in exercises, dietary behaviors, lack of motivation, and attitudes of healthcare professionals are additional barriers that can prevent women from gaining adequate knowledge and may negatively influence preventive behaviors and attitudes (18).

Conclusion

The present study highlighted the interesting realities against research questions. First, the knowledge of post-menopausal women in Al-Baha region regarding different aspects of osteoporosis was fair, but the overall average knowledge remained poor among participants. Second, the percentage of perceived knowledge was good regarding risk, symptoms, screening, and preventive factors. However, actual knowledge among women about the term bone mineral density as a screening tool for osteoporosis remained uncertain. Throughout the assessment, participants have shared mostly their perceived knowledge, and therefore a significant level of uncertainty is the limitation for Saudi women gaining access to effective prevention and treatment care. About 464 women participants responded to the survey, with most of them in the age range of 40-50 years, similar to our target age since the development of symptoms can occur around this age. Besides, a racial difference in the development of symptoms showed that white women are more susceptible to osteoporosis in the region. However, limitations were found because of the need to assess other sociodemographic factors that can interfere with knowledge and attitudes. These were not assessed since the scope of the study was mainly focused on assessing the knowledge of women. The assessment of knowledge toward disease risk and prevention is a significant approach prior to looking for standards of practices such that it shifts the attention of researchers and clinicians toward an important area of discussion. In this regard, the overall behavior of women regarding osteoporosis care and prevention was a significant determinant of their needs and preferences, and their potential knowledge and perceptions determined the significance of reducing the risk of the prevalence of osteoporosis.

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Ophthalmologists' Attitudes Towards Complementary and Alternative Medicine

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Abstract

Aim: To evaluate ophthalmologists' attitudes toward CAM and define their use and recommendations of CAM for their patients.

Methods: This cross-sectional study was conducted among ophthalmologists in Saudi Arabia. A self-administered questionnaire was distributed electronically among ophthalmologists via social media. The questionnaire was pre-tested in a pilot study of 10 individuals. The questionnaire contained questions about socio-demographics and knowledge about, practices of, and attitudes toward CAM. All statistical analyses were performed using SPSS version 26.

Results: A total of 102 ophthalmologists were involved in this study (68 men and 34 women). Of all the ophthalmologists, 40.2% do not ask their patients about the use of CAM, whereas only 11.8% of them ask their patients about it most of the time. Nearly 60% never recommended CAM to their patients. Most of the ophthalmologists (65.7%) think that CAM can negatively affect patients' compliance to the conventional treatment and 61.8% felt annoyed when patients did not tell them about CAM use. When asked about their knowledge of CAM, 54.9% and 37.3% indicated poor and intermediate knowledge, respectively. Most of the respondents (64.3%) were willing to take courses related to CAM, and only 3.9% of them did.

Conclusion: In the time of increased use of CAM by the patients, most of the ophthalmologists demonstrated poor knowledge about CAM and do not regularly ask the patients about it.

Keywords: Complementary and alternative medicine, ophthalmologist, attitudes, knowledge

Introduction

Complementary and alternative (CAM) medicine refers to a spectrum of therapeutic and diagnostic practices that operate mainly beyond the facilities provided by conventional healthcare. Potential CAM therapies include herbal use, massage, hypnosis, osteopathy, acupuncture, and reflexology. CAM is an increasingly popular aspect of healthcare practice, but there is uncertainty regarding what exactly it is and what role it should play in relation to traditional medicine by the disciplines included in this field1.

CAM practices vary widely between countries depending on their traditions and disease prevalence. Fasting and reciting the Quran alone or only consuming water is the most commonly used spiritual ritual in Saudi Arabia, while herbs (8%–76%), honey (14%–73%), and dietary items (6%–82%) are other commonly used forms. The least commonly used method was cupping (Al Hijamah) (4%–45%), which is typically related to religious beliefs2. However, manual manipulation, phototherapy, acupuncture, and homeopathy are the most widely used conventional therapeutic methods in Europe3.

Many people use complementary medicine to manage their ophthalmological conditions. A study on herb and vitamin supplementation use among the general ophthalmology practice population showed that a significant number of patients used CAM in ophthalmology settings, with 58% of the participants reporting daily use of vitamins and 8% of them using herbal products4. Patients may believe that using CAM can control their treatment options and how they are going to manage their lives by making an action plan, trying to change a situation, and learning something new to deal with a problem5.

A previous study conducted on the opinions of Canadian ophthalmologists regarding CAM use in glaucoma showed that 22% of them thought that CAM has a beneficial effect on patients with glaucoma and 9% would recommend the use of CAM to their patients6. According to a local study, having physicians with wider knowledge of CAM led to better health outcomes7. Another study highlighted the importance of educating physicians about CAM to improve patient care8.

The aim of our study was to evaluate ophthalmologists' attitudes toward CAM and to define their use and recommendations for CAM to their patients.

Materials and Methods

This cross-sectional study was conducted among ophthalmologists and optometrists in Saudi Arabia. The study was approved by the Institutional Review Board (IRB) committee of Imam Mohammed Ibn Saud Islamic University, with approval number HAPO-01-R-011, Project number 22-2021. The study was conducted in accordance with the Declaration of Helsinki of 1975 and its later amendments or comparable ethical standards. The dataset was obtained via a self-administered questionnaire distributed electronically among ophthalmologists and optometrists. Consent was obtained by all participants in this study. The questionnaire was pre-tested in a pilot study of 10 individuals to ensure comprehension and ease of administration and to determine the time needed to complete it. The final adjustments were made after the pilot review.

Statistical analysis

Statistical Packages for Social Sciences version 26 (Armonk, NY: IBM Corp., USA) was used to analyse the data. The assessment of the ophthalmologists' attitude toward CAM was measured using 9-item questionnaires, with a 3-point Likert scale coded as follows: "disagree" coded as 1, "neutral" coded as 2, and "agree" coded as 3. The total attitude score was calculated as the sum of all items, and a score ranging from 3 to 27 points was attained, where the higher the score, the better the attitude toward CAM. Using 50% and 75% to determine the level of attitude, participants were classified as negative if the score was < 50%, neutral if the score was 50%–75%, and positive if the score was > 75%.

Categorical variables are presented as numbers and percentages, while continuous variables are summarised as mean and standard deviation. The overall mean attitude score was compared with sociodemographic characteristics using an independent samples t-test and a one-way ANOVA test. A normality test was performed using the Shapiro–Wilk test. The overall attitude score followed a normal distribution; and therefore, a parametric test was applied between the comparisons. A level of 0.05 was considered as the cut-off value for statistical significance.

Results

A total of 102 ophthalmologists were recruited for the study. Table 1 describes the socio-demographic characteristics of the ophthalmologists. The most common age group was 20–30 years (52%), with a male predominance (66.7% vs. 33.3%). Most respondents were of Saudi nationality (95.1%) and lived in the central region (69.6%), with most of them being in the city (93.1%). With regard to years of practice, the majority had 1–10 years of experience (72.5%). With respect to professional specialty, 41.2% were optometrists and 33.3% were consultants. In addition, more than half (54.9%) worked at government centres.

Table 1. Socio-demographic characteristics of ophthalmologists (n = 102)

Study Data	N (%)
Age group	
• 20–30 years	53 (52.0%)
• 31–40 years	30 (29.4%)
• 41–50 years	11 (10.8%)
• > 50 years	08 (07.8%)
Gender	
• Male	68 (66.7%)
• Female	34 (33.3%)
Nationality	
• Saudi	97 (95.1%)
• Non-Saudi	05 (04.9%)
Residence region	
• Central region	71 (69.6%)
• Eastern region	11 (10.8%)
• Western region	13 (12.7%)
• Northern region	01 (01.0%)
• Southern region	06 (05.9%)
Living area	
• City	95 (93.1%)
• Province	07 (06.9%)
Years in practice	
• 1–10 years	74 (72.5%)
• 11–20 years	21 (20.6%)
• 21–30 years	04 (03.9%)
• > 30 years	03 (02.9%)
Professional specialty	
• Optometrist	42 (41.2%)
• Resident	15 (14.7%)
• Specialist	11 (10.8%)
• Consultant	34 (33.3%)
Subspecialty	
• General ophthalmologist	22 (21.6%)
• Anterior segment	20 (19.6%)
• Glaucoma	03 (02.9%)
• Neuro-ophthalmology	01 (01.0%)
• Oculoplasty	03 (02.9%)
• Retina and vitreous	08 (07.8%)
• Pediatrics ophthalmology and strabismus	02 (02.0%)
• Optometry	42 (41.2%)
• Ophthalmic genetics	01 (01.0%)
Type of centre	
• Government centre	56 (54.9%)
• Private centre	28 (27.5%)
• Both	18 (17.6%)

Regarding knowledge and practice of CAM, 46.1% of physicians sometimes asked their patients if they were using CAM, while 56.9% of patients were sometimes advised about CAM therapy. Nearly 60% never recommended CAM to their patients and 41.2% sometimes discouraged patients from using CAM. Most ophthalmologists (61.8%) felt annoyed when patients did not tell them about their CAM use. The proportion of physicians approached by patients regarding the side effects of CAM use was 51%. The main concern of ophthalmologists regarding the use of traditional medicine was scientific evidence of the benefits (42.2%). When asked about their knowledge of CAM in their daily practice, 54.9% indicated poor knowledge, and 37.3% indicated intermediate knowledge. Only 3.9% of the respondents had attended courses related to CAM. Of those who had not yet attended CAM courses, 64.3% were willing to take them. (Table 2)

As shown in Figure 1, the most common CAM treatments recommended to patients were fish oil (49%) and exercise (47.1%), whereas the most common CAM treatments used by patients were tea bags (57.8%) and honey (52%).

As shown in Figure 2, the most common disease that was treated with CAM was dry eye disease (52%), followed by chalazion and stye (30.4%), while glaucoma was the least common (1%).

In the assessment of attitudes toward CAM, 26.5% agreed that some CAM therapies were beneficial for the treatment of eye conditions, while 46.1% did not agree that they should be used and prescribed to patients. Of these, 65.7% agreed that it could negatively affect patient compliance with conventional treatments, and 55.9% agreed that the use of CAM may prevent patients from visiting ophthalmological clinics. Moreover, 40.2% disagreed that the main use of CAM was to prevent diseases. Moreover, 32.4% agreed that CAM works only through the placebo effect and 48% agreed that CAM should only be used in minor conditions. In addition, 31.4% of respondents agreed that CAM courses are beneficial for ophthalmologists. The overall mean attitude based on 9-items was 18.5% (SD, 2.99), with 9.8%, 64.7%, and 25.5% compromising negative, neutral, and positive attitudes, respectively (see Table 3).

When measuring the differences in the attitude score among the socio-demographic characteristics of ophthalmologists, the attitudes of female participants were statistically significantly better attitude than those of male participants ($T = –2.941$; $P = 0.004$), while the differences in the attitude score of age group, residence region, years in practice, professional specialty, subspecialty, type of centre, and attended course-related CAM were not statistically significant ($P > 0.05$) (see Table 4).

Table 2. Knowledge and practices toward CAM (n = 102)

Statement	N (%)
Do you ask your patients if they use CAM?	
• No	41 (40.2%)
• Sometimes	47 (46.1%)
• Yes, most of the time	12 (11.8%)
• Yes, always	02 (02.0%)
Do patients ask you about the use of CAM?	
• No	19 (18.6%)
• Sometimes	58 (56.9%)
• Yes, most of the time	23 (22.5%)
• Yes, always	02 (02.0%)
Do you recommend CAM to patients?	
• No	61 (59.8%)
• Sometimes	34 (33.3%)
• Yes, most of the time	07 (06.9%)
• Yes, always	0
Do you discourage patients from using CAM?	
• No	29 (28.4%)
• Sometimes	42 (41.2%)
• Yes, most of the time	20 (19.6%)
• Yes, always	11 (10.8%)
Do you feel annoyed when you find out one of your patients is using CAM without telling you?	
• No	39 (38.2%)
• Yes	63 (61.8%)
Have you ever been approached by a patient because of CAM side effects?	
• No	50 (49.0%)
• Yes	52 (51.0%)
What makes you concerned about patients using traditional medicine?	
• There is no scientific evidence for its benefits	43 (42.2%)
• Interaction with traditional medicines	06 (05.9%)
• Side effects	28 (27.5%)
• Dependence on it and dispense with modern medicine	25 (24.5%)
How would you rate your knowledge of CAM in the ophthalmological field	
• No knowledge of it	07 (06.9%)
• Poor	56 (54.9%)
• Intermediate	38 (37.3%)
• Expert	01 (01.0%)
Have you ever taken courses in CAM?	
• No	98 (96.1%)
• Yes	04 (03.9%)
Would you like to take courses in CAM?	
• No	35 (35.7%)
• Yes	63 (64.3%)

CAM: complimentary alternative medicine

Figure 1: Type of CAM treatments recommended to and asked by patients

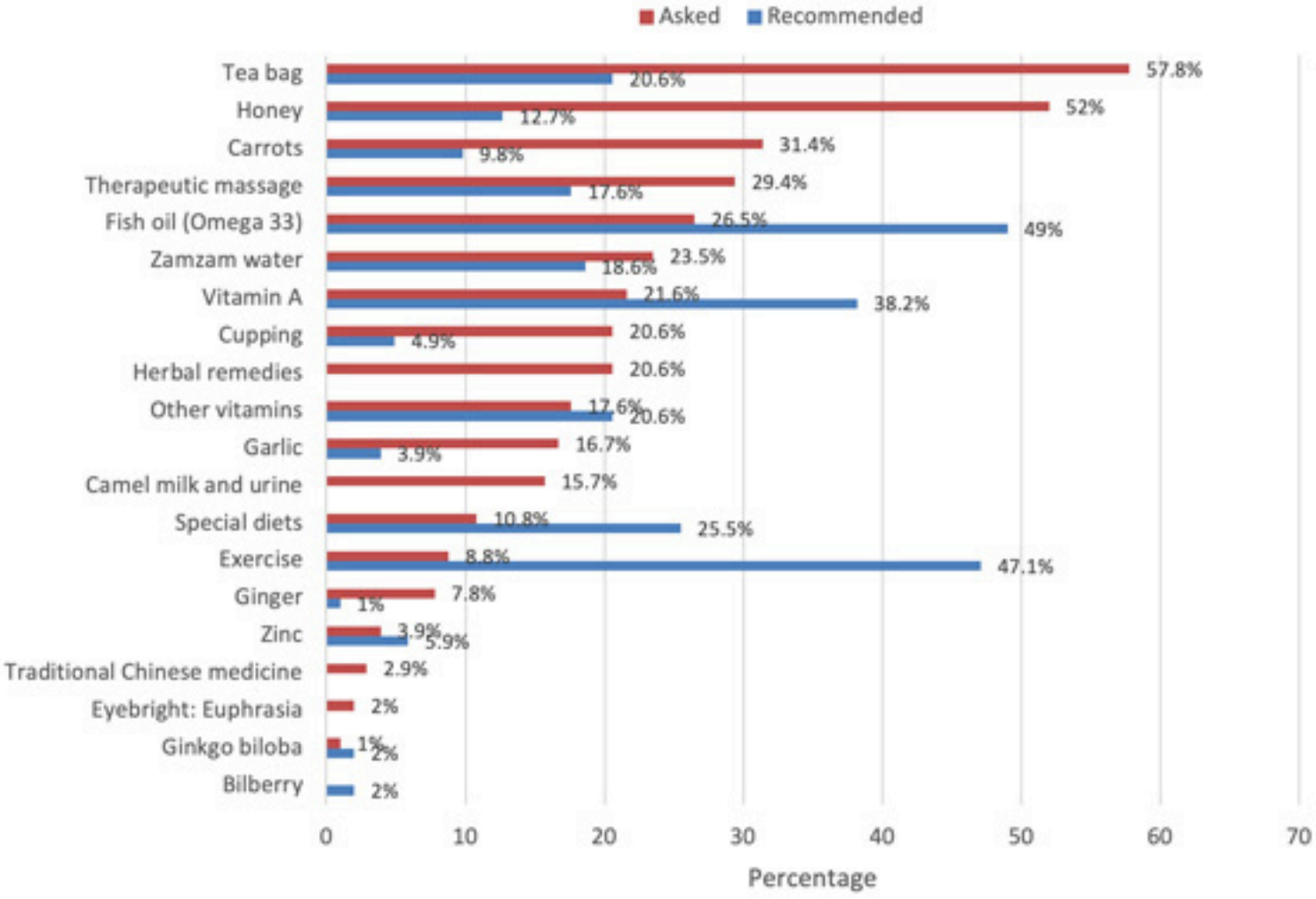

Figure 2: Diseases that can be treated by CAM

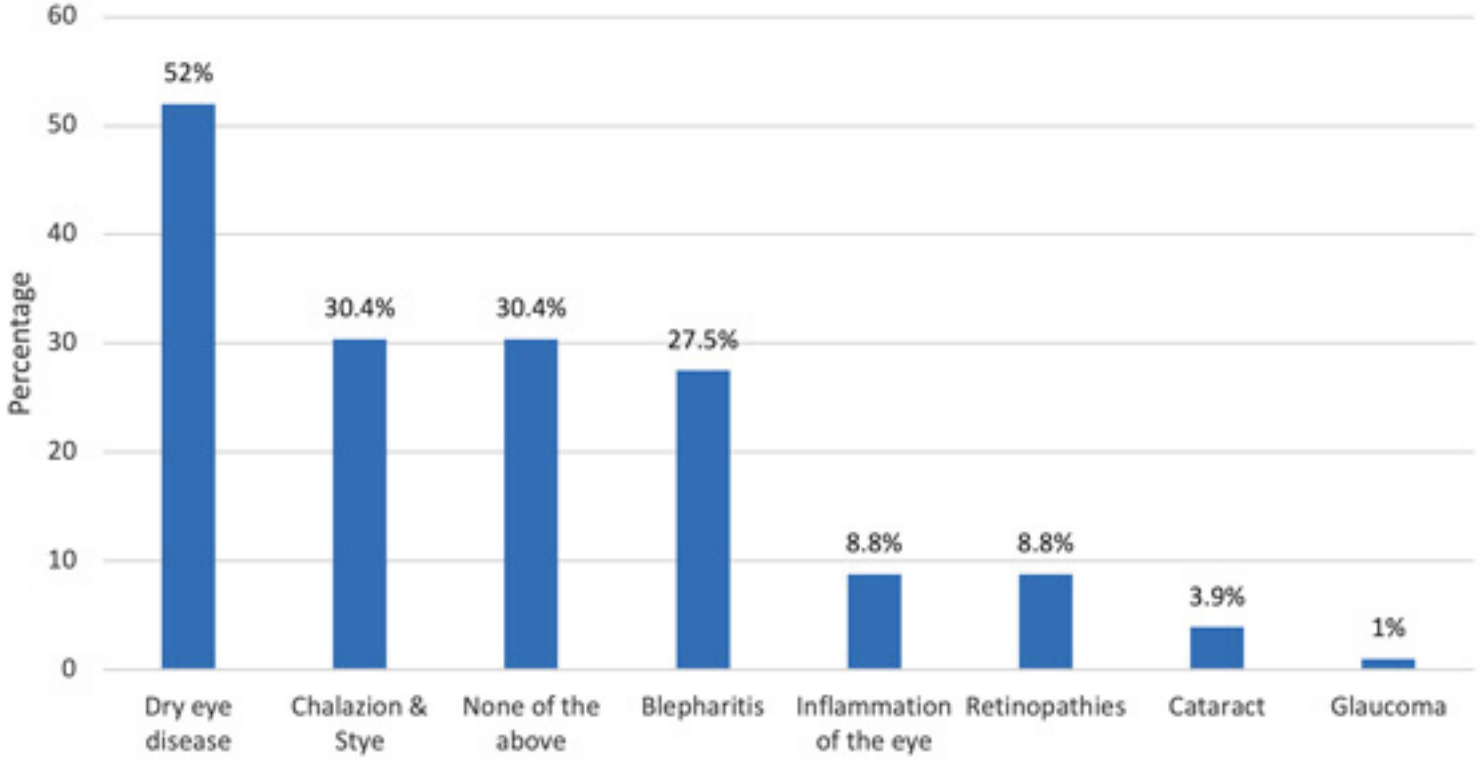

Table 3. Assessment of attitude toward CAM (n = 102)

Statement	Score Mean ± SD	Disagree N (%)	Neutral N (%)	Agree N (%)
1. Do you think that some CAM therapies may be beneficial for the treatment of ophthalmological symptoms/conditions?	2.03 ± 0.71	24 (23.5%)	51 (50.0%)	27 (26.5%)
2. Do you think that CAM should be used and prescribed to patients?	1.71 ± 0.74	47 (46.1%)	38 (37.3%)	17 (16.7%)
3. Do you think that CAM can negatively affect patients' compliance to the conventional treatments and may prevent them from getting proper treatment?	2.58 ± 0.64	08 (07.8%)	27 (26.5%)	67 (65.7%)
4. Do you think that CAM may prevent patients from visiting ophthalmological clinics and seeking conventional medicine?	2.34 ± 0.81	22 (21.6%)	23 (22.5%)	57 (55.9%)
5. Do you think that the main use of CAM is as a prevention of diseases, and not a treatment?	1.84 ± 0.79	41 (40.2%)	36 (35.3%)	25 (24.5%)
6. Do you think that CAM should only be used as a last resort when conventional medicine has failed?	1.68 ± 0.76	51 (50.0%)	33 (32.4%)	18 (17.6%)
7. Do you think that CAM works only through the placebo effect?	2.04 ± 0.78	29 (28.4%)	40 (39.2%)	33 (32.4%)
8. Do you think that CAM should only be used in minor conditions and not in the treatment of more serious illness?	2.19 ± 0.86	30 (29.4%)	23 (22.5%)	49 (48.0%)
9. Do you think that CAM courses are beneficial for ophthalmologists?	2.12 ± 0.71	20 (19.6%)	50 (49.0%)	32 (31.4%)
Total score	18.5 ± 2.99	--	--	--
Level of attitude	N (%)	--	--	--
• Negative	10 (09.8%)	--	--	--
• Neutral	66 (64.7%)	--	--	--
• Positive	26 (25.5%)	--	--	--

Table 4. Differences in attitude score in relation to the socio-demographic characteristics of ophthalmologists (n = 102)

Factor	Attitude Score (27) Mean ± SD	T/F-test	P-value
Age group *			
• 20–30 years	18.9 ± 3.25	T = 1.431	0.156
• > 30 years	18.1 ± 2.64		
Sex *			
• Male	17.9 ± 2.92	T = –2.941	**0.004** ‡
• Female	19.7 ± 2.79		
Residence region *			
• Inside central region	18.6 ± 3.13	T = 0.510	0.611
• Outside central region	19.3 ± 2.67		
Years in practice *			
• ≤ 10 years	18.6 ± 2.96	T = 0.410	0.682
• > 10 years	18.3 ± 3.12		
Professional specialty †			
• Optometrist	19.3 ± 2.99	F = 1.582	0.199
• Resident	17.7 ± 3.37		
• Specialist	18.2 ± 2.68		
• Consultant	18.1 ± 2.82		
Subspecialty †			
• General ophthalmologist	17.7 ± 3.25	F = 2.079	0.108
• Anterior segment	18.2 ± 2.94		
• Optometry	19.4 ± 2.98		
• Other allied subspecialties	17.9 ± 2.47		
Type of centre †			
• Government centre	18.8 ± 2.93	F = 1.750	0.179
• Private centre	18.7 ± 3.24		
• Both	17.3 ± 2.59		
Attended course related to CAM *			
• No	18.5 ± 2.92	T = -0.157	0.876
• Yes	18.7 ± 4.99		

* P-value was calculated using independent samples t-test.
† P-value was calculated using one-way ANOVA test.
‡ Significant at $p < 0.05$ level.

Discussion

It is clear that CAM will be a part of healthcare for a greater part of the population, even in the foreseeable future. Fortunately, studies in this field are increasing rapidly9,10. The integration of CAM into the ophthalmological field is necessary to tackle and gain insights into traditional medicine. Thus, we examined ophthalmologists' attitudes regarding the use and concept of CAM. To improve one's attitude, one should have sufficient knowledge about the subject. In the present study, the majority (54.9%) of ophthalmologists reported poor ratings on their knowledge of CAM, which was consistent with the papers published in Qatar11, Ghana12, and Saudi Arabia13. Incidentally, in the ophthalmological field, the use of CAM is not widely popular as only 26.5% of ophthalmologists believe that CAM therapies play a role in the management of ophthalmological conditions, and 40.2% of them do not ask their patients about CAM.

The findings of this study showed that the overall attitude of ophthalmologists toward CAM was adequate. Approximately one-quarter (25.5%) of the respondents demonstrated a positive attitude, 64.7% were neutral, and only 9.8% had a negative attitude. Several publications have reported a positive attitude toward the concept of CAM, whether amongst general practitioners11 or medical students12,14,15. However, in Saudi Arabia, researchers have found that there is a positive attitude among primary care physicians towards CAM, but most of them are hesitant to refer or initiate a discussion with patients regarding CAM practices. Moreover, we observed that the attitude of female ophthalmologists toward CAM was significantly better attitude than that of male ophthalmologists ($P = 0.004$). This finding is comparable with the study of Akan et al. 15, who indicated that female and first-year students had more positive attitudes than others. However, their optimism regarding CAM and willingness to receive training declined as the level of training increased. Another study conducted by Marie et al.13 indicated that residents and newly practicing physicians had a more positive attitude toward CAM than those with a long history of practice. On the contrary, our results revealed that age, years in practice, professional specialty, subspecialty, type of centre, and courses attended related to CAM were not relevant factors of attitude, which was consistent with the findings of Ameade et al.12.

Ophthalmologists living in the provinces were more likely to believe that patients' compliance with conventional treatments can be negatively affected by the use of CAM and can prevent them from visiting ophthalmological clinics. This is most likely a result of the exposure of these physicians to a greater population of people with less education about conventional medicine and cultural beliefs about the positive effects of CAM.

The data from this study showed that most ophthalmologists were annoyed when they found out that patients were using CAM without revelation. Indeed, 51.0% of them reported being approached by a patient because of the side effects of CAM. These findings are in agreement with those of Furlow and associates16. According to their reports, most patients did not consult a healthcare provider before starting CAM.

Interest in CAM lectures or courses is a significant step towards improving the knowledge of the subject. In this study, although the majority (64.3%) were interested in taking courses related to CAM, only 3.9% were able to participate, which resulted in their lack of knowledge. In Mexico,17 72% of study subjects thought that it was useful to have knowledge of CAM, and more than half (51%) agreed that CAM should be included in a medical career, which was supported by the findings of Marie et al13.

Among the different CAM therapies, ophthalmologists recommended the use of fish oil containing omega 33 (49%), regular exercise (47.1%), vitamin A (38.2%), and a special diet (25.5%) for the treatment of certain eye conditions in their patients. In contrast, the most frequently requested CAM by patients were teabags (57.8%), honey (52%), carrots (31.4%), and massage (29.4%). The use of a specific type of CAM therapy varies according to region and condition. For instance, in Riyadh, Saudi Arabia7, researchers indicated that most physicians were aware of ruqyah (spiritual healing), honey and bee products, dietary supplements, massage therapy, relaxation, herbal medicine, and cupping as CAM therapies, and half of them had used these therapies for themselves or their families. In Qatar11, counselling and psychotherapy (69%), diet and supplements (68.1%), and acupuncture (45.2%) were the CAM therapies that general practitioners were mostly aware of. In Iran14, findings indicated that 90% of participants demonstrated competent knowledge of acupuncture, while the lowest scores were for homeopathy (12%). In Ghana12 and Turkey15, herbal medicine was the most commonly used CAM therapy by medical students and also the most commonly recommended.

This study has some limitations that may have affected the results. The major limitation is the small sample size, which may not have been sufficient to ensure statistical significance. Additionally, this was a questionnaire-based study that relied on self-reported measures rather than observational measures in practice; therefore, we should be particularly cautious in addressing any firm conclusions. However, to the best of our knowledge, this study is the first to explore this important topic among ophthalmologists.

Conclusion

Despite ophthalmologists' willingness to help their patients make informed decisions about the use of CAM, many of them tend not to do so because of their own poor knowledge. Certainly, physicians have a duty to use evidence-based practice medicine, where CAM does not. However, increased use of CAM is inevitable due to the rapid rise of electronic resources that patients can easily access. Thus, physicians' behaviour in learning more about CAM is vital for them to provide and guide their patients with the best possible available treatment. Ophthalmologists

should inquire more frequently about CAM use by their patients and educate them about the side effects of their use if used inappropriately as this transparency between physicians and patients will hopefully result in a more beneficial therapeutic alliance and treatment outcomes. Finally, regular CAM courses should be integrated among physicians, which will help ensure that all patients obtain evidence-based knowledge from which they can make decisions about using CAM.

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Driving and using mobile phone among medical students at Al-Majmaah University

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Abstract

Introduction: Driving accidents in Saudi Arabia are very common and the main reason is that it's the most common transport method in the KSA. Little research has been conducted on the issue. The purpose of our research is to assess the attitude of medical students in our university, while driving. Students use their mobile phone more because of the increased number of applications on smart phones.

Methodology: The study design is a across sectional study, based in the medical department in Majmaah university. The sample size comprised 218 students, and data were collected by pre tested questionnaire and analyzed by SPSS.

Results: Students who use a mobile phone while driving were 87%. Most of the students use their mobile phone while others are in the car (59.5%).

Conclusion: We have observed that 87% of the students said that they use a mobile phone while driving and the majority of those who had negative impacts (74.7%), are still using their mobile phone (81.6%).

Keywords: Driving, Mobile, Medical, Students, Al-Majmaah, Saudi

Introduction

A Mobile phone is a wireless handheld device that allows users to communicate, through audios, videos, and calls, and sends text messages, among other features (1). The phone is a huge help in people's lives. In 1983, the first mobile phones went on sale in the U.S (1).

At that time, it was a huge step toward making people's lives easier. They commenced with voice messaging only, followed by text messaging. Then using a Wi-Fi open network allowed more connections with the world, and more people using different applications, though some people mess misuse them making their lives difficult instead of what it is supposed to do, which is making their lives easier (2).

Using mobile phones while driving entails composing, sending and reading text messages, email, and calling or using the web on a mobile phone while operating a motor vehicle. It therefore, disturbs the concentration of the driver and is common among teenagers according to WHO. Drivers using a mobile phone are approximately 4 times more likely to be involved in an accident than when a driver does not use a phone. Using a Hands-free phone is not much safer than hand-held phone sets (2).

Cell phone technology has become very useful for people on the move, which is demonstrated by surveys that show that the majority of users reported using their phones while driving. Cell phone use by drivers, although difficult to quantify, has been estimated through observational data by the Spanish federal government at six percent of drivers in 2021. (3).

This rate means that at any moment during the day, one million passenger vehicles in the United State are being driven by people using hand-held cell phones. Further analysis of these statistics show that women are more likely to be on their phones while driving; eight percent of women use cell phones while driving compared to five percent of their male counterparts (4).

Two-thirds of cell phone owners say they were expected by family, friends or employers to always be reachable by phone or another communication device. Among young drivers in this survey, 40 percent said they send or read text messages along with other activities while driving in order to remain connected (5).

A 2010 study conducted by the Pew Internet & American Life Project surveyed 2,252 adults on cell phone distractions. 47% percent of texting adults reported they have sent or read a text message while behind the wheel. 75 % percent of adults owning cell phones, reported that they have talked on a mobile phone while driving. In addition, 49% reported that they have been a passenger in a car when the driver was texting on their mobile phone. 44% indicated that they have been a passenger in a car when the driver used a cell phone in a way that put themselves or others in danger (6). A trial was done at Carnegie Mellon University regarding brain distraction while driving. The researchers examined fMRI pictures of the brain while participants drove and answered true/false questions. The results showed that simply listening to someone speak on the other end of a cell phone is enough to impair driving. Furthermore, the fMRI scans showed that listening to someone speak while they were driving reduced by 37 percent the amount of brain activity associated with driving, compared to driving alone (7).

A study by Laberge-Nadeau was done to determine whether an association exists between mobile phone use and the risk of being involved in a road crash. A total of 36,078 drivers completed a survey regarding driving habits, and crash history within the preceding 24 months and mobile phone use data were collected. The results shows that the relative risks (RR) for injury collisions and also for all collisions is 38% higher for men and women cell phone users (8).

A US study done for Traffic Safety, analysed a nationally representative sample of crashes that occurred between 1995 and 1999 and resulted in one or more passenger vehicles having to be towed due to damage, and found that 8.3% of drivers in these crashes were reported to have been distracted. The most common sources of distraction cited in these crashes were an outside person, object or event (29.4% of crash-involved drivers); adjusting radio, cassette or CD (11.4%), or another occupant in the vehicle (10.9%). Distraction related to the use of a cell phone was cited in (1.5%) of crashes (9).

In a study done in 2011, distraction was a contributing factor in about 10% of all driver fatalities and 17% of injuries in the U.S. (10), with drivers 15–19 years of age representing the highest proportion of distracted drivers (11). Among U.S. high school students, 45% reported texting and driving in 2012 (12), which was an increase from 26% of 16- and 17-year-olds in 2009 (13). In certain college samples, 92% of respondents reported reading texts while driving (14). Of all adults in 2010 in the U.S., 31% said they have "sent or read a text while driving" (15), while in Europe, the self-reported frequency of texting "regularly or fairly often" or "at least once" in the past 30 days ranged from approximately 15 to 31% (16).

In the UAE more than a third regularly lose concentration while driving, a new survey suggests. This was particularly true for younger drivers aged 18 to 24, of whom 43% admitted their full attention was not always on the road (17).

This study aimed to assess pattern of mobile phone uses during driving among male medical students at Al-Majmaah university, Saudi Arabia.

Subjects and Methods

Study design, setting and time: a cross–sectional study was done at Al-Majmaah University, Saudi Arabia from August to September 2022. AL Majmaah University which is located in ALMajmaah city is a governorate in the north of Riyadh province, Saudi Arabia. It has a population of around 48,000. It is surrounded by many governorates such as Zulfi, Shaqra and Thadiq.

Sampling and study participants: a total coverage sample was used. The inclusion criteria were male medical students at Al-Majmaah University from the 1st till the last academic year. The exclusion criteria were male students from the preparatory year and students from other universities.

Data Collection: A questionnaire was used to collect the data to identify the usage of mobile phones while driving among medical students and the consequences of distractions caused by it.

Data Analysis: The data was analysed using SPSS version 23. Mean and standard deviation (SD) were used to present quantitative variables. Frequencies and percentages were given for qualitative variables. Pearson, chi-square and /or fisher exact test was applied to observe associations between qualitative variables. A p-value of <0.05 was considered as statically significant

Ethical considerations: ethical approval for the study was obtained from the research ethics committee of Al-Majmaah university, Saudi Arabia.

Results

Figure (1) shows that most of the students 166 (76%) were in the age group 22-25 years old, 51 (23%) of them between 18-21 and only 1(0.5%) student was more than 26 years old.

Table (1) shows that students who travel on a daily basis, 147 (67.4%) and 62 (28.4%) weekly, while 9 (4.1%) travel monthly. Table (2) shows that 23 (12.1%) of students uses their mobile all the time, 45 (23.7%), most of the time, 77 (40.5%) of the students uses their mobile sometimes while driving and 45 (23.7%) rarely use their mobile while driving. Of students, 113 (59.5%) uses their mobile phone while driving, in presence of passengers, and 77 (40.5%) use their mobile phone when they are alone. Only 15 (13.3%) of the 113 drivers use a mobile phone in presence of their friends, 34 (30%) use their mobiles with their family and 64(56.7%) use their mobiles with friends and family. The most common type of usage was social media by 92 (42.2%) of students, the second type was calling by 58 (26.6%) then browsing by 40 (18.3%) of 190.

WhatsApp was the most used of applications by 41 (41.6%) out of 92 who use social media, then Snapchat by 29 (31.5%), Twitter by 20 (21.7%) and 2 (2.2%) of students use all of the applications mentioned. Most of the participants, 155 (81.6%) experienced negative impacts during driving and using mobile phone (in the form of divergence on the road and/or accident) while 35(18.4%) of participants have had no negative impact.

Figure (2) shows that 190 (87%) students out of 218 use their mobile phone while driving and 28 (12.8%) don't use their mobile while driving. Figure (3) shows that 157 (82.6%) of 190 students uses the car media utilities (headphone and radio Bluetooth) while driving and 33 (17.4%) don't use them.

There was an association observed between using a mobile phone while driving a short distance (20-70Km) and negative impact P=0.317 (Table 2). The highest negative impact was observed during driving on a weekly basis (59.5%). There was a statistically significant association observed between using mobile phones while driving an intermediate distance (71km-150km) and negative impact P=0.004 (Table 3).

The highest negative impact was observed during driving on a weekly basis (65.2%). There was astatistically significant association observed between using mobile phone while driving a long distance (more than 150 km) and negative impact P=0.013 (Table 4). The highest negative impact was observed during driving on a weekly basis (56.3%)

Figure 1 : Age distribution of students

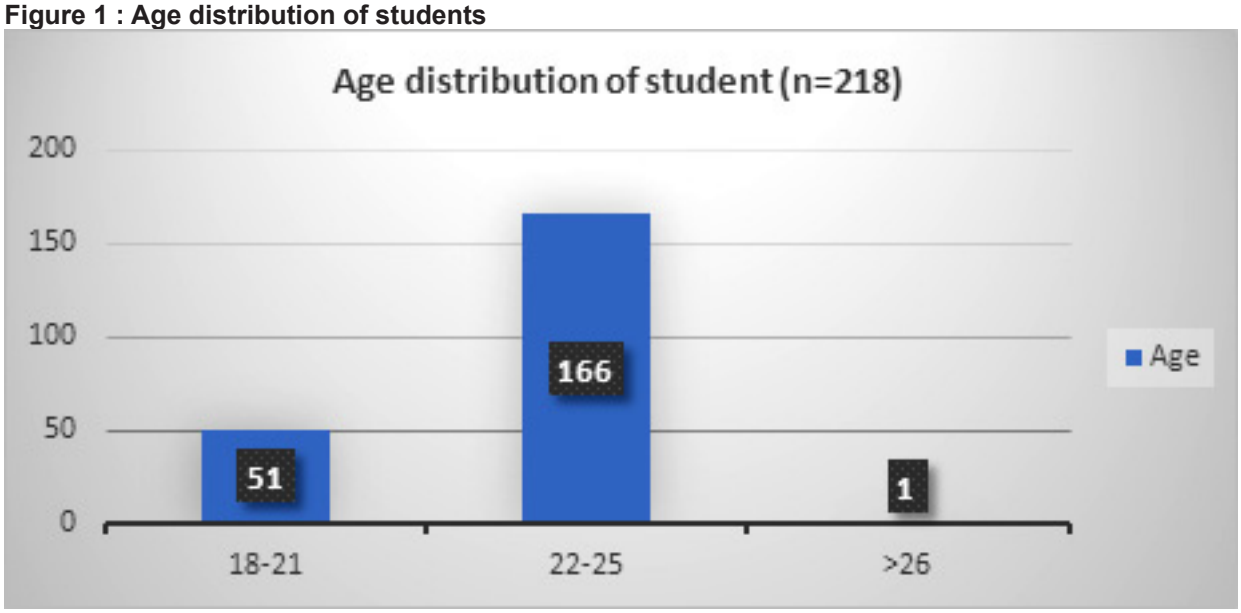

Table 1. Distribution of studied students according to pattern of driving and pattern of mobile phone use during driving

Variable	No.	%
Frequency of driving from the house to the college		
Daily	147	67.4%
Weekly	62	28.4%
Monthly	9	4.2%
Phone Usage Time		
All the time	23	12.1
Most of the time	45	23.7
Sometimes	77	40.5
Rarely	45	23.7
Using mobile with Passengers		
yes	113	59.5
No	77	40.5
Using Phone while passengers in the car		
who are they	15	13.3
friend	34	30.0
Family	64	56.7
both	113	100
Types of using mobile phones types of usage		
calling	58	26.6
Browsing	40	18.3
Social media	92	42.2
Most used social media application.		
Most used of apps	20	21.7
twitter	29	31.5
Snapchat	41	44.6
WhatsApp	2	2.2
Impact of using mobile phone while driving.		
Yes	155	81.6
No	35	18.4

Figure 2: Using mobile phone while driving

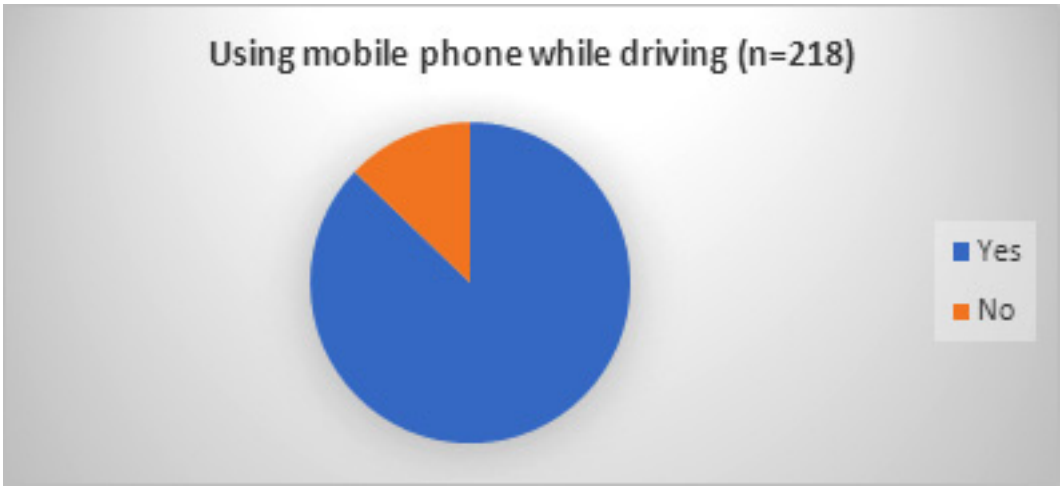

Figure 3 – using of the car media utilities.

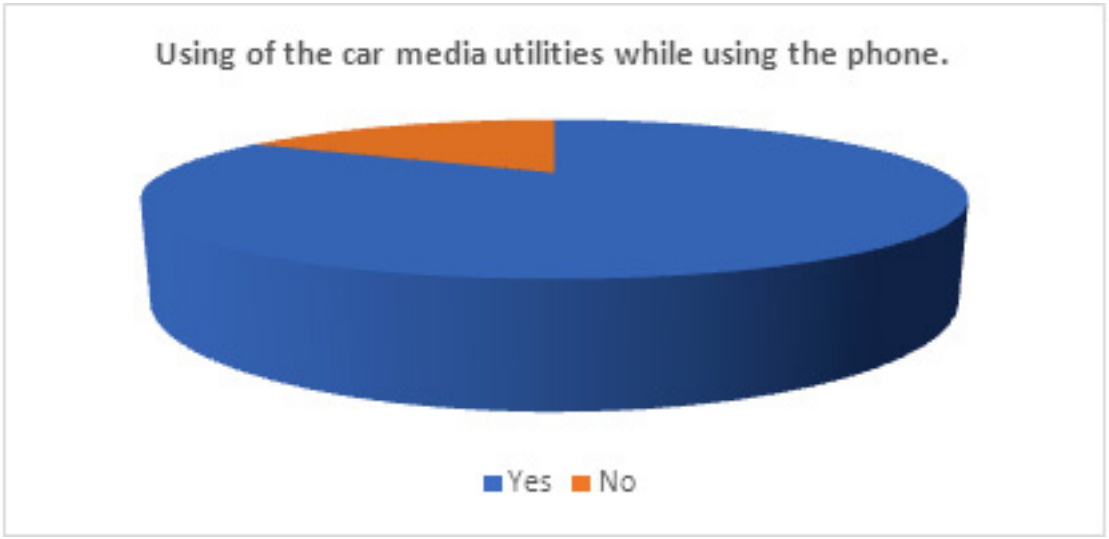

Table 2. Association between negative impact, frequency of driving in short distance (between 20 _70Km)

	Daily		weekly		monthly		Total	
impact	No	%	No	%	No	%	No	%
Accident	42	31.1	77	57.1	16	11.8	135	100
Divergent of the road	21	38.1	30	54.5	4	7.4	55	100
Total	63	33.1	107	56.3	20	10.6	190	100

N.B.: P=0.317

Table 3. Association between negative impact, frequency of driving in intermediate distance (between 71 _ 150Km)

	Daily		weekly		monthly		Total	
impact	No	%	No	%	No	%	No	%
Accident	42	31.1	77	57.1	16	11.8	135	100
Divergent of the road	21	38.1	30	54.5	4	7.4	55	100
Total	63	33.1	107	56.3	20	10.6	190	100

N.B.: P=0.004

Table 4. Association between negative impact, frequency of driving in Long distance (More than 150Km)

	Daily		weekly		monthly		Total	
impact	No	%	No	%	No	%	No	%
Accident	21	15	98	70	21	15	140	100
Divergent of the road	14	28	26	52	10	20	50	100
Total	35	18.5	124	65.2	31	16.3	190	100

N.B.: P=0.013

Discussion

The current study showed that there was a high percentage of male students using a mobile phone while driving (87%). This figure is higher than a study conducted by the Pew Internet American life project which showed that 75% of adults were using mobile phones while driving (18).

In KSA a study was conducted on 418 candidates (students and teachers) trying to evaluate distracted driving namely the use of mobile phones (texting and talking) while driving. On enquiring about what they do when they get a call while driving, 72% of all respondents (teachers + students) were answering the calls, 17% were ignoring the calls, and only 11% were pulling over the car and answering. When we compare this figure in the various groups, we found only 44% (26/59) of teachers were answering while driving while 275/359 students (76.6% of all students) were answering the call while driving (19).

It is thought that our percentage is higher due to a difference in sample size or methodology. In addition, now smartphones are more used and technology and applications are distracting drivers.

In relation to the time of driving, we found that the higher impact (accident and diversion on the road) are those where participants were driving weekly and of distances between 71-150 km (65.2%). A previous study done in Riyadh region Saudi Arabia and found that , where 44.6% of participants reported having car accidents in the six months prior, and 37.9% of them blamed their cell phones for these incidents. Variable percentages claimed participants always text (53.3%), talk on a handheld (66.2%), or use a hands-free phone (26.1%) while driving. More people (77.0%) and acknowledged that there were risks associated with texting (73.9%) and talking on handheld phones (83.9%) while driving than with hands-free (35.9%) (20).

According to our knowledge this is a unique result for the study which showed an association between impact, distances of driving and time of driving despite our sample size being medical students who are supposed to be well educated people in the community. Those students should be aware of the hazards of using mobile phones while driving.

The risky behavior among the participants while using mobile phone was very high and still 74.7% of them who have had a negative impact are still using their mobile phone. It is therefore a problem of behavior, rather than knowledge.

Limitations

A limitation of the present work could be the use of a self-reporting questionnaire which could entail recall bias.

Conclusion

This work found that a high percentage of medical students were using a mobile phone while driving (87%) and this led to negative impacts. The majority of those who had negative impacts were still using their mobile phones (74.7%) in (81.6%). Implantation of programs to change behavior and strict rules regarding anyone using their mobile phone while driving is needed. Health education programs are necessary to raise the awareness of the community about health risks of using mobiles during driving.

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Leukemia Perspective in Current Practice

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Abstract

Leukemia is cancer that affects the blood formation in the bone marrow, which is characterized by an increase in the number of leucocytes (leukocytosis) in the blood and bone marrow. Leukemia has four major types, which include acute myeloid leukemia (AML), acute lymphoid leukemia (ALL), chronic myeloid leukemia (CML), and chronic lymphoid leukemia (CLL). Hematopoiesis is a process in which the stem cells differentiate into erythrocytes, megakaryocytes, and immune cells of myeloid, and lymphoid, in bone marrow or lymphatic tissues. The blood is made up of fluid called plasma and three types of cells and each type has special functions. White blood cells (also called WBCs or leukocytes) help the body fight infections and other diseases. Red blood cells (also called RBCs or erythrocytes) carry oxygen from the lungs to the body's tissues and take carbon dioxide from the tissues back to the lungs. The red blood cells give blood its color. Platelets (also called thrombocytes) help form blood clots that control bleeding. Leukemias can affect any age and the incidence is different between each type. The Clinical presentation of leukemia cells may be mature, such as in chronic myeloid leukemia, and it may come in precursor form such as in acute myeloid leukemia It can also come in two forms (precursor and mature) such as chronic myeloid leukemia. Many risk factors have been identified, such as Klinefelter, Down syndromes, ataxia telangiectasia, Bloom syndrome, Viral infections from Epstein Barr virus, Human T-lymphotropic virus, ionizing radiation exposure, radiation therapy, environmental exposure with benzene, and smoking history. There is a strong relationship between nutrition status and leukemia which strongly affect the overall survival rate. This article aims to provide a brief introduction and the signs and symptoms of leukemia, its causes, epidemiology, nutrition profile, treatment prevention and good practice management advice.

Keywords: Leukemia, Acute Myeloid Leukemia, Acute Lymphoid Leukemia, Chronic Myeloid Leukemia. Chronic Lymphoid Leukemia

Introduction

Leukemia is a common name for multiple blood malignant disorders. Leukemia is cancer that affects the blood formation in the bone marrow, which is characterized by an increase in the number of leucocytes (leukocytosis) in the blood and bone marrow. Leukemia has four major types, which include acute myeloid leukemia (AML), acute lymphoid leukemia (ALL), chronic myeloid leukemia (CML), chronic lymphoid leukemia (CLL), and other less common variants such as mature B-cell and T-cell leukemias, and NK cell-related leukemias. The incidence rate of leukemia is high, with around 474,519 cases in North America (1-3). Leukemias may present at all ages, from the neonate to the old person, but different forms have very different age distributions (4). Leukemia can spread through a cascade of molecular events entailing intravasation, extravasation, and tissue colonization (5-8). A widespread disease such as leukemia is challenging to treat and can easily fuel future relapse (9, 10).

Hemopoiesis

Hematopoiesis is a process in which the stem cells differentiate into erythrocytes, megakaryocytes, and immune cells of myeloid, and lymphoid, in bone marrow or lymphatic tissues. The blood is made up of fluid called plasma and three types of cells and each type has special functions. White blood cells (also called WBCs or leukocytes) help the body fight infections and other diseases. Red blood cells (also called RBCs or erythrocytes) carry oxygen from the lungs to the body's tissues and take carbon dioxide from the tissues back to the lungs. The red blood cells give blood its color. Platelets (also called thrombocytes) help form blood clots that control bleeding. Blood cells are formed in the bone marrow, the soft, spongy center of bones. New (immature) blood cells are called blasts. Some blasts stay in the marrow to mature. Some travel to other parts of the body to mature. Normally, blood cells are produced in an orderly, controlled way, as the body needs them. This process helps keep us healthy (11-13).

Epidemiology

The most common presentation of leukemia cells may be mature such as in chronic myeloid leukemia, and may come in precursor form such as in acute myeloid leukemia. It can also come in two forms (precursor and mature) such as in chronic myeloid leukemia (14). Leukemia can affect any age and the incidence different between each type. Acute myeloid leukemia mainly affects adult patients rather than neonates or child patients while acute lymphoblastic leukemia affects childhood patients rather than the adult. Chronic Myeloid and Lymphocytic leukemia mainly affect the adult patient with a median age at diagnosis above 70 years. The incidence rate of leukemia in the United States is more in Whites (15 persons in 100,000), than Blacks (11 persons in 100,000), and Hispanics (10.6 persons in 100,000), while the lowest incidence among Asian/Pacific Islanders is around (7.8 persons in 100,000) (11, 14).

Types Of Leukemia

1 Acute Lymphoblastic Leukemia

It mostly affects the child population, and is around 80% of all types of leukemia in children. The disease occurs due to the arrest of lymphoid precursor cells called Lymphoblasts in the early stage of development. The significance of this disease is by it decreasing the normal blood cells due to the invasion of bone marrow by lymphoblasts. Also, lymphoblasts may invade other organs such as the liver, spleen, and lymph nodes. Clinical pictures for the patient are mainly fever, infection, marked neutropenia and thrombocytopenia, anemia, bone pain, and lymphadenopathy (15-17).

2 Acute Myelogenous Leukemia

It mostly affects the adult population. It is a maturational arrest of hematopoietic precursors which is characterized by 20% blasts in the bone marrow. As a result, the bone marrow will be infiltrated by leukemia cells and this will reduce the normal bone marrow cells and the proliferation process in the blood and liver, and spleen. Symptoms may include infection, fatigue, bleeding, and shortness of breath (15, 18, 19).

3 Chronic Lymphocytic Leukemia

It is the most common type of leukemia that affects the adult population; median age affected is around 50 to 60 years. It is discriminated from other types by an accumulation of mature and immunocompetent lymphocytes in the bone marrow and lymphoid organs. The clinical picture is mainly asymptomatic and sometimes it comes with generalized fatigue and it may develop organomegaly such as splenomegaly. In severe cases, it may lead to death because of the progression of the disease to diffuse large cell lymphoma, and this type of lymphoma is called Richter syndrome (15, 20, 21).

4 Chronic Myelogenous Leukemia

This type of leukemia is characterized by the proliferation of granulocytes and their precursors. The main cause of this type of leukemia is chromosomal translocation. This chromosome is called the Philadelphia chromosome. Clinical Picture is mainly asymptomatic such as chronic lymphocytic leukemia but it may develop malaise, splenomegaly, and anemia (15, 22, 23).

Pathophysiology

Leukemia affects the pluripotent hematopoietic stem cell transformation and makes it malignant (may give myeloid and lymphoid precursors). The characteristics of acute leukemias are the cell mainly shows poorly differentiated, immature formation and abnormal leukocytes (blasts) that can either be lymphoblasts or myeloblasts. These blasts may undergo clonal expansion and proliferation, leading to replacement and interference with the development and function of normal blood cells, which will lead to clinical symptoms (24, 25).

1. Acute Leukemia
In acute lymphoblast the most common chromosomal translocation number which can lead to mutation in precursors lymphoid cells include t(12;21) and t(9;22). In acute myeloid lymph blasts, chromosomal rearrangements, loss, gain, and translocations may lead to mutations and abnormal formation of myeloblasts (24, 26).

2. Chronic Leukemia
The most common pathophysiology of chronic leukemia is the abnormalities in the hematopoietic stem cell's chromosome. The chromosomal abnormalities involve deletions, translocations, and extra chromosomes. The most common translocation is t(9;22) which affects granulocytes in chronic myeloid and affects lymphocytes in chronic lymphocytosis. The main characteristic of these cells is that they show as partially mature, do not function, and the division rate is high, not like acute leukemias. They occupy peripheral blood and lymphoid organs, which can lead to anemia and thrombocytopenia, and leukopenia (24, 27).

Diagnosis

The most common tests that should be done to diagnose leukemia include a complete blood count, comprehensive metabolic panel, liver function tests, and coagulation panel, which are often followed by a peripheral blood smear evaluation and a bone marrow biopsy and aspiration. In some situations, leukemia can be diagnosed by histology alone such as acute myeloid leukemia can be diagnosed by the presence of Auer rods on a peripheral smear (28-30)

Signs and Symptoms

The most common symptoms shown in a leukemic patient may include frequent or severe infections, weight loss, persistent fatigue and weakness, fevers or chills, abdominal pain, and bleeding issues such as recurrent nosebleeds (24, 31-33).

Management

The treatment mainly depends on the type of cell lineage and whether the patient has acute or chronic leukemia. In acute leukemia, mainly the best choice is systemic chemotherapy, while the actual drugs used vary by the leukemia type. In severe cases and poor prognosis of leukemia, the patient may receive a stem cell transplant. For chronic leukemias, the therapy is indicated only in case patients develop decreasing platelet counts or red cells. Patients with B-cell chronic leukemias can be treated with non-toxic targeted therapy with anti-B-cell antibodies (rituximab). In chronic myeloid leukemia, the specific genetic alteration (the Philadelphia chromosome) makes the cells sensitive to a class of drugs that inhibit the tyrosine kinase activity of the abnormal protein produced by the Philadelphia chromosome (imatinib, dasatinib, and nilotinib). These drugs are very effective at eliminating the abnormal cells in this disorder, so where patients previously would be considered for stem cell transplants, now patients can live successfully for many years without taking the risks involved with a stem cell transplant (34-37).

Risk Factors

Many risk factors that can cause leukemia have been identified, such as Klinefelter and Down syndromes, ataxia telangiectasia, Bloom syndrome, Viral infections from Epstein Barr virus, Human T-lymphotropic virus, ionizing radiation exposure, radiation therapy, environmental exposure with benzene, smoking history, and history of chemotherapy with alkylating agents (14, 24).

Special Cases

1 COVID-19 patients
The patient with leukemia has a higher risk to become infected by the COVID-19 Virus. Lymphoid types have a higher risk to get COVID-19 infection because of the impairment of humoral response caused by disease or treatment-related hypogammaglobulinemia. Patients with leukemia and who are immunocompromised with COVID-19 infection can also be at higher risk of superimposed bacteria or fungal pneumonia (38).

2 Pregnancy
In pregnant patients, there is an increase in the risk of spontaneous abortions, low neonate weight, and preterm birth in some populations. Unfortunately, nowadays we have little data to support counseling patients on perinatal death, uterine rupture, premature birth etiology in pregnancy, and newer therapies' effect on maternal and fetal health. A patient who has leukemia during pregnancy may put the patient and the treating physician in a serious situation, as weighing the risk of chemotherapy that should be given versus cancer itself is a very tough issue (39, 40).

Nutrition and Breast Cancer

There is a strong relationship between nutrition status and leukemia which affects the overall survival rate. In acute lymphoid leukemia, children and adolescents who live in low or middle-socioeconomic countries have poorer survival rates than those in high-socioeconomic countries. On the contrary, in acute myeloid leukemia, children and adolescents who live in high socioeconomic countries have poor survival rates (41).

1 Breastfeeding and Childhood Leukemia Incidence
Systematic review and meta-analysis study shows the encouragement of pregnant mothers to breastfeed their child for the first 6 months or more may lower the incidence of childhood leukemia, in addition to the benefit of breastfeeding on general health (42).

Prognosis of Leukemia

The prognosis and survival rate vary based on leukemia subtype, cytogenetic and molecular findings, patient age, and comorbid conditions. Broadly, the 5-year cancer survival rate for leukemia has increased from 33% in 1975 to 59% in 2005 (43).

Complications

1 Tumor Lysis Syndrome

In Tumor lysis syndrome the cells die very quickly and this occurs as a side effect of chemotherapy medications. This destruction of the cells releases a high quantity of intracellular content in the bloodstream and this overwhelms the kidney and results in dangerously high serum levels of potassium, phosphorus, and uric acid (44).

2 Disseminated Intravascular Coagulation

In Disseminated Intravascular Coagulation the proteins that control the blood clotting process become dysfunctional, leading to both thrombosis and hemorrhage, Disseminated Intravascular Coagulation is mainly associated with acute promyelocytic leukemia but can be seen in other subtypes of leukemia as well (28).

3 Cancer

Survivors of leukemia are at an increased risk of subsequent cancers (45).

3 Infection

Immunosuppression from chemotherapy, stem cell transplantation, or leukemia itself increases the risk of dangerous infections (46).

Conclusion

Hematopoiesis is a process in which the stem cells differentiate into erythrocytes, megakaryocytes, and immune cells of myeloid, and lymphoid, in bone marrow or lymphatic tissues. Leukemia is cancer that affects the blood formation in the bone marrow, which is characterized by an increase in the number of leucocytes (leukocytosis) in the blood and bone marrow. Leukemia mostly affects the child population; around 80% of all types of leukemia are in children. The most common tests that should be done to diagnose leukemia include a complete blood count, comprehensive metabolic panel, liver function tests, and coagulation panel, which are often followed by a peripheral blood smear evaluation and a bone marrow biopsy and aspiration. Many risk factors that can cause leukemia have been identified, such as Klinefelter and Down syndromes, ataxia telangiectasia, and Bloom syndrome. The most common symptom in a leukemic patient is frequent or severe infections. The treatment mainly depends on the type of cell lineage and whether the patient has acute or chronic leukemia. Patients with leukemia have a higher risk of being infected by the COVID-19 Virus. In pregnant patients, there is an increase in the risk of spontaneous abortions, low neonate weight, and preterm birth in some populations. The 5-year cancer survival rate for leukemia has increased from 33% in 1975 to 59% in 2005. Complications include: Tumor lysis syndrome, Disseminated Intravascular Coagulation, Cancer and Infection.

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AUTHORS' CONTRIBUTIONS

'H. Karrar' supervised the team and directed the research. 'M. Nouh' wrote the introduction, epidemiology, complication, and Conclusion paragraph. 'A. Aljuman' wrote the introduction. 'M. Almutiri' wrote the introduction. 'L. Alqudairy' wrote the introduction. 'A. Aljameeli' wrote the Normal Hematopoiesis. 'A. Aljameeli' wrote the Normal Hematopoiesis. 'A. Alabdullatif' wrote the Epidemiology. 'K. Alsuqayh' wrote the Pathophysiology. 'A. Alhuthayli' wrote the Classification of acute leukemia. 'M. Alkredees' wrote the Classification of chronic leukemia. 'A. Alriyaee' wrote the diagnosis. 'M. Alaithan' wrote the Management. 'B. Alshmrany' wrote the risk factor. The authors had full access to the data and take full responsibility for the integrity of the data. All the authors gave their approval for the submission of the final manuscript.

DEFINITIONS, ACRONYMS, ABBREVIATIONS

AML; ACUTE MYELOID LEUKEMIA.
ALL; ACUTE LYMPHOID LEUKEMIA.
CML; CHRONIC MYELOID LEUKEMIA.
CLL: CHRONIC LYMPHOID LEUKEMIA.

Breastfeeding: prevalence, health effects, obstacles and ways to encourage it

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Abstract

Background: Breastmilk is the best way to feed infants due to its balanced nutritional composition. Because of its many health benefits, the prevalence of breastfeeding, ways to encourage it and the effects of breastfeeding on mothers and children have been extensively researched.

Objectives: This review aims to demonstrate the short-and-long term health consequences of breastfeeding for infants and mothers. Additionally, it will estimate the rate of breastfeeding mothers, identify the causes behind this rate and discuss ways to increase awareness about its importance.

Main outcomes: The prevalence of breastfeeding is 40% worldwide and 10.2% in the Kingdom of Saudi Arabia (KSA). Women who don't breastfeed list a lack of information, negative attitudes towards breastfeeding within wider society and a return to work as the main reasons that discourage them from breastfeeding. Breastfeeding reduces mothers' risk of breast and ovarian carcinoma, diabetes and BMI by 4.3%, 28%, 32% and 1%, respectively. It also decreases the risk of postpartum depression and increases the duration of amenorrhea. Children who are breastfed for longer periods have lower risks of diarrhoea by 31%, pneumonia by 57%, being overweight by 26%, diabetes by 35% and raises intelligence scores by 3.4.

Conclusion: This review found evidence that breastfeeding reduces the risk of breast cancer, ovarian cancer, Type 2 diabetes, postpartum depression, being overweight, and improves birth spacing. For infants, breastfeeding lowers infectious morbidity and mortality and enhances growth and development. Professional and public education and fathers' support are important to encourage the over 50% of women who do not breastfeed their infants.

Keywords: breastfeeding, maternal health, infant health, effects.

Introduction

The reproductive cycle of humans consists of two stages: pregnancy and nursing. According to the WHO, "nursing or breastfeeding is defined as the normal way of providing young infants with the nutrients they need for healthy growth and development." (1) Breast milk is made of nutrients from the mother's bloodstream in addition to her bodily stores. Even though the composition of breastmilk is unique and varies from one mother to another depending on her baby's specific needs, breastmilk always consists of a perfect balance between protein, fat, sugar and water (2) .

Researchers and health professionals recommend that breastfeeding begins within the first hour after birth and continues for at least six months afterwards. In addition to the incredible benefits of breastmilk for babies, studies have found that breastfeeding is important and has many health benefits for breastfeeding mothers as well (3).

Despite all the studies that have concluded that breastfeeding is the best way to provide babies with the optimal nutrients, many mothers do not breastfeed their babies and choose to feed them artificially instead. Artificial feeding is not equivalent to breastfeeding as it lacks the non-nutritional benefits of breastfeeding such as its preventive effects on obesity, chronic diseases and cancer (4).

Thus, it is very important to discover the reasons many mothers do not breastfeed their babies, to find ways to encourage them to do so and to promote the positive effects of breastfeeding on both mother and child health. This article reviews the short-term and long-term health consequences of breastfeeding for the child and the mother, studies the reasons behind the small percentage of breastfeeding mothers and suggests ways to encourage breastfeeding.

Aim and Objectives

The aim of this study is to give an overview on the health benefits of breastfeeding in order to increase awareness about its importance with the following objectives:

1. To demonstrate the prevalence of breastfeeding worldwide and in KSA.
2. To determine obstacles to breastfeeding.
3. To recognise the effects of breastfeeding on maternal health.
4. To recognise the effects of breastfeeding on infant health.
5. To recognise the effects of artificial feeding.
6. Identify how to encourage mothers to breastfeed.

Prevalence

Globally, the prevalence of babies who receive exclusive breastfeeding for the first 6 months of life has significantly increased with time. The rate of exclusive breastfeeding from 1993 to 2013 increased from 24.9% to 35.7% (Fig.1). The Global Breastfeeding Scorecard found that 40% of infants, less than 6 months of age, are breastfed. However, although the prevalence has increased, it still doesn't meet the recommendation of WHO (4).

Although the data are limited, studies have shown that the rates of breastfeeding in KSA have been decreasing for more than two decades. Some of the studies used the World Health Organization's definition of "exclusive breastfeeding," which is feeding infants only breastmilk with no other solids or liquids with the exception of medicines for six months. Those studies have found that only 1.7% to 24.4% of Saudi mothers breastfed their babies exclusively until they were six months. Another study has shown that 21.5% of infants in KSA were exclusively breastfed, 20.6% were bottle fed, while the rest were both breastfed and bottle fed during the first year and a half of their lives. The results of a recent survey revealed that 10.2% of babies were breastfed while just 8% were breastfed exclusively (5).

Obstacles

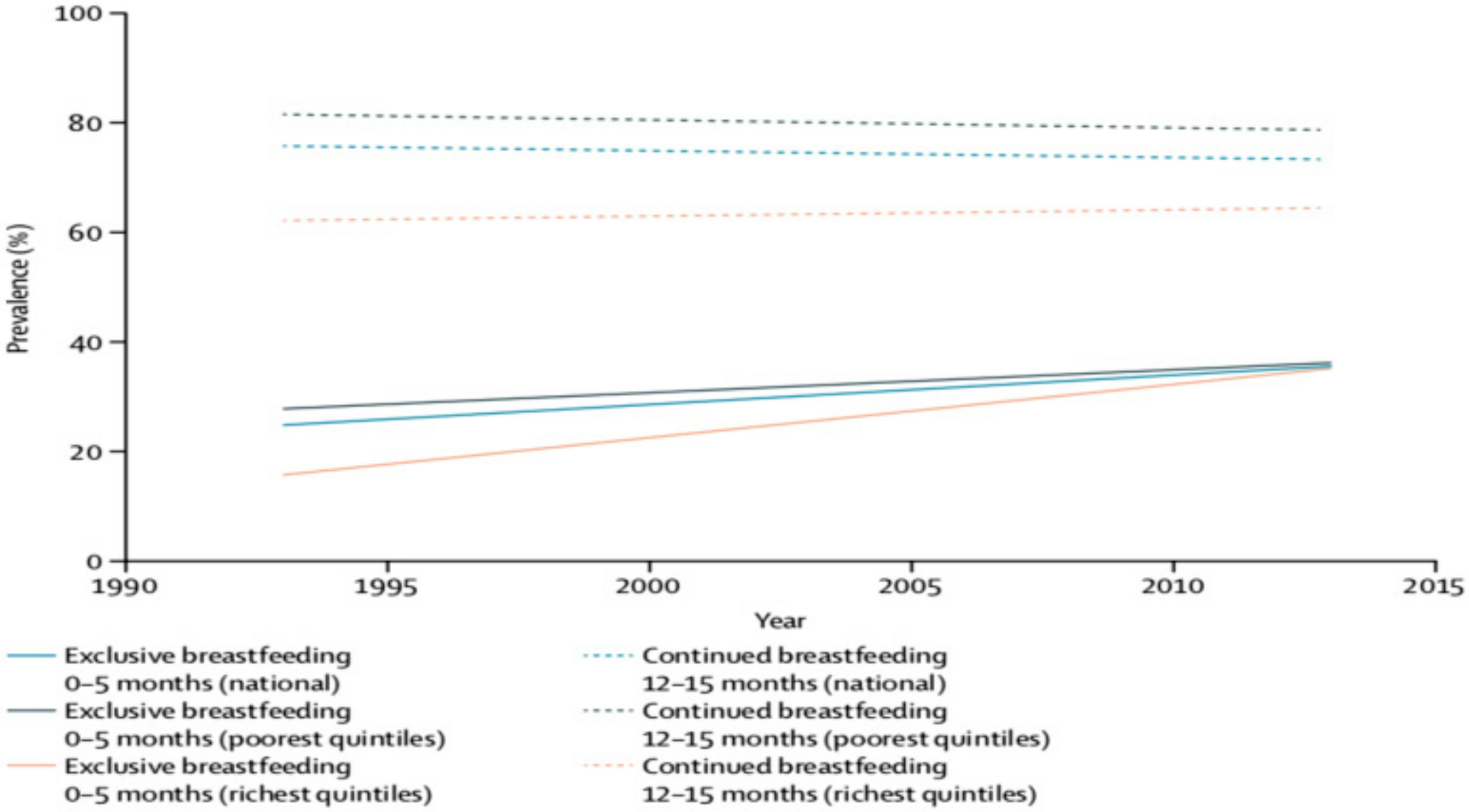
While 44.3% of women initiate breastfeeding, only 13% of them continue breastfeeding until their babies are six months old. The majority of women make their decision to breastfeed or to bottle-feed before they are even pregnant or during the first trimester of their pregnancy. When a mother decides to breastfeed, it is usually because of the health benefits for her infant, her desire to emotionally bond with her new baby, and because of how natural breastfeeding feels. Women who bottle-feed state that among other reasons, the negative attitude of family members and society towards breastfeeding mothers, their uncertainty regarding their milk supply, and return to work prevent them from breastfeeding,(Fig.2) (6).

The effects of breastfeeding on maternal health

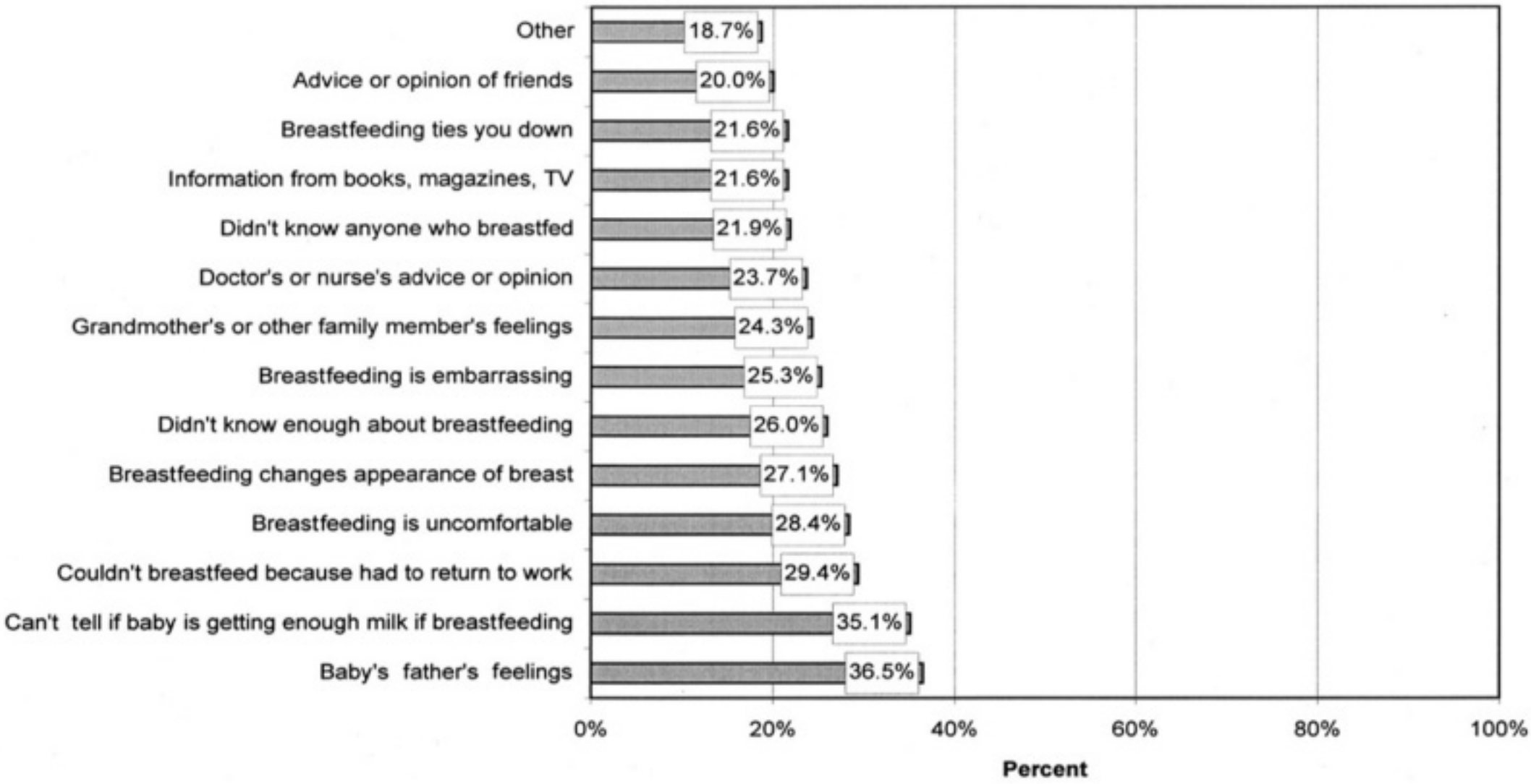
A. Short-term effects

1. Lactational amenorrhea

During breastfeeding, the suckling stimulus sends nerve impulses to the mother's hypothalamus to decrease the gonadotropin-releasing hormone, which responds by changing the production of the follicle-stimulating hormone (FSH) and the luteinizing hormone (LH) from the anterior pituitary. This hormone is needed to stimulate ovulation to produce ovum. Without this stimulation, there is a time when breastfeeding women have a period of infertility,(Fig.3) (7).



(Fig.1) National and wealth quintile-specific time trends in exclusive and continued breastfeeding, 1993–2013 (4)



(Fig.2) Survey results of bottle-feeding mothers describing factors contributing to bottle-feeding (6)

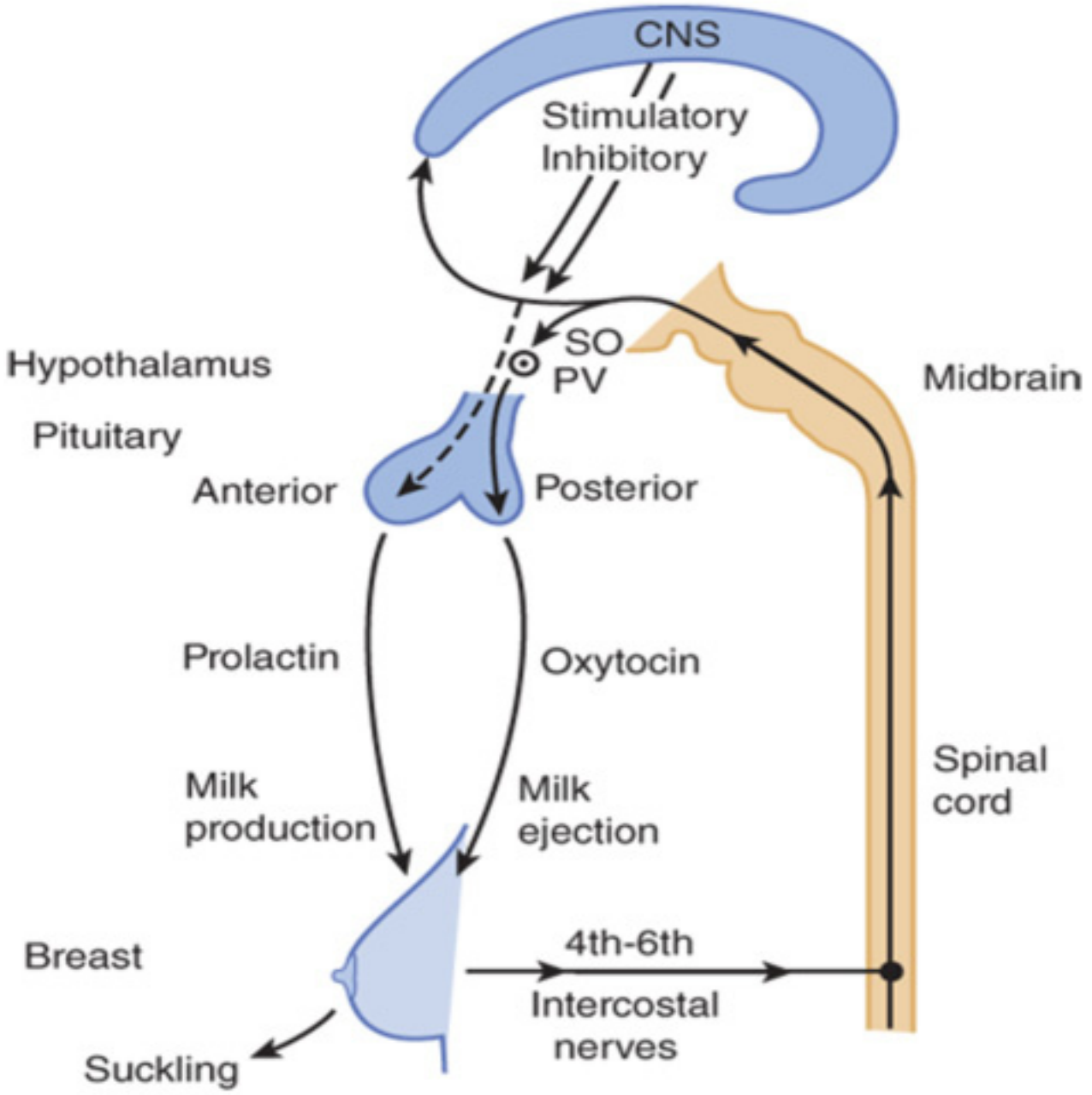


Fig.3) The physiology of lactation.

(CNS: central nervous system, PV: paraventricular nucleus, SO: supraoptic nucleus.) (7)

2. Postpartum weight change
During pregnancy and after delivery are periods of high risk for weight gain. The role of breastfeeding in weight loss is still unclear. Theoretically, breastfeeding consumes high energy and that is supposed to enhance weight change (10).

However, most studies show no or only little association between breastfeeding and weight change. An analysis of 54 articles on the role of breast feeding on postpartum weight change was inconclusive (4).

High methodological quality studies show a positive association between breastfeeding and weight loss. For every 6 months a woman breastfed, her BMI was 1% lower. This significant reduction could protect her from obesity related disease (11).

3. Postpartum depression
In almost all studies, there is a strong association between the duration of breastfeeding and decreased postpartum depression. However, the exact connection between them is still unclear (12). Several biological and psychological mechanisms have been suggested. First, breastfeeding reduces the cortisol response to stress, which as a result, promotes hormonal process (12). Also, breastfeeding may reduce the incidence of postpartum depression by enhancing the mother's feeling of self-efficacy, improving the child's mood, regulating the mother and baby's sleep and waking rhythm, and by promoting better interaction between the mother and her child (12).

B Long term effects
1. Breast cancer
Breastfeeding lowers the risk of premenopausal and postmenopausal breast cancers. A study of 50,000 women from 30 different countries showed that mothers who breastfeed for 12 months, (which can be the duration of breastfeeding one baby or the cumulative duration of breastfeeding several babies), have a 4.3% lower risk of breast cancer (4).

Lactation decreases the risk of breast cancer by four possible mechanisms.

First, the physical changes in breast tissue during breastfeeding helps the breast to get rid of its potentially damaged tissue cells through the physical exfoliation of breast tissue and breast tissue remodeling through apoptosis after the lactation period (13).

Second, while estrogen promotes breast cancer growth, breastfeeding reduces the number of menstrual cycles leading to a reduction of estrogen levels in the breast (13).

Third, breastfeeding works to decrease the concentration of toxic organochlorines in the breast and many studies suggested there is a positive correlation between organochlorine and breast cancer risk (13) .

Fourth, the effect of breastfeeding on increasing the expression of one of the transforming growth factors, beta (TGF-β). This growth factor has a tumor suppressor effect on many types of cancer, including breast cancer (13) .

2. Ovarian carcinoma
Over 40 studies have linked prolonged breastfeeding to a reduced risk of ovarian cancer. It has been found that the longer women breastfeed, the more protection they acquire against ovarian cancer (4).

Women who breastfeed for less than 6 months are 17% less likely to develop ovarian cancer, while women who breastfeed for 6 to 12 months have a lower risk of ovarian cancer by 28% compared to those who never breastfed. Mothers who breastfeed beyond 12 months lower their risk of ovarian cancer dramatically by 37% (8).

Breastfeeding protects against ovarian cancer almost in the same way it protects against breast cancer. It reduces the number of menstrual cycles in a lifetime and consequently, reduces the cells' exposure to estrogen, which has been found to promote cancerous cell growth (14).

3. Type 2 diabetes mellitus
Studies have found that there is an inverse relationship between breastfeeding and Type 2 diabetes. One study has suggested that breastfeeding actually reduces the risk of mothers having Type 2 diabetes by 32% (15).

Although other studies were not as specific or as conclusive about the role of breastfeeding in protecting against Type 2 diabetes, it has been suggested by many studies that longer durations of lactation can play a role in preventing Type 2 diabetes. According to a systematic review, mothers whose cumulative duration of breastfeeding is one year reduce their risk of Type 2 diabetes by 9%, by improving glucose homeostasis (8).

The effects of breastfeeding on infant health

A Short- term effects:
1. Diarrhoea
In 2010 alone, diarrhoea was responsible for the deaths of 800,000 children worldwide (16).

A comprehensive review recommended breastfeeding for the prevention and treatment of diarrhoea. The review found that exclusively breastfed babies have about a 31% lower risk of diarrhoea compared to partially breastfed babies. Additionally, breastfeeding reduces the need for hospitalization because of diarrhoea by 72% and lowers the risk of death because of diarrhoea by 77% (17).

The protective effects of breastmilk against diarrhoea has been explained in three different ways. Firstly, it has been suggested that mothers who have been previously exposed to infectious agents produce antibodies known as secretory Immunoglobulin A (IgA), in their breastmilk. These antibodies protect infants against the infectious agents their mothers were exposed to, which reduces

infants' risk of diarrhoea. Secondly, bottle-fed babies are more likely to be exposed to pathogens causing diarrhoea through either contaminated bottles or contaminated milk. Finally, the protective effect of breastfeeding against diarrhoea can be explained by how nutritious the breastmilk is. Those nutrients are necessary to boost infants' immune systems especially in situations where infants suffered from multiple infections (17).

2. Respiratory tract infection
Respiratory infections are rated as the top cause of deaths in young children around the world. In 2010, pneumonia was responsible for the deaths of 1.384 million children under five years of age (16).

Studies have showed that exclusive breastfeeding for at least six months decreases the risk of respiratory infections such as pneumonia and otitis media (18). In addition, breastfeeding has been found to reduce the need for hospitalization due to respiratory infections by 57% (17).

Breastmilk protects against respiratory infections by transferring a mother's antibodies to their infant through breastmilk and because the breastmilk contains oligosaccharides, which are known to protect the infant's mucosa from infectious agents that could cause respiratory infections. Finally, the nutritional composition of breastmilk is necessary to strengthen the infants' immune systems and help them fight against all kinds of infections especially in low income locations where undernutrition is a serious threat. (17).

.B Long- term effects:
1. Performance in intelligence tests
The effects of breastfeeding on child development have been studied for some time. In 1929, one study found that there was a positive correlation between breastfeeding and intelligence (19). Among children and adolescents, breastfed children do better in intelligence tests. They get 3.4 higher scores than non-breastfed children (4).

Children who received breastmilk have higher levels of the long-chain polyunsaturated fatty acids (LCPUFAS), which are important for the development of the cortical brain. Breastfeeding is positively related to brain volume, which means that it promotes structural changes in the brain (19).

Bonding between a mother and infant is considered as another way to enhance the child's cognition (20).

2. Overweight and obesity
Breastfeeding for longer periods decreases the likelihood of children being overweight or obese by 26% (4).This preventative effect can be explained by at least three biological pathways. Breastmilk is a high fat, low protein diet, and it has been proposed that there is positive correlation between protein intake in infancy and the development of later obesity. Differences in hormonal responses to breastmilk and infant formula constitute another potential mechanism. With formula, insulin secretion is greater, which results in fat deposition and an increased number of adipocytes. Finally, differences in dietary preferences can have a role, too (19).

3. Type-2 diabetes
The ratio of having Type-2 diabetes among children who are breastfed compared to non-breastfed children is 0.65 (4). This significant reduction can be explained by several mechanisms. Firstly, the presence of LCPUFAS in breast milk particularly docosahexaenoic acid (DHA) and arachidonic acid (AA) decreases the glucose level in the blood. High saturation of LCPUFAS in skeletal muscle membrane may decrease the incidence of insulin resistance, β-cell failure, and Type-2 diabetes. Another possibility is that the high concentration of insulin in infant formula, may results in β-cell failure and Type-2 diabetes. In addition, the effect of breastfeeding against obesity may constitute in the reduction of Type-2 diabetes (19).

The effects of artificial feeding

Non-exclusive breastfeeding in infants costs the world 1.4 million deaths and 10% of the disease burden in children younger than 5 years (21). In developing countries, the mortality rate in infants increases 6 to 10 times in artificially-fed infants (22). Artificial feeding increases infant mortality rates through increasing the risks of malnutrition diseases as well as infections (18). Evidence links artificial feeding to long-term immunological diseases such as atopic conditions, asthma, Type-1 diabetes, celiac disease and inflammatory bowel diseases (22).

Artificial feeding is also associated with a higher risk of cardiovascular diseases including hypertension, higher blood cholesterol levels and atherosclerosis (22).In addition studies have found that bottle-fed children have an increased risk of childhood leukemia (22).

Ways to encourage mothers to breastfeed

Practicing breastfeeding has many stumbling blocks. Understanding the obstacles to breastfeeding is critical to encourage and increase levels of breastfeeding.

1. Father's support:
Many studies suggest that involving fathers in this process promotes the parenthood experience (6). Studies showed that strong social support from partners increases the rates of breastfeeding (23).

2. Professional education
Health care providers must provide parents with detailed information and extensive education about the benefits of breastfeeding and discuss the barriers and issues surrounding breastfeeding with each parent (6).

Attendance to antenatal classes increases the rate and duration of breastfeeding. By providing working mothers with strategies that help them continue breastfeeding and promoting self-efficacy, mothers will hopefully breastfeed their children for longer periods of time (24).

3. Public education

Family support and information about breastfeeding presented in the media can encourage mothers to breastfeed. In fact, magazines, television and social media are reported to be some of the most important sources of information that will encourage mothers to breastfeed (6).

Conclusion

The global prevalence of breastfeeding is 40% while it ranges from 1.7% to 24.4% in Saudi Arabia. This low prevalence is due to many factors involving inadequate milk supply, return to work, lactational and medical issues, and the attitude of society and family members. As many studies have shown, breastfeeding has short- and long-term positive effects on the mothers' health as well as infants' health unlike artificial feeding which increases mortality and morbidity rates. Finally, mothers need to be encouraged to breastfeed their children by changing the attitudes of society, providing professional education and improving public education.

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The prevalence of hypertension and diabetes mellitus during the COVID-19 pandemic era: A systematic review

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Abstract

Background: The impact of on blood pressure (BP) and incidence of diabetes mellitus has not yet been elucidated. Therefore, the present study aimed to systematically discuss the prevalence of DM and hypertension in the published studies during the COVID-19 pandemic between 2019 and 2022 and compare these results with results reported in previous studies.

Methodology: This was a comprehensive electronic systematic review that was time and language restricted. The search was conducted depending on different databases including PubMed, Google Scholar, Web of Science, and Cochrane library, for all studies published in the period between 2019 and 2022. Keywords used included COVID-19 OR SARS-CoV-2 OR Coronavirus OR “Corona virus” OR COVID, AND hypertension OR diabetes mellitus OR prevalence OR metabolic disorders AND cardiovascular conditions. The period of the study was chosen based on the fact that COVID-19 started in the beginning of 2019.

Results: The primary search results of the current analysis ended in 875 hits which were reduced to 360 studies after removal of the duplicated studies. From those 360 studies, further evaluation for inclusion and exclusion criteria was conducted ending in 346 excluded studies. The reasons for exclusion included because of title and abstract (216 studies), being not relevant to the subject of the study (86 studies), being replies to authors (17 studies), books (2 topics), and being other reviews (26 studies). Finally , we included 13 studies in the qualitative synthesis of the current review.

Conclusion: There was no significant increase in the prevalence of diabetes mellitus and hypertension among the general public in different regions of the world during the period of the COVID-19 pandemic compared with previous studies.

Keywords: COVID-19, hypertension, diabetes mellitus

Introduction

In 2019, the first case of coronavirus disease (Covid-19) was reported starting the largest pandemic of the past 100 years, affecting more than 200 countries and affecting millions of people worldwide [1]. The severe acute respiratory syndrome coronavirus (SARS-CoV-2) was identified as the main pathogen of the COVID-19. Moreover, previous reports showed that angiotensin-converting enzyme 2 (ACE 2) was identified to be one of the cellular receptors of SARS-CoV-2 [2]. The spectrum of clinical manifestations of Covid-19 ranges from asymptomatic or mild symptoms in approximately 80% of those infected, based on community surveys, to approximately 2% of deaths in the hospitalized population [3–5]. Although statistical estimates change daily, more than 11 million people have been affected by Covid-19, so as of July 7, 2020, there had been more than half a million deaths worldwide [6].

Hypertension is one of the most common conditions worldwide, and is associated with the incidence of many dangerous complications such as acute heart attack, heart disease and stroke. Therefore, there are many treatment and care challenges faced by the health care systems which are related to the complications associated with hypertension [7–9]. Furthermore, a previous report showed that there is higher risk for more severe COVID-19 conditions in those diagnosed with diabetes mellitus and hypertension [10]. A study of 191 patients found that those with diabetes had a 2.85-fold and 3.05-fold increased risk of mortality, respectively [11]. In addition, the Chinese Center for Disease Control reported that the mortality rate of individuals with diabetes is higher than that of non-diabetics (7.3% and 2.3%, respectively) [3]. Based on the results of published studies and reports, since the beginning of the Covid-19 pandemic, a number of high-risk individuals and groups have been identified with increased risk of mortality and others have serious complications [12–16]. Patients who were diagnosed with hypertension and diabetes mellitus belong to these high-risk group [17,18]. The reason behind the role of hypertension in the pathogenesis of COVID-19 may be associated with the role of ACE 2 which played as a receptor of SARS-CoV-2 virus. In some previous systematic reviews, the authors reported that the prevalence of diabetes mellitus and hypertension in patients who were diagnosed with COVID-19 was between 9.7-11.9 % for diabetes mellitus and 17.1-20 % for hypertension [19–22].

As presented, it was confirmed that hypertension and diabetes mellitus are associated with increased risk of severe COVID-19 and associated with higher mortality rate in those patients, however the impact of COVID-19 on blood pressure (BP) and incidence of diabetes mellitus has not yet been elucidated. Therefore, the present study aimed to systematically discuss the prevalence of DM and hypertension in the published studies during the COVID-19 pandemic between 2019 and 2022 and compare these results with results reported in previous studies.

Methodology

This is a systematic review which was conducted according to the PRISMA guideline (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement.

-System for identification of studies to include in the review:

This was a comprehensive electronic systematic review that was time and language restricted. The search was conducted depending on different databases including PubMed, Google Scholar, Web of Science, and Cochrane library, for all studies published in the period between 2019 and 2022. Keywords used included COVID-19 OR SARS-CoV-2 OR Coronavirus OR “Corona virus” OR COVID, AND hypertension OR diabetes mellitus OR prevalence OR metabolic disorders AND cardiovascular conditions. The period of the study was chosen based on the fact that COVID-19 began in 2019.

- Inclusion criteria and selection of studies

In the first step two researchers reviewed the retrieved articles and removed the duplicates. In other steps, the researchers screened the title and abstract of the records and the ineligible studies were removed. Then, the authors surveyed the full text of the remaining studies based on inclusion and exclusion criteria and the eligible studies (case reports, case series, and cross-sectional) were identified.

We excluded the articles which were topic to at least one of the following criteria

- **Exclusion criteria:**
- Unpublished studies
- Non-original articles including reviews, protocols, and editorials.
- Studies depending on animal samples
- Unpublished and unsupported opinion of expert (not including references or being a letter).
- Clinical trials which were in progress without yet published results.
- Studies which consisted of replies to author/editor and not including new data or information
- Books’/conferences’ abstracts.
- Abstract papers, articles without obtainable full text
- Those studies published in other languages without presence of English version
- Published material or conducting of the study prior to 2019.

- Data analysis:

The review was conducted after an extensive search across many databases and throughout references of found studies for eligible studies. We then combined the search terms and limited them to those in English language and in the period between 2019 and 2022. Then duplicated studies were removed and according to PRISMA checklist, articles were screened according to title, abstract, and full text. For each study, title, authors, year of publication, design of the study, sample characteristics (age, gender, BMI, smoking and physical activity), and prevalence of hypertension and diabetes mellitus were collected. Tables and figures were used for presentation of the results.

Results

- Study selection

The primary search results of the current analysis ended in 875 hits which was reduced to 360 studies after removal of the duplicated studies. From those 360 studies, further evaluation for inclusion and exclusion criteria was conducted ending in 346 excluded studies. The reasons for exclusion included because of title and abstract (216 studies), being not relevant to the subject of the study (86 studies), being replies to authors (17 studies), books (2 topics), and being other reviews (26 studies).Finally we included 13 studies in the qualitative synthesis of the current review (Figure 1).

- Studies results:

Among the 13 studies included in the current review, nine studies investigated that prevalence of diabetes mellitus [23–31] and all the included studies investigated the prevalence of hypertension and were conducted and published in the period between 2019 and 2022 [23–35]. All studies were cross-sectional in nature. Two studies were conducted in Saudi Arabia [26,35], while two studies were conducted in India [32,33], three in Ethiopia [23,28,31], one study in France [24], UAE [34], Lebanon [25], Nepal [27], Iran [30], and Malaysia [29]. All studies were conducted among adult public population (Table 1).

The pooled sample size among the 13 studies was 51,975 adults where 21,431 were males (41.23 %) and 28,014 (53.89 %) were females. Moreover, 57.42 % of the participants were older than 35 years old (N=30,849) and 25.80 % were smokers (N=8789). Considering BMI, 49.73 % of the participants of the total sample were overweight or obese while 43.05 % had normal BMI and prevalence of underweight was 7.22 %. Furthermore, 71.63 % of the participants reported good exercise practice (Table 2). Considering the prevalence of hypertension, the pooled results reported a prevalence of 30.56 % ranging between 13.6 % in study of Elbashir et al in Saudi Arabia [35] to 44.91 % in the study of Belay et al in Ethiopia [23]. Considering the prevalence of diabetes mellitus, the pooled results reported a prevalence of 9.23 % ranging between 3.9 % in the study of Takala U et al in Ethiopia [28] to 18.3 % in the report of NHMS in Malaysia [29].

Discussion

Studies published since the beginning of the epidemic have focused on evaluating optimal treatment to reduce mortality from COVID-19. Recent studies have also focused on identifying independent predictors of mortality in patients with Covid-19 [36]. Various biomarkers and comorbidities have been identified as independent predictors of severe disease and poor outcome in Covid-19 [37–39]. Regarding hypertension, and its relationship to COVID-19, 19 have been debated since the early stages of the epidemic. A previous systematic review was conducted by

Tadic et al among studies in order to assess the relation between COVID- 19 and presence of hypertension and impact of hypertension on outcomes among the patients treated from COVID-19.

The authors reported that arterial hypertension is considered one of the most common comorbidities in patients diagnosed with COVID-19 [40]. However, some authors thought that the relation between hypertension and DM with the mortality and morbidity in COVID-19 could be also in the other direction where some doubts that COVID-19 itself could increase the risk for developing hypertension and DM among the population [34,40]. In the current study, we collected data from very recent studies conducted in different regions of the world to assess the prevalence of hypertension and DM among population in the time of COVID-19. The mean prevalence of hypertension in the current review was 30.56 % ranging between (13.6 % and 44.91 %). This prevalence was slightly higher than reported in some previous studies including a recent systematic review that assessed the prevalence of hypertension among Saudis in the period between 2008 and 2018 just before the COVID-19 pandemic. The authors reported a total prevalence of 28.875 % ranging between 18.5 % and 54.9 % [41] and in India, another systematic review reported an overall prevalence of hypertension of 29.8 % [42]. Moreover, in another systematic review conducted in 2016, based on 135 population-based studies in 90 countries, the authors reported that the prevalence of hypertension was 31.1 % in 2010 [43]. Furthermore, in Brazil, a systematic review conducted among 40 studies included 122,018 subjects and reported that according to JNC criteria for diagnosis of hypertension, the prevalence of hypertension was 28.7 % in 2000 [44]. According to these results, we concluded that prevalence of hypertension does not show a significant increase in the era of COVID-19 however, it is alarming to know that almost one third of the population were patients with hypertension which indicates that there is a need to understand the factors associated with this prevalence and introduce strategies to control and try to reduce it.

Considering diabetes mellitus, the current review reported a prevalence of 9.23 % ranging between 3.9 % and 18.3 %. This is similar to a previous systematic review conducted among studies published 1992 and 2007 in northern Africa which reported a mean prevalence of 9.31 % [45]. While in another systematic review conducted among 25 studies in the Gulf region, the authors reported a pooled prevalence of 12.71 %, higher than reported in the current review [46]. However, our prevalence was significantly higher than reported in a previous systematic review conducted in Ireland in the period between 1998 and 2015 which reported a prevalence between 2.2 % and 5.2 % [47]. These results indicate a non-significant increase in the prevalence of DM among the public population indicating that the COVID-19 pandemic had a lower impact on increasing the developing of DM and hypertension among the general public. However, some previous studies reported that COVID-19 had a negative impact on controlling of hypertension and DM which increased the incidence of complications associated with these conditions [48,49].

In conclusion, no significant increase in the prevalence of diabetes mellitus and hypertension among the general public in different regions of the world during the period of COVID-19 pandemic was reported compared with previous studies. However, more interest should be focused on understanding whether COVID-19 is associated with an increase in the prevalence of hypertension and DM among patients with COVID-19.

Figure 1: The steps of choosing the studies for systematic review according to PRISMA steps

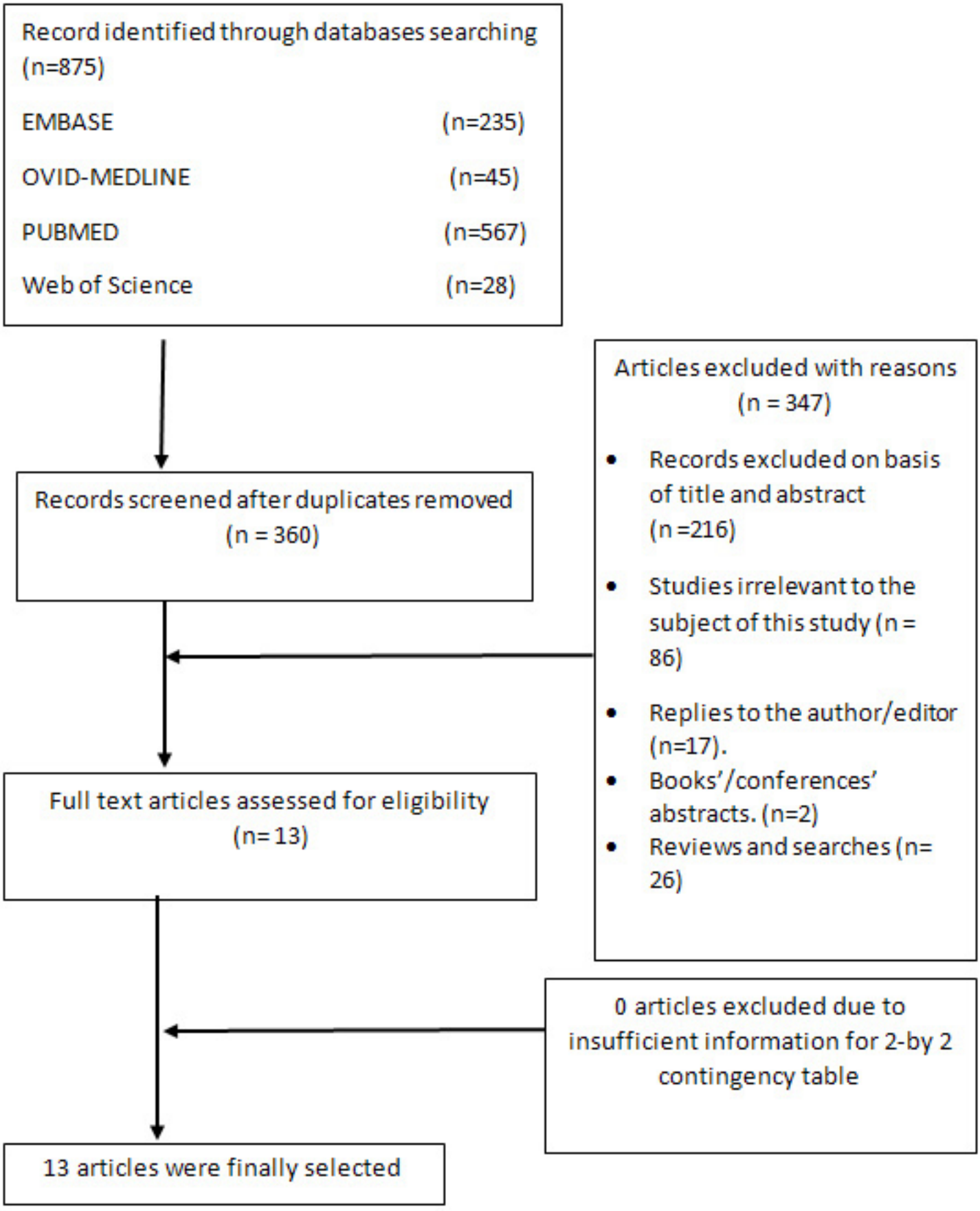

Table 1: The general characteristics of the studies

No.	Authors	Year	setting	Study design	Aims	Population	Prevalence of HTN	Prevalence of DM
1	Elbashir et al [25]	2021	Riyadh, Saudi Arabia	Cross-sectional	The prevalence of hypertension	Adult public population	13.60%	NA
2	Vijna [22]	2022	India	Cross-sectional	To assess prevalence and predictors of hypertension in the rural adult Indian population	Adult public population	31.50%	NA
3	Calas et al [24]	2022	Mayotte, France	Cross-sectional	To assess the prevalence of hypertension, determine the level of awareness, management, and control of this condition	Adult public population	38.40%	7.1 %
4	Mamdouh et al [24]	2022	Dubai, UAE	Cross-sectional	To assess the prevalence of hypertension and pre-hypertension and the related socio-demographic factors, behavioral risk factors and complications among the adult population of Dubai.	Adult public population	32.50%	NA
5	Belay et al [22]	2022	Northwest Ethiopia	Cross-sectional	To determine the prevalence of hypertension and demographic factors associated with it	Adult public population	44.91%	9.28 %
6	Geevar et al [22]	2022	South India	Cross-sectional	To study the prevalence of hypertension	Adult public population	37.20%	NA
7	Ghaddar [25]	2021	Lebanon	Cross-sectional	To determine the prevalence of hypertension and the level of awareness among adult population	Adult public population	30.70%	7.4 %
8	Khafaji [26]	2021	KAU, Saudi Arabia	retrospective study	Investigate the prevalence and control of diabetes and hypertension among employees at a university in Saudi Arabia	Employees	31%	5 %
9	Shrestha et al [27]	2022	Nepal	Cross-sectional	Prevalence of DM	Adult public population	36.90%	8.5 %
10	Takala Utura [28]	2021	Ethiopia	Cross-sectional	Determine the prevalence of diabetes mellitus and the associated factors among public population in Southern Ethiopia.	Adult public population	16.30%	3.9 %
11	NHMS [29]	2019	Malaysia	Cross-sectional	To provide community-based data and evidence to the Ministry of Health Malaysia on non-communicable diseases	Adult public population	32.70%	18.3 %
12	Oraii et al [30]	2022	Tehran, Iran	Cross-sectional	To assess the prevalence of DM and the level of awareness, treatment, and control.	Adult public population	28.10%	16.8 %
13	Endris et al [31]	2022	Northwest Ethiopia	Cross-sectional	To assess the current prevalence of DM, prediabetes and its associated factors in Dessie Town, Northeast Ethiopia	Adult public population	23.50%	6.8 %

Table 2: The general characteristics of the individuals reported in the study

Total sample		Age				Gender				BMI						Smoking		Physical activity	
		< 35		> 35		male		Female		Underweight		Normal		Obese					
Author	Total sample	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Yes	
[42]	934	312	33.40%	622	66.60%	459	49.10%	475	50.90%	NA	NA	NA	NA	NA	NA	185	19.80%	NA	NA
[43]	425	167	39.30%	258	60.70%	225	52.90%	200	47.10%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[44]	2620	1483	56.60%	939	43.40%	951	36.29%	1669	63.71%	72	3.20%	831	35.20%	1717	61.60%	317	12.10%	901	65.20%
[45]	2530	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[46]	432	125	28.92%	307	71.08%	125	28.93%	307	71.07%	75	17.36%	313	72.45%	44	27.55%	130	30.09%	280	64.80%
[47]	5,150	1221	23.70%	3929	76.30%	2061	40.01%	3089	59.99%	NA	NA	NA	NA	NA	NA	653	12.70%	NA	NA
[48]	2214	1254	56.69%	960	43.31%	1017	44.20%	1197	55.80%	72	NA	709	32.02%	1433	67.98%	1309	58.70%	1183	53.43%
[49]	1000	NA	NA	NA	NA	365	36.50%	635	63.50%	32	3.20%	283	28.30%	685	68.50%	286	28.60%	NA	NA
[50]	12557	4562	36.33%	7995	63.67%	4908	39.05%	7649	60.95%	1534	12.21%	7156	56.98%	3866	43.02%	3955	31.48%	NA	NA
[51]	410	274	66.82%	136	33.18%	292	71.29%	118	28.71%	13	3.10%	225	54.87%	172	45.13%	19	4.63%	116	28.29%
[52]	14965	7750	51.71%	7215	48.29%	7064	47.23%	7901	52.77%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[53]	8151	0	0%	8151	100.00%	3731	45.77%	4420	54.23%	222	2.70%	2044	25.07%	5885	74.93%	1920	23.55%	6647	81.54%
[54]	587	250	42.58%	337	57.42%	233	39.69%	354	60.31%	0	0	479	81.60%	108	18.40%	15	2.56%	270	45.99%
otal	51975	17398	33.47379	30849	59.35354	21431	41.23329	28014	53.89899	2020	7.22	12040	43.05	13910	49.73	8789	25.80825	9397	71.63986

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Alazami syndrome in a Saudi girl: a case report

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Abstract

The assembly of profound global developmental and intellectual delay, short stature and severe growth restriction, certain characteristic dysmorphic facial features, with the occasional inclusion of behavioral abnormalities, sensory disturbances, as well as some vague bony involvement that can be rather inconsistent, all constitute an extraordinarily uncommon clinical entity coined as “Alazami Syndrome”, the diagnosis of which can be further established by genetic studies confirming the autosomal recessive biallelic frameshift mutations in the LARP7 gene, culminating in a complex and novel form of primordial dwarfism (PD). Herein, we report a patient presenting with this disease, comorbid with pathogenetic variants in SEPSECS mRNA as well, which cause an amalgamation of central nervous system anomalies that include microcephaly, atrophy, mental retardation, and epilepsy, termed as “Pontocerebellar hypoplasia”, accentuating the rarity of our case, as no such variants of these ailments have been formerly defined in preexisting literature. Genetic sequencing of our patient provides further affirmation of the culpability of the pathogenetic variants for each respective condition, and which suggests a potential connection between Alazami syndrome and other genetic malformation disorders.

Keywords: Alazami, syndrome, Saudi, girl, case, report

Introduction

Alazami syndrome (AS) is an autosomal recessive disorder caused by homozygous or compound heterozygous mutations in La ribonucleo protein 7, a transcriptional regulator (LARP7). This gene encodes a protein found in the 7SK snRNP (small nuclear ribonucleoprotein) (1). SnRNP complex inhibits the positive transcription elongation factor b, cyclin-dependent kinase, required for arrested RNA polymerase II to initiate transcription elongation at the promoter, a pseudogene for this gene is located on chromosome 3; alternative splicing gives rise to multiple transcript variants (2). It is a Syndromic form of primitive dwarfism, characterized by short stature and severe growth restriction. Patients with Alazami syndrome present with severe intellectual disability and characteristic facial features such as zygomatic hypoplasia, deep eyes, wide nose, short philtrum, and macrostomia (3). There are some nonspecific skeletal findings that are inconsistent such as scoliosis and mild epiphyseal changes of the proximal phalanx. Such cases are extremely rare. Fewer than 30 cases have been reported worldwide (4). Laboratory investigations would reveal normal plasma amino acids and acylcarnitines, urinary organic acids, very long chain fatty acids, CBC, kidney profile, and bone profile. MRI performed on 2 patients diagnosed with AS showed unilateral mild insular and anterior cortical thickening of the prefrontal gyrus, the other was unremarkable (5).

The diagnosis of Alazami syndrome is confirmed by Whole-exome sequencing (WES) which will identify a homozygous pathogenic variant in exon 12 of LARP 7. Management is multidisciplinary and based on clinical manifestations, with lifelong follow-up. Most people require varying degrees of assistance with daily activities. Neuropsychiatric support, speech therapy, and educational support are effective. Life expectancy is currently unknown. Affected individuals have been reported to reach early adulthood and the degree of autonomy depends on the severity of intellectual disability and language delay.

Case presentation

We present a ten-year-old female patient with a primary complaint of global retardation, development delay, cognitive deficit, and localization-related partial idiopathic epilepsy and epileptic syndromes with localized onset seizures. There was a positive family history of consanguinity and a similar condition; the patient's sibling was diagnosed with global retardation. The patient was on oral levetiracetam (Keppra), an anticonvulsant, oral topiramate (Ipramax), a carbonic anhydrase inhibitor, 25 milligrams taken twice daily for three months, and oral atomoxetine (Strattera) a selective norepinephrine (noradrenaline) reuptake inhibitor. On examination, her height and weight were below the 3rd percentile; she weighed 13 kilograms, and her height was 107 centimeters. An awake digital electroencephalogram (EEG) record showed some multifocal epileptiform discharges superimposed on diffuse background slowing. The beta wave showed 15-20 hertz (Hz), low voltage, and diffuse. The theta wave showed 4-5 Hz, low-medium voltage, irregular, and intermixed diffusely, and the delta wave showed 2 Hz, medium voltage, irregular, and diffuse. There was evidence of multifocal spikes involving C4 and F3 independently, and no driving response was noted.

Eight months later, the patient's condition was under control, and we ordered Whole-exome sequencing, which led to the diagnosis of a rare form of primordial dwarfism, Alazami syndrome. The WES identified SEPSECS, a homozygous silent variant, and homozygous big deletion in LARP7 gene. The Sep (O-Phosphoserine) TRNA: Sec (Selenocysteine) TRNA Synthase SEPSECS (NM_016955.4):c.477A>G(p.Arg159=), Chr4(GRCh37): g.25157729T>C. This sequence change affects codon 195 of the SEPSECS mRNA, but does not change the encoded amino acid sequence. Pathogenic variants in SEPSECS cause pontocerebellar hypoplasia type 2, which is characterized by microcephaly, postnatal onset progressive atrophy of the cerebrum and cerebellum, profound mental retardation, and variable seizures, all of which are evident in our patient. The LARP7 (NM_016648.4):c.507_553-12del (p.Val171fs), Chr4 (GRCh37): g.113568066_113568178del; this sequence change is a deletion of 113 nucleotides that result in removing many amino acids on the LARP7 protein. This alteration is predicted to lead to truncated significantly altered or absent protein.

Discussion

Alazami syndrome (AS) is a rare form of primordial dwarfism (PD). In a paper published in 2012, Alazami et al describe a consanguineous family in Saudi Arabia in which three interrelated branches have a total of 10 children with PD, dysmorphic features, and inconsistent skeletal findings. Further investigations revealed a frameshift mutation in LARP7 which causes a novel form of PD. This autosomal recessive disease is characterized by marked global developmental delay, short stature, varying intellectual retardation, and distinct dysmorphic facial features including, triangular face, scant eyebrows, deeply set eyes, malar hypoplasia, wide nose, short philtrum, and macrostomia (6). It can also present with behavioral abnormalities such as anxiety and hypersensitivity to tactile and auditory stimuli (7). This syndrome is caused by biallelic mutations of LARP7 gene, found on chromosome 4q25, which causes 7SK snRNP depletion (8). 7SK plays a role in the expression of several genes by inhibiting positive transcription elongation factor b (P-TEFb) and competing with DNA for binding to HMGA1, thus directly controlling its activity (9).

Pontocerebellar hypoplasia (PCH) is a group of heterogenous neurodegenerative disorders with a predominantly antenatal onset. PCH was first reported in 1917, but its clinical characteristics were primarily described by Krause in 1928. It is classified into 11 types based on distinctive clinical elements and genetic mutations. Patients with PCH have severe atrophy or hypoplasia of the pons and cerebellum. However, motor and cognitive impairments as well as the involvement

of supratentorial structures are inconsistent. PCH2D is attributable to mutations in the SEPSECS gene and encompasses a spectrum of clinical severity. Patients with normal motor development initially and cognitive disability with motor decline and pediatric onset ataxia have been reported. Additionally, some patients completely lack pontine hypoplasia (10). Our patient presented with dwarfism, developmental retardation, cognitive disability, and idiopathic epileptic seizures of localized onset, fulfilling some aspects of both AS and PCH2D.

The results of Whole-exome sequencing (WES) reveal two distinct genetic mutations, specifically a frameshifting LARP7 mutation and a synonymous SEPSECS mutation. It is unclear if the concurrence of the identified variants in LARP7 and SEPSECS play a part in the disease of the patient. Further investigations are warranted to demonstrate their clinical significance. Analogous to our patient, a case report by Patalan et al depicts a patient that was diagnosed with Phenylketonuria in addition to AS, both of which are caused by genetic mutations (11,12). This suggests a possible association between AS and other genetic abnormalities and requires deeper examination by future research.

Conclusions

In this article, we discussed the phenotype and molecular pathology of Alazami syndrome, and presented a clinical case for reference and example, who was particularly unique by sharing a second genetic affliction, Pontocerebellar hypoplasia. Albeit scarce, the former should still be an important consideration for patients with potential primordial dwarfism, while the latter should be so for patients with intense neurological, developmental, or intellectual deficiencies. Despite considering the complexity of presentation and thus potential management options of Alazami syndrome, it is too rare and understudied to establish any form of sure prognosis. Yet, we hope that shedding more light upon it, alongside our researcher colleagues, would help facilitate a better understanding of the disease, leading to more effective measures of treatment and prevention.

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Authors' contribution

Fawzia Alsharif, Hussein O. Taher, Mohammed Ashoor, Sara A. Alkhamis , Zainab E. Alobaidi, Hossam Alawady, Ahmad W. Alyafi, Refan H. Alshareef , Israa A. Peeran, Hisham Almuzaini, Abdullah Alharthy: all shared in designing the study, they wrote the protocol and planed the study. All collected the data and wrote the case report. All Co-Authors have read and approved the paper. All authors have read and agreed to the published version of the manuscript.

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Emergency Department Overcrowding in the Western Region of Saudi Arabia

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Abstract

Introduction: Emergency department (ED) overcrowding is a global public health threat that affects both patients and ED staff. In Saudi Arabia, ED crowding is a challenge to the Ministry of Health. To date, the direct relationship between patient perceptions of ED crowding and their satisfaction has not been fully explained. We aim to assess the perception of our population on ED overcrowding and how it affects their satisfaction level.

Methods: A quantitative, cross-sectional study where data collection took place through a pre-structured online questionnaire targeting all accessible adult population in the Western Region of Saudi Arabia.

Results: Most of our 373 participants agreed that the decreased number of available emergency departments, lack of coordination, and short staffing were the main reasons of emergency departments overcrowding. The majority were neutral regarding staff incompetence and around 22% of them disagreed. More than half of our participants (59.8%) were unsatisfied, 62.2% of them reported delayed services as the reason behind their dissatisfaction. All participants who reported a delay in the provided services, reported an overall dissatisfaction with the emergency department's provided care and services (P-Value <0.001)

Conclusions: There is a need to provide more ED departments in the western region, designing educational programs for emergency physicians and all the ED staff, and designing awareness campaigns for the public to educate them on the concept of urgent cases and how to access healthcare properly to avoid ED crowding.

Keywords: Emergency Department, Overcrowding, Satisfaction, Saudi Arabia.

Introduction

The Emergency Department (ED) is considered the center of any healthcare organization and its main role is to treat critical cases in a timely manner. There has been a noticeable increased demand on the ED to meet the expectations of the community and provide its members with the best quality of medical care (1). The simplest definition for ED overcrowding is an imbalance between the demand of patients visiting the ED and the available resources to meet these needs (hospital beds, staffing, etc.). The Australian College for Emergency Medicine defines overcrowding as a dysfunction of the ED when the numbers of patients awaiting transfer, visits, diagnosis, and/or treatment exceed the ED's physical and staffing capacity (2). ED overcrowding is a global public health issue that can harm both patients and physicians (3). There is no reliable consensus on measuring ED overcrowding despite being the subject of international research for two decades (4). The Association of Academic Chairs of Emergency Medicine (AACEM) has published data that shows that the rates of ED patient boarding rose by almost 130% (from 7.0% to 16.0%) from 2012 to 2019. Additionally, the rates of boarding patients for more than 24 hours have increased double (from 0.78% to 1.45%, then increased to 1.64%) (5).

ED overcrowding has been proven to cause avoidable mortality and morbidity among patients. The effects of ED overcrowding include worsened patient outcomes due to long waiting times, increased hospital admissions, ambulance diversion, misdiagnosis, medication errors, offering inadequate care to patients, premature discharge, and patient discomfort due to long waiting times in the waiting rooms, and increased need for return visits (6,7). Furthermore, ED overcrowding is dangerous for the ED staff as well. It has been documented that overcrowding in the ED leads to decreased productivity, increased human errors, consequent legal actions, increased violence against the ED staff, and burnout (6). A study by Wang et al. suggested that overcrowding of the ED was correlated with patient satisfaction (8). Dong-uk et al. have also reported that ED overcrowding has been shown to decrease patient satisfaction and profit loss in medical establishments (7).

As discussed above, the literature suggests that the effects of ED overcrowding result in overall low patient satisfaction and compromised medical care. It is worth noting that a small number of the currently published studies document this effect. Globally and locally in Saudi Arabia there has been slow progress in alleviating the issue of ED overcrowding and its harmful effects on both patients and medical staff. In this study, we aim to assess the perceptions of our population on ED overcrowding and how their perceptions affect their satisfaction levels. Gaining the patients' insights will help us improve the quality of healthcare services provided in the ED and highlight the importance of this issue.

Methodology

This is a quantitative, cross-sectional study where data collection took place through a pre-structured online questionnaire targeting all accessible adult population in the Western Region of Saudi Arabia.

This questionnaire was filled in by a total of 373 participants (above 18 years) who access health care in the western region of Saudi Arabia. The study was conducted from August to May of 2021. Data collection took place via an online questionnaire that was approved, along with all the methods used in the current study, by the research ethics committee unit of Taif University. We obtained written informed consent from all the participants and from legal guardians of illiterate participants.

The questionnaire had three sections. The first section measured the demographic characteristics of the respondents (age, gender, nationality, employment status, level of education, whether the participants visited the ED, and the date of their last visit to the ED). The second section was designed to determine the participants' perception of the ED services, overcrowding, and the reasons for overcrowding. The final section measured the participants' level of satisfaction with the quality of the delivered services in the ED. We obtained written consent from all of the participants. Data were analyzed using SPSS (Statistical Package for Social Sciences) version 28. Qualitative data variables were expressed by using frequency and percentage.

Results

Out of our 373 participants, (34.6%) were aged between 40 and 50 years old, followed by participants aged from 18-25 (32.4%). Most of the participants were females (62.5% females versus 37.5% males). Around 99.7% of the respondents were educated, while 52.3% were employed. Approximately 94.6% of the participants reported visiting the ED before, mostly during the last six months (29.5%). The full demographic characteristics of the participants are shown in (Table 1).

We explored the reasons the participants perceived as the cause of emergency department overcrowding. Most of our participants agreed that the decreased number of available emergency departments, lack of coordination, and short staffing were the main reasons. However, most of them were neutral regarding staff incompetence and around (22%) of them disagreed (Table 2).

Table 1: Baseline Characteristics of the whole cohort (n=373)

Variable	Count	Percent (%)
Age Group		
18 - 24	121	32.4
25 - 29	23	6.2
30 - 39	31	8.3
40 - 49	129	34.6
50 and more	69	18.5
Gender		
Male	140	37.5
Female	233	62.5
Education		
Educated	372	99.7
Not educated	1	0.3
Employment		
Employed	195	52.3
Not employed	178	47.7
Previous emergency department visitations		
Yes	353	94.6
No	20	5.4
Time of the last emergency department visit		
Less than a month ago	68	18.2
During the last six months	110	29.5
Around one or two years ago	77	20.6
Three to four years ago	79	21.2
More than 10 years ago	16	4.3
More than 20 years ago	23	6.2

Table 2. Perception of the reasons for ED overcrowding (n=373)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree	
	Count	%	Count	%	Count	%	Count	%	Count	%
Lack of ED facilities in hospitals	84	22.5	168	45.0	59	15.8	51	13.7	11	2.9
Lack of coordination	78	20.9	169	45.3	67	18.0	46	12.3	13	3.5
Short staffing	77	20.6	163	43.7	90	24.1	28	7.5	15	4.0
Staff Incompetence	36	9.7	77	20.6	109	29.2	82	22.0	69	18.5

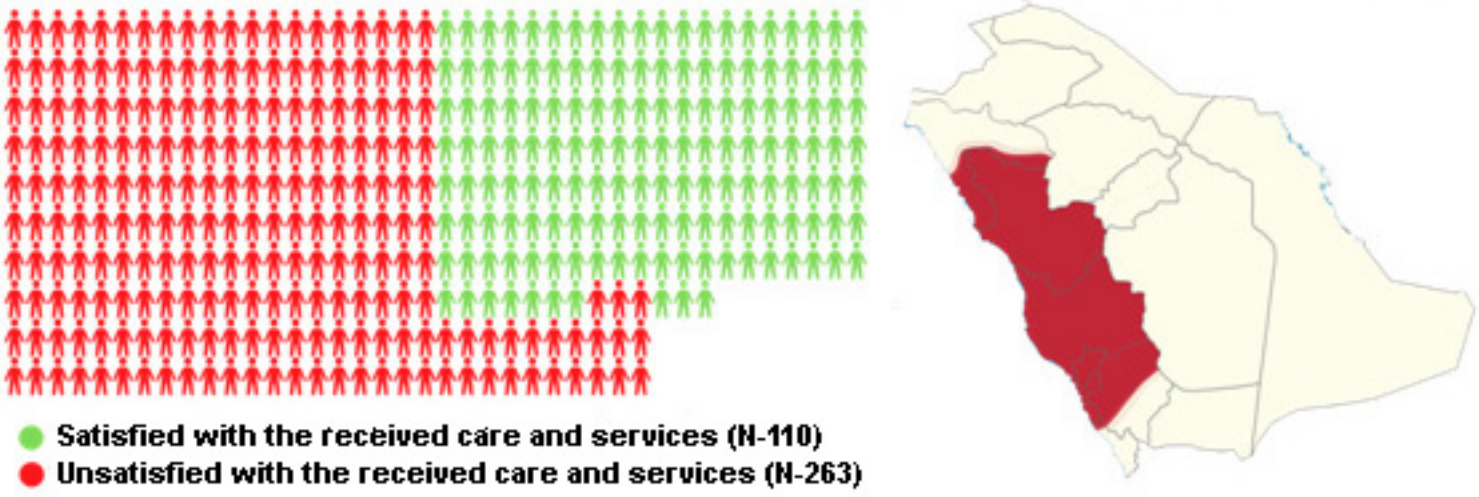
Additionally, 43% of our participants added additional reasons for Emergency department overcrowding, and the most common reason provided was staff's negligence, followed by disorganization and Lack of awareness of the concept of emergency departments among participants (Table 3).

Table 3. Additional reasons provided by 45.3% of the patients

Other cause	Frequency (n)	Percent (%)
Staff's negligence	22	17.7
Disorganization	19	15.3
Lack of awareness of the concept of emergency departments among patients.	19	15.3
Decreased number of beds	16	12.9
Few Hospitals in the area	12	9.7
Lack of emergency physicians	9	7.3
Patients not being sorted correctly	9	7.3
Lots of emergency cases	8	6.5
There are no specializations for ER departments	3	2.4
Lack of experience and training	3	2.4
Long break time	2	1.6
The patients' relatives stay with them in the ED waiting rooms	2	1.6

Furthermore, we investigated the degree of satisfaction with the quality of care and provided services in the emergency department which revealed that more than half of our participants (59.8%) were unsatisfied. Figure1 shows a visual representation of our cohort of participants' satisfaction.

Figure 1: Visual representation of our participant's satisfaction after receiving care in the emergency department



Participants who were unsatisfied were asked to clarify the reason behind their dissatisfaction; most of them, (62.2%) reported delayed services as the reason behind their dissatisfaction. We asked all participants even those who were satisfied with the provided ED care if they were satisfied with the waiting time in the emergency department, and the percentage of dissatisfaction increased to 70.5% (Table 4).

Table 4: Level of patient satisfaction with ED services.

Variable	Count	Percent (%)
Are you satisfied with the quality of care provided at your ED?		
Yes	150	40.2
No	223	59.8
If you answered the previous question with (No), please specify why?		
Delayed services	196	62.2
Crowdedness	60	19.0
Negligence	33	10.5
Critical Cases	26	8.3
Are you satisfied with the period of waiting time at the ED		
Satisfied	110	29.5
Dissatisfied	263	70.5

Finally, we compared our participants' characteristics with the level of satisfaction. Gender, education and employment showed insignificant P-value. However, when we compared the satisfaction levels of those who experienced a delay in the emergency department, we discovered that all participants who reported a delay in the provided services, reported an overall dissatisfaction with the emergency department provided care and services (P-Value <0.001) (Table 5) .

Table 5. Relationship between patient characteristics and satisfaction levels

Factor		Satisfied		Dissatisfied		P. value
		Count	% within factor	Count	% within factor	
Gender	Male	52	37.1	88	62.9	0.12
	Female	58	24.9	175	75.1	
Educated	Yes	110	29.6	262	70.4	0.517
	No	0	0.0	1	100.0	
Employed	Yes	63	32.3	132	67.7	0.212
	No	47	26.4	131	73.6	
Satisfaction level	Patients who did not experience delayed ED services	110	80.9	26	19.1	<0.001
	Patients who experienced delayed ED services	0	0.0	237	100.0	

Discussion

The setting of the ED is detrimental to patient satisfaction with its services. The patients' satisfaction levels need to be analyzed to improve the quality of care, patient experience, and meet the needs and expectations of our community. Patient satisfaction surveys have been proven to be an excellent way to gain a clear insight into patients' perceptions. Additionally, they are an important tool for quality improvement.

The reported causes of ED overcrowding include an increased number of patients coming to the ED as well as those waiting to be moved to their wards, as well as resource shortage (9). Crowding in ED has been established as a challenge to the Saudi Ministry of Health, especially at the referral hospitals. Furthermore, no national initiatives to reduce ED crowding have been revealed. A survey in which directors from 10 ED in Riyadh provided their insights showed that half of the participants stated that overcrowding is an issue in their departments, and 40% mentioned it is a constant problem. The most significant causes of overcrowding were delayed patient discharge (90%), limited inpatient beds (70%), the prolonged stay of ED cases (70%), and delayed disposition plans (60%). Additional data from King Faisal Specialist Hospital and Research Center revealed that more than 505 of the patients had an average waiting time of six hours, and around 15% of the cases waited more than 24 hours (10). In Saudi Arabia, the main causative factor for ED overcrowding is a large number of patients with non-urgent medical problems attending the ED for non-urgent reasons, increasing the waiting times for themselves and acutely ill patients. Efstathiou et al. reported that more than 50% of the participants reported visiting the ED to access healthcare (11). Another Saudi study conducted in the Eastern region found that ED visits have increased by almost 30%, and 60% of the visitors presented with non-urgent conditions. They also found that the length of stay in the ED has increased (12). Previous studies have highlighted the importance of measuring patients' satisfaction to improve the overall quality of healthcare (13). Patients' non-clinical perception of their care environment affects their satisfaction level. Additionally, satisfaction level is affected by the ability of the staff to effectively manage patients' expectations. Satisfaction level is also affected by the overall ED performance, patient compliance, and presence or absence of any medico-legal concerns (14) . Around 22.5% of the participants strongly agreed that the main reason for ED overcrowding is the low number of hospitals equipped with an ED. Additionally, 45.3% of the patients provided additional reasons. These included, decreased number of beds (12.9%), the presence of few hospitals in the area (9.7%), lack of emergency physicians (7.3%), insufficient experience and training provided to the staff (2.4%). These reasons are similar to the reasons reported by Jayaprakash et al. They included inadequate outpatient access to primary care, inadequate out-of-hours service, bed shortage, patient self-referral, staff shortages, and lack of medical staff experience (15).

Around 59.8% of the participants are dissatisfied with the quality of care provided in their ED. These rates are higher than the rates reported by Alazmi, where more than 80% of the respondents attending Farwanyia hospital in Kuwait were dissatisfied with emergency care services. (16) On the contrary, in Australia, Dinh et al. reported that around 84% of the respondents believed that the care they received in the ED was very good or excellent (18).

In our study, the main reasons for dissatisfaction included delays in services (62.2%), crowdedness (19.0%), negligence (10.5%), and an increased number of critical cases (8.3%). Another study in Kuwait by Alazmi and Almutairi revealed that 55.8% of the patients were dissatisfied with the overall cleanliness, 48.5% of the patients were dissatisfied with the comfort of the waiting area, and 46.4% were unhappy about the long waiting time for the first visit (17).

There was a statistically significant relationship between waiting time and ED dissatisfaction, as 100% of the patients who were dissatisfied with the waiting time were also dissatisfied with the quality of services provided in the ED (p-value <0.001). These results agree with what was reported by Dinh et al., that waiting time is highly predictive of patient satisfaction with the ED. They noticed a linear decrease in median satisfaction scores for each hour of waiting time in the ED (17). Another Moroccan study has shown that around 94% percent of the participants were dissatisfied with the overall ED care, and the most patient-reported problem was waiting time (79.2%) (19).

Conclusion

In short, we can conclude that ED overcrowding is an issue in the Western Region of Saudi Arabia. There are multiple areas for improvement that need to be addressed. These include providing more ED departments in the region, designing educational programs for emergency physicians and all the ED staff, and designing awareness campaigns for the public to educate them on the concept of urgent cases and how to access healthcare properly. All of this will help us improve patient satisfaction rates and provide them with a better quality of care.

Limitations

The study has the traditional limitations of cross-sectional studies as non-response and response bias. The sample size is small and therefore not indicative of the perception of all Saudi patients. Further studies across the kingdom are needed to establish the relationship between patients' perceptions and ED overcrowding and their satisfaction with the provided care.

Declarations

• Ethics approval and consent to participate:

The study along with all of its methods was approved by the Research Ethics Committee at Taif University, School of Medicine. We obtained a written informed consent from all the participants and from legal guardian of illiterate participant, which is available upon request from the corresponding author.

Authors' contributions

AMA, RHK, and SKA led the writing of the manuscript and statistical analysis. EMA, SMA, MAA, and YHA collected the data and revised and edited the manuscript, SAA assisted with the writing and revision of the manuscript. All authors read and approved the final manuscript.

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Knowledge of Saudi type 2 diabetic patients about diabetic peripheral neuropathy and its risk factors in Abha City, Saudi Arabia

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Abstract

Objectives: To assess the level of knowledge about diabetic peripheral neuropathy (DPN) and its risk factors among diabetics in Abha City, Saudi Arabia.

Subjects and Methods: A cross-sectional study was conducted from March to July 2022 in primary health care (PHC) centers, Abha City, Saudi Arabia. Data were collected using an Arabic Language interview questionnaire, which included patients' demographics, to awareness and knowledge items about DPN and its risk factors in addition to screening for neuropathic symptoms of DPN using the history part of the validated Michigan Neuropathy Screening Instrument (MNSI).

Results: This study included 300 type 2 diabetic patients. Age of 74.7% of participants was (41-60 years). Males constituted 56.7%. The largest proportion of patients were house wives or unemployed (41.3%). More than half of the participants were school –educated (59.7%), while 18.7% were university educated. Almost half of participants (46.6%) reported disease duration between 6-9 years, while for that of 29.2% it was 2-5 years, and for 24.3% was 10 years or more. HbA1c was <7% in 46% of participants. Only 18.3% of participants were aware of DPN. Two-thirds of participants had poor knowledge level about DPN. The most frequently experienced neuropathic symptoms were feeling weak all over most of the time (62.7%), having an open foot sore (59.7%), having muscle lower limb cramps (48.7%) and experiencing burning lower limb pain (45.7%). Prevalence of DPN according to the history part of the MNSI was 9.3% of type 2 diabetic patients had DPN. Participants' knowledge levels were significantly higher among those with DPN (p=0.045). However, their knowledge levels did not differ significantly according to their personal or clinical characteristics.

Conclusions: Most type 2 diabetic patients in Abha City have poor knowledge about DPN and its risk factors. However, prevalence of DPN among them is relatively low.

Key words: Diabetes mellitus, diabetic peripheral neuropathy, knowledge, Saudi Arabia.

Introduction

Diabetes mellitus is a chronic metabolic disease, characterized by high levels of blood glucose. In the 21st century, it is considered a pandemic and the primary cause of mortality and morbidity (1). It may affect any organ in the body, including the heart, eyes, kidneys, and nervous system. The risks for complications increase with disease duration. By ten years after diagnosis, at least 50% of type 2 diabetic patients develop some form of neuropathy, mainly peripheral neuropathy, known as diabetic peripheral neuropathy (DPN) (2).

Zakin et al. (3) stated that DPN is one of the most common long-term complications of diabetes. It refers to the occurrence of symptoms associated with peripheral neurological dysfunction in people with diabetes while excluding other causes. It affects all peripheral nerves, including pain fibers, motor neurons, and the autonomic nervous system, and is the second most common cause of post-traumatic nerve injury. Its complications include two types of pain and sensory abnormalities, the most severe of which is diabetic peripheral neuralgia. It is the main initiating factor for foot ulceration, Charcot neuroarthropathy, and lower-extremity amputation (4).

Kamalarathnam and Varadarajan (5) stressed that early detection of DPN using an objective screening test followed by its appropriate management is important since up to 50% of the patients may be asymptomatic. Screening for DPN enables early detection and management and helps prevent morbidities, like foot ulcerations, amputation, etc. therefore, it is recommended to screen for diabetic neuropathy at diagnosis and then every year afterwards. The Michigan Neuropathy Screening Instrument (10) is commonly used to screen for DPN in outpatient settings by primary health care (PHC) providers (6).

Several studies from different parts in the world revealed that prevalence of diabetic peripheral neuropathy (DPN) was very high and ranged from 36.6%, in the U.S. to 20% in the Middle-Eastern region (7). Among Saudi patients, after more than 10-years of diabetes, prevalence of DPN was reported to be as high as 82% (8).

Bahhary et al. (9) stressed that diabetic patients can play a vital role in early identification and reporting of DPN if they are aware about it. However, data on awareness and knowledge about diabetic nephropathy in Saudi Arabia remain scarce. Therefore, this study aimed to assess the level of knowledge about DPN and its risk factors among type 2 diabetics in Abha City, Saudi Arabia.

Methodology

A cross-sectional study design was followed at PHC centers in Abha City, Saudi Arabia during the period between March and July 2022.

The minimum sample size needed was calculated according to the Raosoft Sample Size Calculator (10) website to be 285 patients, with 5% error margin, 95% confidence level, and 75% response distribution. However, the sample size was increased to 300 to compensate for possible non-response or any missing data.

A simple random sampling technique was followed to select five PHC centers within Abha City. The Chronic Diseases clinics in selected PHC centers were visited by the researchers to interview and examine all attending Saudi type 2 diabetic patients on the day of our visit. To fulfill the required sample size, 60 type 2 diabetic patients were included from each selected PHC center.

Inclusion criteria: Saudi type 2 diabetics, with disease duration > 2 years.
Exclusion criteria: Non-Saudi diabetic patients who have been diagnosed since less than two years.

For data collection, the researchers used an interview questionnaire that has been used by the study of Bahhary et al. (9). It included the following parts:

- **Personal characteristics:** age, sex, job, marital state, education level, smoking status, and body mass index.
- **Present history of diabetes:** Duration of diabetes, types of received medications, and HbA1c.
- **Knowledge about DPN and its risk factors**: Eight multiple choice questions that assess patients' awareness on DPN and its risk factors were included. A correct answer was assigned a score of (1), while an incorrect response was assigned a score of (0). According to participants' percentage of correct responses, their knowledge was classified into two categories, either "Poor" for those who attained <50%, or "Good" for those who attained ≥50%.
- **Screening for neuropathic symptoms of DPN:** This was done using the validated MNSI (10). It consists of two parts, a history questionnaire followed by physical assessment. MNSI history questionnaire consists of 15 (Yes/No) questions on symptoms, such as numbness, burning sensation, temperature perception, and history of open sores or amputation. The higher the score, the worse is the level of neuropathic symptoms. A score of $\geq$4 was considered as positive for having significant DPN (6).

The Statistical Package for Social Sciences (IBM, SPSS version 28.0) was used for data entry and analysis. Descriptive statistics were calculated using frequency and percentage for qualitative variables, or mean and standard deviation for quantitative variables. Chi square test was used to test significance of differences in participants' knowledge according to their diabetes control.

Results

A total of 300 type 2 diabetic patients were enrolled in the present study. Table (1) shows that age of 74.7% of participants was (41-60 years). Males constituted 56.7%. The largest proportion of patients were housewives or unemployed (41.3%), followed by governmentally employed participants (36.3%). More than half of participants were school educated (59.7%), while 18.7% were university educated and 21.7% were illiterate. Almost three-quarters of participants (74%) were non-smokers, while 11.3% were current smokers and 14.7% were ex-smokers. Almost half of participants (48.7%) were overweight, while 31.3% were obese. Almost half of participants (46.6%) reported a disease duration between 6-9 years, while for that of 29.2% it was 2-5 years, and for 24.3% it was 10 years or more. HbA1c was <7% in 46% of participants.

Table (2) shows that only 18.3% of participants were aware of DPN. Burning and tingling were the most frequently stated DPN symptoms (74% and 63.3%, respectively), while throbbing, and not feeling pain or hot/cold feet were the least stated (17.7% and 11%, respectively). High blood glucose levels were the most frequently stated risk factor for DPN (86%), while the least stated was high blood pressure and elevated triglycerides (28.3% and 31%, respectively). Foot ulcers and missing minor cuts and sores were the most frequently stated complications of DPN (75.7% and 77%, respectively), while amputation was the least frequently stated (63.7%). Most participants (54.3%) stated that DPN can be diagnosed with special tests, while all participants stated that DPN can be prevented by proper foot care and strict blood glucose control, and 47.3% stated that there are certain medications that decrease DPN pain.

Figure (1) demonstrates that 67% of participants had poor knowledge level about DPN.

Table (3) shows that the most frequently experienced neuropathic symptoms were feeling weak all over most of the time (62.7%), having an open foot sore (59.7%), having muscle lower limb cramps (48.7%) and experiencing burning lower limb pain (45.7%).

Figure (2) shows that 9.3% of type 2 diabetic patients had DPN.

Table (4) shows that participants' knowledge levels were significantly higher among those with DPN (p=0.045). However, their knowledge levels did not differ significantly according to their personal or clinical characteristics.

Table 1: Participants' characteristics

Variable	Count	Percent (%)
Age Group		
18 - 24	121	32.4
25 - 29	23	6.2
30 - 39	31	8.3
40 - 49	129	34.6
50 and more	69	18.5
Gender		
Male	140	37.5
Female	233	62.5
Education		
Educated	372	99.7
Not educated	1	0.3
Employment		
Employed	195	52.3
Not employed	178	47.7
Previous emergency department visitations		
Yes	353	94.6
No	20	5.4
Time of the last emergency department visit		
Less than a month ago	68	18.2
During the last six months	110	29.5
Around one or two years ago	77	20.6
Three to four years ago	79	21.2
More than 10 years ago	16	4.3
More than 20 years ago	23	6.2

Table 2: Knowledge of diabetic patients regarding diabetic peripheral neuropathy (DPN) and its risk factors in Abha City

Knowledge items	Yes		No	
	No.	%	No.	%
Do you know what DPN is?	55	18.3	245	81.7
Exposure to high blood glucose levels over an extended period of time causes damage to peripheral nerves	127	42.3	173	57.7
Symptoms of DPN in the toes and feet:				
• Burning	222	74.0	78	26.0
• Tingling	190	63.3	110	36.7
• Sharp, shooting pain	123	41.0	177	59.0
• Pins and needles	123	41.0	177	59.0
• Throbbing	53	17.7	247	82.3
• Not feeling pain or hot/cold feet	33	11.0	267	89.0
Risk factors for DPN:				
• High blood glucose levels	258	86.0	42	14.0
• Elevated triglycerides	93	31.0	207	69.0
• Excess body weight	121	40.3	179	59.7
• Smoking	199	66.3	101	33.7
• High blood pressure	85	28.3	215	71.7
Complications of DPN:				
• Foot ulcers	227	75.7	73	24.3
• Not noticing minor cuts and sores	231	77.0	69	23.0
• Wounds infections and gangrene	205	68.3	95	31.7
• Amputation	191	63.7	109	36.3
Are there special tests to diagnose DPN?	163	54.3	137	45.7
How to prevent complications of DPN?				
• Proper foot care	300	100.0	0	0.0
• Strict blood glucose control	300	100.0	0	0.0
• Control risk factors	182	60.7	118	39.3
Are there certain medications that decrease DPN pain?	142	47.3	158	52.7

Table 3: History of peripheral neuropathy symptoms in diabetic patients

Questions	Yes		No	
	No.	%	No.	%
Are your legs and/or feet numb?	62	20.7	238	79.3
Do you ever have any burning pain in your legs and/or feet?	137	45.7	163	54.3
Are your feet too sensitive to touch?	20	6.7	280	93.3
Do you get muscle cramps in your legs and/or feet?	146	48.7	154	51.3
Do you ever have any prickling feelings in your legs or feet?	81	27.0	219	73.0
Does it hurt when the bed covers touch your skin?	30	10.0	270	90.0
When you get into a tub or shower, are you able to tell the hot water from the cold water?	287	95.7	13	4.3
Have you ever had an open sore on your foot?	179	59.7	121	40.3
Did your doctor tell you that you have diabetic neuropathy?	18	6.0	282	94.0
Do you feel weak all over most of the time?	188	62.7	112	37.3
Are your symptoms worse at night?	95	31.7	205	68.3
Do your legs hurt when you walk?	27	9.0	273	91.0
Are you able to sense your feet when you walk?	283	94.3	17	5.7
Is the skin on your feet so dry that it cracks open?	20	6.7	280	93.3
Have you ever had an amputation?	0	0.0	300	100.0

Figure 1: Participants' knowledge levels about DPN

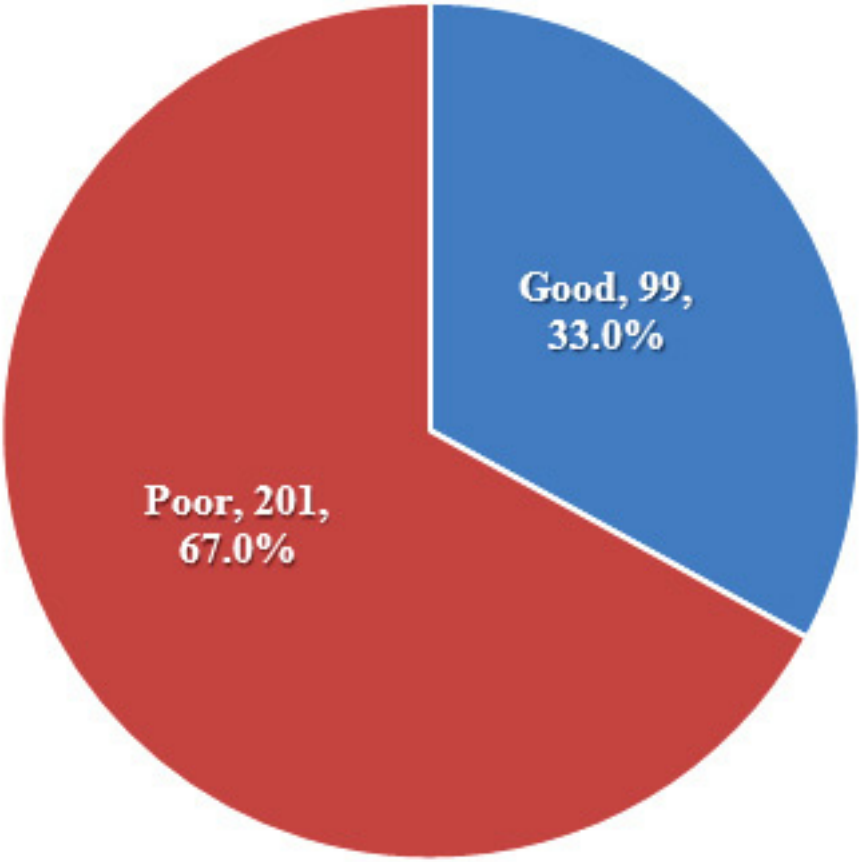

Figure 2: Prevalence of diabetic peripheral neuropathy among participants

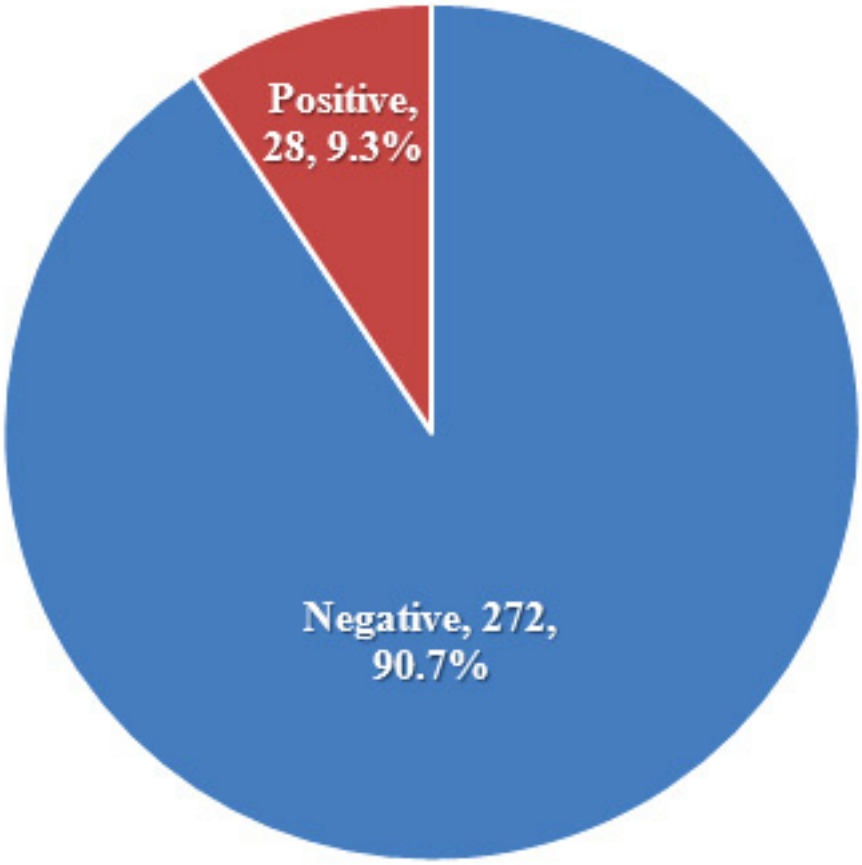

Table 4: The association between participants' diabetes control and their awareness Level regarding diabetic peripheral neuropathy

Characteristics	Good (n = 99)		Poor (n =201)		P-value
	No.	%	No.	%	
HbA1c level					
• Controlled (≤7%)	50	36.2	88	63.9	
• Uncontrolled (>7%)	49	30.2	113	69.8	0.272
Age					
• ≤ 40 years	10	10.1	22	10.9	
• 41-60 years	72	72.7	152	75.6	0.687
• ≥ 61 years	17	17.2	27	13.4	
Gender					
• Male	55	55.6	115	57.2	
• Female	44	44.4	86	42.8	0.785
Job					
• Housewife/unemployed	39	39.4	85	42.3	
• Governmental	40	40.4	69	34.3	
• Private	11	11.1	31	15.4	0.617
• Other	9	9.1	16	8.0	
Education level					
• Illiterate	25	25.3	40	19.9	
• School	55	55.6	124	61.7	0.518
• University	19	19.2	37	18.4	
Smoking status					
• Current smoker	10	10.1	24	11.9	
• Non-smoker	13	13.1	31	15.4	0.745
• Ex-smoker	76	76.8	146	72.6	
Body mass index					
• Normal	22	22.2	38	18.9	
• Overweight	50	50.5	96	47.8	0.537
• Obese	27	27.3	67	33.3	
Duration of diabetes					
• 2 – 5 years	29	29.3	58	28.9	
• 6 – 9 years	47	47.5	93	46.3	0.952
• ≥ 10 years	23	23.2	50	24.9	
DPN					
• Present	14	50.0	14	50.0	
• Absent	85	31.3	187	68.8	0.045†

† Statistically significant

Discussion

Saudi Arabia is the second highest country in the Middle East and the seventh globally for rating diabetes according to the World Health Organization (WHO) (11). Diabetic peripheral neuropathy is a common complication in diabetic patients (12).

We aimed to assess knowledge of Saudi type 2 diabetic patients regarding DPN and its risk factors.

The present study revealed that 81.7% of participants were unaware about DPN, and only two-thirds of patients had poor knowledge about it. Type 2 diabetics' knowledge differed significantly according to presence of DPN, but did not differ significantly according to other studied participants' characteristics.

Our results are in accordance with those of Alhashim et al. (13) in Al-Ahsa, Saudi Arabia, who found that only 7.2% of patients had high knowledge level, whereas more than 54.6% were not aware of DPN. However, their patients' level of knowledge differed significantly between patients who received health education about DPN by their healthcare providers and those who did not.

These findings confirm that diabetic patients need to be informed about DPN, hence the role of health education is essential in increasing their level of knowledge about DPN.

Based on the history part of the MNSI, prevalence of DPN among our patients was 9.3%. The most frequently experienced symptoms were feeling weak all over most of the time, having an open foot sore, having muscle lower limb cramps or experiencing burning lower limb pain.

Higher prevalence of DPN was reported by several studies in Saudi Arabia. A study from primary care centers in Riyadh City showed that 35% of diabetic patients suffered from DPN (4). Another study reported a prevalence of 30.1% (14). A hospital-based study reported a high prevalence of DPN (69.2%) among type 2 diabetic patients (15). In Jeddah City, prevalence of DPN, based on a combination of neurological symptoms and reduced vibration perception was reported to be 19.9% (7).

A study on diabetic patients in the US and Europe reported that prevalence of DPN ranged from 6% to 51%, based on the population studied (16). In India, prevalence of DPN was reported to be 47%, and it was associated with a longer duration of diabetes (17).

These wide variations in prevalence rates of DPN reported by different studies may be explained by assessment of DPN prevalence depends on several factors, such as type of diabetes, study population, criteria for case definition, glycemic control and duration of diabetes. Ziegler et al. (18) noted that prevalence of DPN can be reduced by provision of high health care and strictly controlling blood sugar.

Wang et al. (7) reported that prevalence of DPN among diabetic patients was associated with their glycemic control, duration of diabetes, and abdominal obesity. Aljohani et al. (15) noted that the risk factors for DPN include high HbA1c, patient's age, and duration of diabetes. Similarly, Akbar et al. reported that factors including poor glycemic control, longer duration of diabetes, smoking, and older age were reported to be risk factors for DPN among Saudi patients with type 2 diabetes (19).

In conclusion, this study revealed that most type 2 diabetic patients in Abha City, Saudi Arabia, have poor knowledge about DPN and its risk factors. Since diabetic patients are at high risk of developing DPN, it is necessary to conduct intensive health education about diabetes and its complications to raise their awareness and improve their knowledge about it. Health education sessions should start at the time of diagnosis to minimize the associated complications among these patients, and to maintain regular clinical assessment to detect DPN. Moreover, family physicians should do annual screening for diabetic patients to manage DPN. In addition, diabetics should be trained to perform self-care for prevention of DPN.

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COVID-19 vaccines receiving, barriers and encouraging factors among chronically ill patients in Al-Qassim region, Saudi Arabia

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Abstract

Objectives: The study aimed to determine the COVID-19 vaccine acceptance, barriers, and encouraging factors among chronically ill patients in the Qassim population, Saudi Arabia.

Method: This cross-sectional study was conducted between July 1, 2021 and March 1, 2022 using a validated and pretested interview-based questionnaire and included adult patients aged ≥ 18 years visiting health care centers. A total of 551 responses were included

Result: In total, 19.2% of participants suffered from one or more chronic diseases. 27.3% were infected with COVID-19, and 96.2% were vaccinated against COVID-19. The knowledge related to COVID-19 was moderate among our participants (Mean score 12.3 ± 3.0). Participants who were divorced or had higher educational levels had significantly higher knowledge scores (p=0.038, p=0.027). The most strongly agreed-upon barrier factors that increase vaccine receiving hesitancy are concerns about its safety and adverse events. The fear of spreading the sickness to their family was the most common motivator, followed by the lack of adequate vaccination information. Participants who had received the COVID-19 immunization had a substantially higher attitude score (p = 0.005). When compared to non-chronically ill participants, chronically ill patients' knowledge and attitude toward vaccination exhibited no statistically significant changes.

Conclusion: This research gives an early look at Saudi people's understanding and views concerning COVID-19 vaccinations. The participants mostly report their concerns about vaccination safety and potential adverse effects as a valid explanation for their reluctance to receive the immunization. These findings might help health officials prevent future drops in vaccination rates by increasing public awareness.

Key words: COVID-19 vaccines, vaccinations barriers, chronic ill patients, Qassim, Saudi Arabia

Introduction

The seventh human coronavirus COVID-19, was discovered in Wuhan, Hubei Province, China, during the recent pneumonia epidemic in January 2020. Since then, the virus rapidly spread throughout the world, infecting 4,806,299 people and killing 318,599 people as of May 20, 2020 [1]. COVID-19 vaccines have an important role in the protection against this pandemic. They will reduce the risk of developing the illness and its consequences. Hence, it will decrease the spread of the disease [2]. Chronic disease is an umbrella term that includes any condition that lasts 1 year or more and requires ongoing medical attention or limits activities of daily living or both. Heart disease, stroke, cancer, and diabetes are examples of chronic diseases [3]. The combination of a chronic disease and a severe infection like COVID-19 is a tough challenge to doctors since those patients with underlying chronic diseases are more likely to develop serious complications [4]. A meta-analysis study that enrolled 1,558 samples from 6 retrospective studies shows that patients with chronic diseases had a higher risk of exacerbation [5]. Moreover; Saudi Arabia (SA) is one of the leading countries with increased prevalence of chronically ill patients [6]. 25% of the population suffers from hypertension and one third of adults has either diabetes or suffers from obesity [7,8]. According to a recent study carried in Al-Qassim, the majority of the Saudi elderly have one or more chronic diseases [9]. Studies showed patients with diabetes, hypertension and obesity are prone to severe illness [10]. Also, they are more likely to need hospitalization, intensive care, and mechanical ventilation if they develop COVID-19, compared with normal patients, and have a higher case fatality rate and increase the chance of in-hospital COVID-19 related death [11]. Moreover; obese patients who develop COVID-19 are also at higher risk for venous thromboembolism and dialysis [12,13]. Studies also showed that uncontrolled asthma patients on oral corticosteroids or in three different classes of medications are at increased risk of hospitalization, intensive care admission, and death from COVID- 19 [14,15].

All of these studies and evidence indicates an urgent and continued need to mitigate COVID-19 infection risk in patients with chronic disease [16]. Taking the COVID-19 vaccines has many barriers. One of them is the lack of knowledge about the virus risk and complications. Another important barrier is the confidence which denotes trust in vaccination safety, effectiveness, and competence of Saudi healthcare systems along with the availability, affordability, and delivery of vaccines in a comfortable environment [17]. People having concern about the country where the vaccine is manufactured, the safety, the anti-vaccine movements, and the belief of rushed vaccine trials, along with the conspiracy theory rumours and the misinformation, are all important COVID-19 vaccination barriers [18]. A recent study outlined that COVID-19 vaccination hesitancy is a global issue, furthermore SA is expected to face higher hesitancy towards COVID-19 vaccinations as a consequence of a previous seasonal influenza vaccination on program hesitancy [19-21]. The hesitancy poses dangers for the success of COVID-19 vaccine [22]. Although there are current studies that have been carried out in SA that address the barriers, concerns, and encouraging factors of the public towards the vaccine, there is significant negligence towards chronically ill patients. There is a paucity of studies carried out in SA to assess the willingness of chronically ill patients towards obtaining the vaccine against COVID-19 in conjunction with the barriers and encouragement. This study investigated our populations' perspectives about COVID-19 immunization acceptability, hurdles, and encouraging factors among chronically ill patients in Qassim, SA.

Method

Study Design and Setting

This study is an observational convenient cross-sectional study that was conducted between (1 July 2021 - 1 March 2022) to explore the COVID-29 vaccines acceptance and determine itsbarriers and motivation factors. Ethical approval was taken from the Regional Research and Ethics Committee of Qassim province (IRB# 1443-276192).

Participant Recruitment and Consent

Participants who were above 18 years old with no gender discrimination and who visited health care centers in the Al-Qassim region of SA during data collection were invited to participate after taking consent from them.

Instrument

A pretested interview-based questionnaire was used to collect the data from the participants. There were two language versions of the questionnaire (Arabic and English), and participants were given the choice of selecting one of the versions of the questionnaire. Two experts proficient in both languages performed a back translation validation process. The reliability of the questionnaire was checked using Cronbach's alpha and interclass correlation coefficient. The questionnaire had three sections, Section A had a statement of anonymity and confidentiality explaining the purpose and benefits of the study. It also recorded the participants' sociodemographic characteristics (age, gender, marital status, educational qualification, occupation, monthly salary, whether diagnosed with chronic disease or not, infected with COVID-19, vaccination status and having hypersensitivity). Section B was about knowledge which contained 7 items with a total of 20 possible responses. These items are transmission method, recommended isolation period, symptoms of COVID-19, most susceptible group, vaccination approved in Saudi, doses need for vaccination and COVID-19 causes mortality and the C section enquired about attitudes regarding COVID-19 vaccine barriers and motivation factors.

Study Sample

Sample size of more than 384 subjects was planned to be collected. Sample size calculation on descriptive study was done using EpiInfoTM.

Data analysis plan:
The data collected from the survey were downloaded and transferred to a Microsoft Excel sheet, and data cleaning was done before statistical analysis. IBM Statistical Package for Social Sciences, Version 23 (SPSS Inc., Chicago, IL, USA) was used for Statistical analysis. Categorical data were presented using appropriate tables and figures, with frequencies and percentages. A normality test was performed for all the continuous variables before choosing the appropriate test of significance. Continuous variables that showed normality were compared between categorical variables using Student's 't-test' and/or Analysis of variance (ANOVA), whereas Mann-Whitney U and /or the Kruskal-Wallis H were utilized for those that didn't show normality. Correlation of the continuous variables was done using Pearson correlation coefficient (r). A p-value less than 0.05 was considered statistically significant.

Results

Our survey received a total of 689 responses, where only 551 were included that satisfied the eligibility criteria (participants residing in Al-Qassim province only). The baseline characteristics showed that 38.5% belonged to the age group of 18-25 years, 55.4% were females, 51% were married, 68.6% had a graduate level of education, 41.9% were employed, 50.6% had salaries less than 5000 Saudi Riyals per month, 19.2% suffered from one or more chronic disease(s), 27.3% had been infected with COVID-19, and 96.2% were vaccinated against COVID-19 [Table 1].

Out of 551, only 516 answered the questions related to the COVID-19 vaccine. The responses of the knowledge items are given in Table 2. The total knowledge score was calculated by adding the scores of correct responses for each item. The total maximum score for each participant was 20. The analysis showed that the mean knowledge score was 12.3 ± 3.0. The comparison of knowledge scores was made for each of the sociodemographic characteristics is given in Table 3. There were no statistically significant differences observed for knowledge scores between the two genders (p=0.484). The scores were comparatively lesser in participants aged >55 years (p=0.041). Participants who were divorced showed significantly higher knowledge scores than others (p=0.038). Participants who had educational levels at the graduate and post-graduate level had significantly higher knowledge scores than those with lower qualifications (p=0.027) [Table 3].

The participants were asked about the barriers and motivating factors for taking the COVID-19 vaccine and were recorded using a 5-point Likert scale. The analysis of barriers to vaccinating against COVID-19 showed that "Covid-19 is global conspiracy to reduce the population" was the most commonly strongly disagreed statement, which was followed by "Covid-19 is a hoax". Whereas the most strongly agreed factor was "Covid vaccine is generally not safe" followed by "Covid vaccine causes symptoms or side effects" [Figure 1].

The most strongly agreed motivating factor was 'fear of transmitting the infection to my family, especially my parents,' followed by 'take vaccine only if given enough information about it.' And the most strongly disagreed statement was "Receive the vaccine if it is available for free," followed by "Receive the vaccine only if taken by the majority of the population" [Figure 2].

The scores for both barriers and motivators were added based on the responses given, which were then used to assess the total attitude towards COVID-19 vaccination. A higher score showed a positive attitude and a lower score negative attitude. Thus the maximum score one participant could obtain was 75 and the minimum 15. The analysis showed that males had significantly higher scores than females (p=0.027). No statistically significant differences in attitude scores were observed for age, education, monthly income, employment, those infected with COVID-19, those who developed hypersensitivity reaction after vaccination, and those who had chronic disease(s). The attitude score was found to be significantly higher in participants who had taken the COVID-19 vaccine (p=0.005) [Table 4].

There were 106 participants with one or more chronic illnesses; the majority of them (83.9%) were younger than 45-years. Fifty-nine (55.6%) of them were female and 47(44.3%) were male. Subgroup analysis showed no statistically significant difference in regard to knowledge and attitude in comparison to non-chronic disease participants.

Table 1: baseline characteristics

		Frequency	Percent
Age in years	18-25	212	38.5
	26-35	110	20.0
	36-45	112	20.3
	46-55	85	15.4
	>55	32	5.8
Gender	Male	246	44.6
	Female	305	55.4
Marital status	Single	250	45.4
	Married	281	51.0
	Divorced	8	1.5
	Widow	12	2.2
Education	Primary	9	1.6
	Middle	24	4.4
	Secondary	121	22.0
	Graduate	378	68.6
	Post-graduate	19	3.4
Occupation	Employed	231	41.9
	Retired	49	8.9
	Student	165	29.9
	Unemployed or Housewife	106	19.2
Salary	<5000	279	50.6
	5000 - 9999	94	17.1
	10000-14999	111	20.1
	15000 - 20000	45	8.2
	>20000	22	4.0
Infected with COVID-19	Yes	151	27.4
	No	371	67.3
	Not sure	29	5.3
Vaccinated	No	21	3.8
	Yes	530	96.2
Hypersensitivity	No	512	92.9
	Yes	39	7.1
Chronic disease	No	35	6.4
	Yes	516	93.6

Table 2: Knowledge related responses to COVID-19 and vaccine among chronical ill patients (n=516)

		N	%
Transmission method	By touching surfaces contaminated with the virus	396	71.9
	Through contact with animals	13	2.4
	Through droplets while talking or coughing	344	62.4
	Blood transfusion	18	3.2
	I don't know	92	16.7
Recommended isolation period for COVID-19 infected people	1-2 days	1	.2
	1-5 days	10	1.9
	1-10 days	386	74.8
	1-20 days	105	20.3
	I don't know	14	2.7
Symptoms of COVID-19	Dry cough	331	60.1
	Body weakness	318	57.7
	Diarrhea	155	28.1
	Nausea/vomiting	159	28.9
	Loss of sense of smell and taste	442	80.2
	Shortness of breath	426	77.3
	Headache	378	68.6
	Nerve inflammation	20	3.6
	Urinary tract infection	11	2.0
Most susceptible group	Children	85	15.4
	Old age	438	79.5
	Those with chronic diseases	353	64.1
	Pregnant woman	86	15.6
	Youth	86	15.6
Vaccines approved in Saudi Arabia	Pfizer-BioNTech	497	90.2
	AstraZeneca Oxford	434	78.8
	Moderna	286	51.9
	Johnson and Johnson	47	8.5
	Sputnik V	50	9.1
	Novavax	7	1.3
	Sinopharm	9	1.6
Doses need for vaccination	One dose	10	1.8
	Two doses	466	84.6
	Three doses	53	9.6
COVID-19 causes mortality	I don't know	69	13.4
	No	42	8.1
	Yes	405	78.5

Table 3: Comparison of Knowledge based different sociodemographic characteristics

		N	Mean	Std. Deviation	P value
Gender	Male	229	12.1747	2.99782	0.484
	Female	287	12.3624	3.04415	
Age (years)	18-25	201	12.3731	2.90260	0.041*
	26-35	103	12.6505	2.96618	
	36-45	104	12.3654	3.28591	
	46-55	78	12.0128	2.86716	
	>55	30	10.7667	3.13691	
Marital status	Single	235	12.2213	2.95442	0.038*
	Married	266	12.3195	3.06892	
	Divorced	7	14.8571	2.41030	
	Widowed	8	10.3750	2.77424	
Educational level	Primary	9	10.3333	3.67423	0.027*
	Middle	20	11.8000	3.48833	
	Secondary	116	11.7672	3.05702	
	Graduate	355	12.4761	2.95567	
	Post-graduate	16	13.3125	2.54869	
Employment	Employed	216	12.4028	3.14011	0.359
	Retired	47	11.8723	2.68342	
	Student	157	12.4586	2.80908	
	Unemployed or Housewife	96	11.9063	3.23168	
Monthly income (SAR)	<5000	260	12.3308	3.01320	0.060
	5000 - 9999	89	11.2921	3.10499	
	10000-14999	106	12.6792	2.61697	
	15000 - 20000	42	12.8333	3.24538	
	>20000	19	12.7368	3.58767	

* Significant at p value lower than 0.05

Table 4: Comparison of attitudes towards COVID-19 vaccination

		Mean Rank	P value
Gender	Male	274.78	0.027*
	Female	245.51	
Age	18-25	279.46	0.114
	26-35	242.24	
	36-45	255.45	
	46-55	241.22	
	>55	229.42	
Education	Primary	221.56	0.585
	Middle	279.75	
	Secondary	250.57	
	Graduate	258.74	
	Post-graduate	304.91	
Monthly income (SAR)	<5000	268.71	0.327
	5000 - 9999	246.54	
	10000-14999	246.29	
	15000 - 20000	272.08	
	>20000	212.84	
Employment	Employed	249.52	0.082
	Retired	238.23	
	Student	283.76	
	Unemployed or Housewife	247.32	
Infected with COVID-19	No	258.83	0.935
	Yes	257.61	
Taken COVID-19 Vaccine	No	165.83	0.005*
	Yes	262.24	
Developed Hypersensitivity reaction after vaccination	No	259.42	0.112
	Yes	140.50	
Chronic disease	No	260.16	0.619
	Yes	252.09	

* Significant at p value lower than 0.05.

Figure 1: The barriers reported by the participants against COVID-19 vaccination

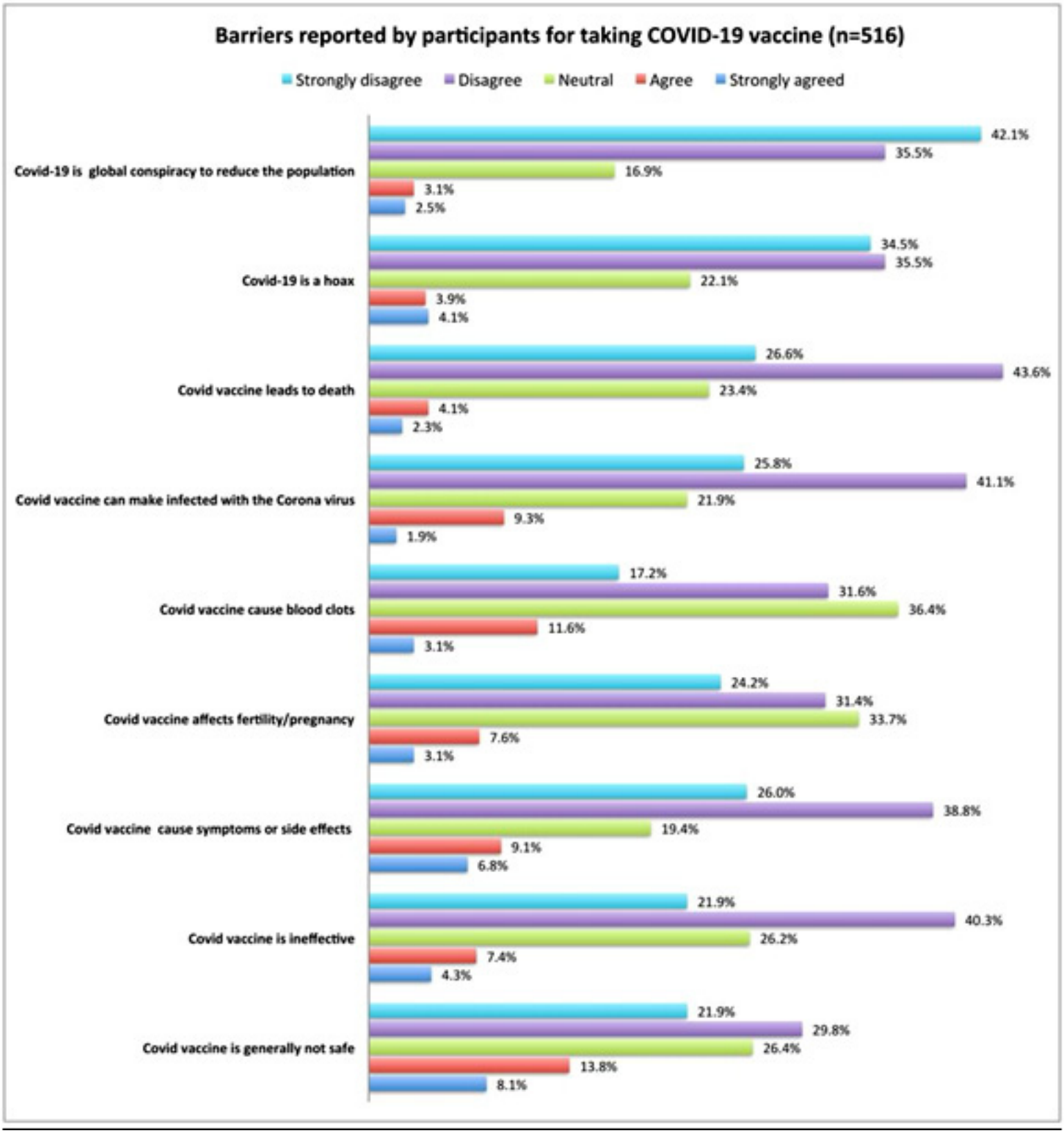
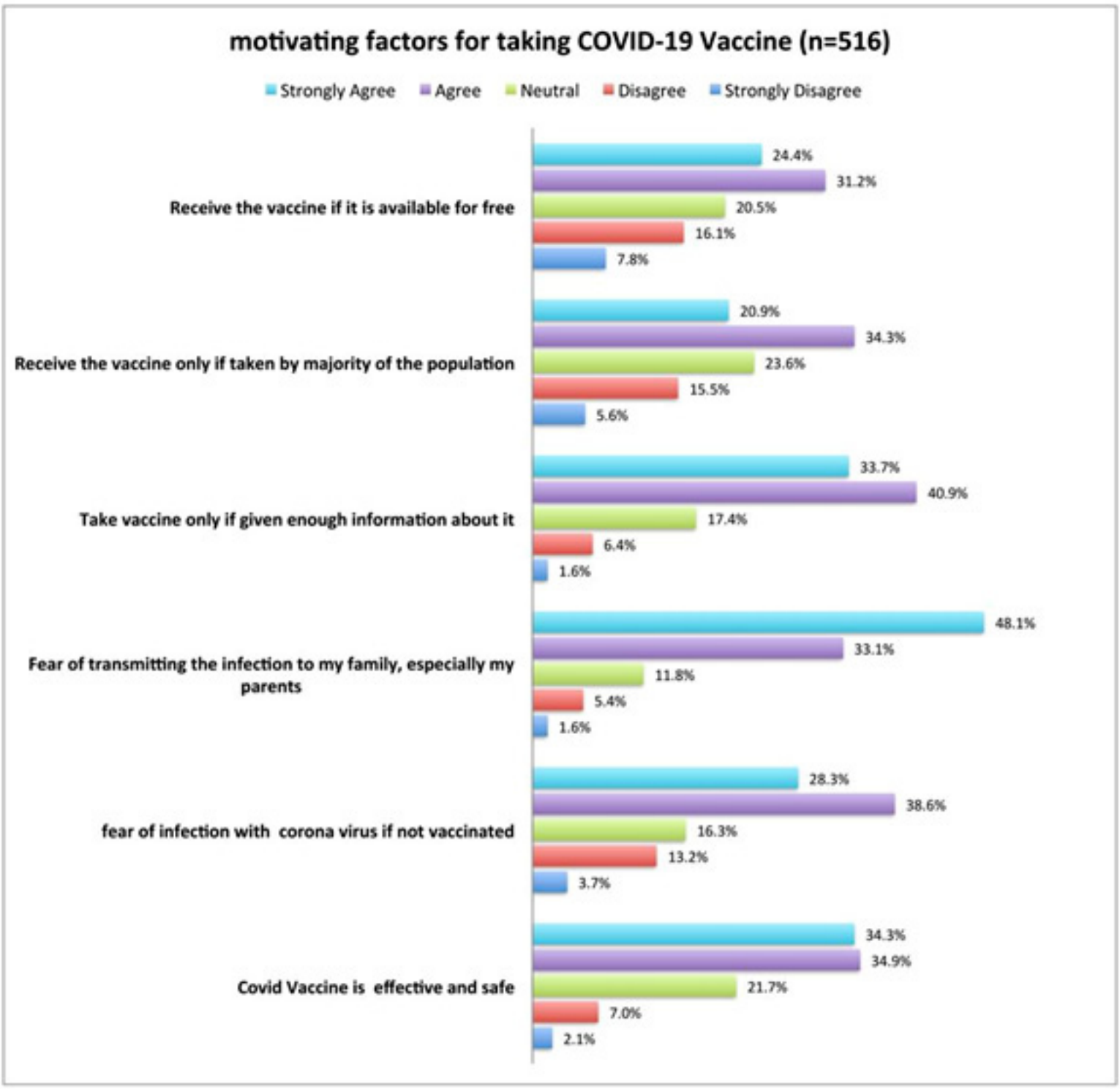


Figure 2: The motivation factors reported by the participants toward COVID-19 vaccination



Discussion

The findings of our survey showed that the knowledge related to COVID-19 was moderate among our participants, where more than three-quarters of them were aware of the correct transmission possibilities, recommended isolation period for COVID-19, symptoms related to it, most susceptible group, and types of COVID-19 vaccines approved in SA. It is reported that public confidence and trust would become lower if there was uncertainty around the new vaccine developing an infectious disease [23]. In SA, a number of vaccines are approved for its residents and citizens, which include Moderna, Pfizer/BioNTech, Janssen (Johnson & Johnson), and Oxford/AstraZeneca [24]. More than nine vaccines, including the four above, are approved by individuals coming from outside SA [25]. According to the recommendation from the Ministry of Health (MOH), all the vaccines need to be taken in two doses except for Janssen (Johnson & Johnson), which is a single-dose vaccine [25]. In our study the majority of the participants were aware of the minimum doses required for the vaccines. Participants with higher educational qualifications had comparatively good knowledge about COVID-19 vaccines than those who had lower qualifications. According to research, people who are well-educated on vaccines have a better understanding of the role of the vaccine in protecting them from various illnesses [26,27].

Vaccine hesitancy is the next hurdle to overcome as more effective and safe vaccines become accessible. The reluctance or refusal to vaccinate despite the availability of vaccines is considered one of the biggest public health threats. There are several factors that contribute to a person's willingness to be vaccinated, and each has a significant impact [28,29]. The effectiveness of the COVID-19 vaccine in eradicating the disease depends on scientific evidence on the vaccine's safety and social obligation to be vaccinated. Vaccination acceptance is influenced by a variety of factors, including the perceived safety of the vaccine, the perceived efficacy, the perceived hazards, and the quick development of the vaccine [28,30]. The current study findings showed that the two common barriers identified by participants were vaccine safety and side effects from it. Two commonly reported motivating factors were fear of the spread of infection to loved ones at home and being ready for a vaccine if sufficient information is given regarding its safety and effectiveness. Public confidence in vaccines is related to people's information in public health and government [31]. Thus, vaccination acceptance is critically reliant on government and healthcare professionals' assurances, especially in areas with high fear about the disease's nature. Claims of vaccine harm spread fast and wide due to the explosion of health information on the Internet and social media [32,33]. Studies show that accessibility, cost, and time are also reported as barriers relating to the inconvenience of vaccinating, which have a negative impact on vaccination uptake [34,35]. However, in our study, these factors were not reported as significant barriers. This could be because the COVID vaccine is free, easily accessible, and delivered in SA. Even though pharmaceutical corporations and governments make vaccines more readily available, individuals will have different opinions about these vaccines [36]. A study done by Al-Mohaithef in SA in 2020, when vaccines were not available, reported that 64.7% showed interest in accepting the COVID-19 vaccine if it is available, where older age groups and people with higher educational qualifications were significantly higher [37].
Several studies cite vaccination effectiveness as the most critical factor when weighing benefits, risks, and costs [38,39]. Rapid developments of COVID-19 vaccines have allegedly aroused worries about their safety and long-term implications, even among medical professionals [40]. In order for immunization programs to be effective, a majority of people must participate. It's possible that some people are "free-riding" on vaccination programs, enabling others to benefit while they themselves remain unvaccinated in order to keep disease at a tolerable range. In our study, males had a comparatively more positive attitude towards COVID-19 vaccination than females. There were no differences observed in attitude between participants who had chronic disease(s). A study done by Ssentongo et al. showed that individuals with existing chronic diseases have significantly lower acceptance rates than those who are healthy [41].

In order to better comprehend the vaccination and clear up any ambiguities or misinformation, it is necessary to hold regular educational sessions. It's ideal if health education is comprehensive, bilingual, and accessible to the general population. No matter where they live or how technologically ignorant, they are, all residents should be able to hear the critical messages. Additional, to web-based and application-based instructional tools, printed materials, face-to-face public presentations may be beneficial to some segments of the population. Public discussions with religious organizations can be held in places of worship by health professionals and experts.

Study Limitations

One of the study limitations was convenience sampling using social media sites, and the results may not accurately reflect the general population. However, our data shows that there were not many differences observed in age group distribution. Another limitation of this study is that vaccinating factors were measured by self-reported assessment rather than objective measurement, leading to social desirability bias.

Conclusion

This study provides early insight into the Saudi populations' knowledge and attitudes towards COVID-19 vaccines. Knowledge about COVID-19 vaccines was moderately good among the participants. Some of the barriers identified in many previous studies conducted before the vaccination campaigns or at the early times of vaccine administration were not found as a significant barrier as vaccinating in our study. These findings could help the MOH plan for future attempts to get more people to get vaccines, leading to herd immunity against COVID-19 and its variants.

List of Abbreviations:
SA: Saudi Arabia
ANOVA: Analysis of variance
MOH: Ministry of Health
AMN: Alrashdi Mousa N
ASM: Alrasheedi SM
AA: Ahmad Alkhdairi
AAA: Ahmed Alanoud A
AME: Almutairi Muteb E
AMA: Aldehami Maryam A
AKO: Almutairi Khalid O
ARA: Albahli Rand A
ASA: Alharbi sultan A

Ethical approval:
Permission from Regional Research and Ethics Committee of Qassim province was also obtained (IRB# 1443-276192).

Consent to Participate
Informed consent was obtained from participants at the start of the questionnaire.

Data Availability
The deidentifed data underlying the results presented in this study may be made available upon request from the corresponding author Dr. Alrashdi Mousa N, at Mosa4444@hotmail.com . The data are not publicly available in accordance with participant privacy.

Code Availability
Analysis was conducted using IBM Statistical Package for Social Sciences, Version 23 (SPSS Inc., Chicago, IL, USA).

Conflict of Interest
All authors have no conflict of interest to declare.

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Author Contribution
Conceptualization: AMN, AAA. Data curation: AMN. Funding acquisition: None. Methodology: AMN, ASM, AA, AAA, AME, AMA, AKO, ARA, ASA. Writing – original draft: AMN, ASM, AA, AAA, AME, AMA. Writing – review & editing: AMN, ASM, AA, AAA, AME, AMA, AKO, ARA, ASA. All authors read and approved the final manuscript.

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The level of competency of emergency residents to interpret the electrocardiogram in Riyadh regions, Saudi Arabia: A cross-sectional study

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Abstract

Introduction: An electrocardiogram (ECG) is a simple test that can be used to assess the rhythm and electrical activity of the heart. Continuous 24-hour ECG monitoring, in addition to the usual 12-lead ECG and 24–48-hour ECG Holter, can detect arrhythmias undetected by 12-lead ECGs and Holters.

Aim: This study aimed to assess the level of competency of emergency room residents to interpret the ECG in the Riyadh region, Saudi Arabia.

Methods: This is a multicenter cross-sectional study conducted among emergency residents in Riyadh, Saudi Arabia. A self-administered questionnaire was sent to the targeted residents of the emergency department using an online survey. The questionnaire includes basic demographic data (i.e., age, gender, hospital, etc.) and a 12-item questionnaire assessing the level of competency using a different scenario. All statistical analyses were carried out using SPSS version 26.

Results: Of the 96 emergency residents involved, 63.5% were aged between 25 and 27 years old. Overall, the level of competency was average among 63.5%; 24% were considered to have high levels, and only 12.5% were considered to have low levels. The mean score of competencies was 7.80 (SD 2.21) out of 12 points. Factors associated with increased competency included working in King Abdulaziz Medical City, having more than 5 years of working experience in emergency care, and attending electrocardiography training courses.

Conclusion: The level of competency among emergency medicine residents in reading electrocardiograms was deemed adequate. Residents who had more years of experience in emergency care and had attended courses and training related to ECG reading tended to increase their competency levels more than the other emergency residents. More research is needed to establish the competency level of emergency residents in our region.

Categories: Cardiology, Emergency Medicine, Internal Medicine

Keywords: Riyadh city, competency, ECG interpretation, emergency residents, electrocardiogram (ECG)

Introduction

An electrocardiogram (ECG) is a fast test to check the heart's electrical activity and rhythm. Continuous 24-hour ECG monitoring, in addition to the standard 12-lead ECG and 24-48-hour ECG Holter, can detect arrhythmias undetected by 12-lead ECGs and Holters. As technology progresses, the quality of ECG monitoring facilities, the size of ECG recorders, and the length of recording time all improve. Continuous ECG recording is now generally available. Patients with known or suspected arrhythmias can now monitor their health with smartwatches and fitness bracelets. The kind and frequency of symptoms are essential factors in determining the type of ECG recording equipment and recording time [1]

Some electrocardiograms are carried in ambulances, emergency rooms, operating rooms, intensive care units, and as part of standard checks for middle-aged and older persons. ECGs are also carried out in the operating room when there has been a possible heart attack, syncope, or abnormal vital signs. Since people over 65 have a higher chance of developing heart disease, medical personnel need to understand ECGs and the significance of early identification of cardiovascular disorders. [2]

In a cross-sectional and comparative descriptive study, Rahimpour and Shahbazi (2021) aimed to compare electrocardiogram (ECG) interpretation competency among emergency nurses and EMS personnel. In this study, 170 participants in northwest Iran, including 105 emergency nurses and 65 EMS personnel, Rahimpour and Shahbazi found that the mean score was 6.65 ± 2.16 out of 10 for emergency nurses and 4.87 ± 1.81 for EMS personnel's ECG interpretation competency ($p < 0.05$) [3].

In another article named Electrocardiogram Interpretation Competency Among Paramedic Students Mobrad (2020) aimed to determine the ECG interpretation competency of paramedic students. The study took place at a single center [Prince Sultan College for Emergency Medical Services (PSCEMS) at King Saud University]. It included all students of PSCEMS, and 137 of 248 paramedic students completed the questionnaire (55% response rate). Mourad found that 88 students (64.2%) scored more than 7.5 points, which means most paramedic students were found to be competent in ECG interpretation, grade point average (GPA) (above 3.5). [4]

There was also c cross sectional study conducted on emergency nurses' competence in electrocardiographic interpretation in Spain. This study aimed to show the current level of competence in electrocardiographic interpretation among nurses in emergency departments. No significant differences between nursing and hospital experiences observed. Nurses who had received training within the previous five years scored significantly higher than those who had not (P = 0.031) [5]

An article published in 2015 entitled Competency in ECG Interpretation Among Medical Students aimed to assess the electrocardiographic interpretation skills of Polish medical students and analyze the determinants of these skills. The overall percentage of correct answers was higher among 4th and 5th year students than among 3rd year students (66% vs 56%; $p < 0.0001$).The ability to interpret ECG was higher among students who reported self-study ECG (69% vs 62%; $p < 0.0001$), but no difference was observed between students who participated and did not participate. As a result, it demonstrates that self-education, rather than regular ECG class attendance, determines ECG interpretation skills [6].

Moreover, a multidisciplinary study in 2022 aimed to assess electrocardiogram interpretation competency among healthcare professionals and students at Ardabil University of Medical Sciences, Iran including 323 staff and students. The results revealed that many participants' ECG interpretation ability was low. Therefore, consistent, regular training and education are advised. Additionally, managers and educators in the healthcare system should consider how experience in ECG interpretation and positive self-assessment might help staff and students become more professional ECG interpreters [7]. A similar study was done in South Africa using a targeted questionnaire, and prospective cross-sectional research of emergency medicine residents and recently graduated emergency physicians and carried out between August 2008 and February 2009. This research discovered that the average ECG interpretation score was 46.4% (95% confidence interval [CI]: 41.5-51.2%). It finds that there was an improvement in interpreting ECGs with higher seniority in this prospective cross-sectional research of Emergency Medicine residents and freshly qualified emergency physicians. [8]

A cross-sectional study published in 2021 entitled Assessment of Electrocardiography Knowledge Among Doctors Working in Emergency Department, on the general practitioners (GPs), emergency residents (ERs), emergency physicians (EPs) and cardiology physicians interpreted a total of 40 ECG samples in non-cardiac pathologies, arrhythmias, conduction disorders, and myocardial infarctions. It found that the general practitioners in emergency departments have insufficient ECG knowledge. During their professional careers in the emergency department, doctors' understanding of ECG should be continually updated with in-service training commencing in medical school. [9]

Lastly, Hamam AH, AlNofaiey YH and AlAlayani AM conducted a study in Saudi Arabia to assess ECG reading skills and knowledge for emergency medicine residents which showed an alarmingly low result compared to other international programs residents, despite the improvement in the interpretation competency observed with clinical experience. Therefore, programs need to implement new methods of teaching ECG reading to improve the resident's proficiency. [10]

Methods

This cross-sectional multicenter study evaluated emergency medicine residents' clinical competence in interpreting electrocardiograms in Riyadh region, Saudi Arabia. It will be conducted from March to May 2022 using an online, self-administered, pre-validated, two-part questionnaire consisting of a professional profile and 12 questions (2 theoretical questions and ten questions on practical cases with an electrocardiographic register [readout]) to be filled out by the participants, who are junior emergency medicine residents in Riyadh. Participants signed informed consent forms and completed the questionnaire after hearing about the study's goals and methodology. All participants were invited to complete the questionnaires in a controlled atmosphere and return them to the researcher to actively supervise their completion and improve the study's accuracy. Inclusion criteria involved any ER junior residents who are currently working. Exclusion criteria applied to any ER junior residents who were not willing to participate in the research. The sampling for this study was non-probability convenience sampling; the reliability of the questionnaire was further evaluated on a subsample using an intraclass correlation coefficient with a 95% confidence interval. The sample size was 96, according to the sample size computation. We check continuous data for normality and comparing means using parametric or nonparametric tests. The Statistical Package for the Social Sciences (SPSS) software analyzed the data. The data will be presented as frequency. In tables, Chi-Square was used to attain a P-Value between categorical data dependent and independent of estimating the association, where a P-Value ≤ 0.05 was considered significant. The data will be kept confidential and only used for the purposes described in the study objectives.

Statistical analysis: The assessment of emergency room residents' competency to interpret the electrocardiogram was assessed using a 12-item questionnaire where the correct answer for each has been identified, marked, and coded with 1, while the incorrect answer was coded with 0. The total competency score was calculated by adding all 12 items. A score range of 1 to 12 points was generated, indicating that the higher the score, the higher the competency to interpret the electrocardiogram. By using 50% and 75% as cutoff points to determine the level of competency, residents were considered to have low competency if the score was below 50%, 50% to 75% was supposed to show average competency, and those above 75% were believed to have high competency levels. Categorical variables were shown as numbers and percentages (%), while continuous variables were summarized as mean and standard deviation. The differences in the score of competencies according to the socio-demographic characteristics of the residents was performed using the Mann-Whitney Z-test and the Kruskal-Wallis H-test. Statistical collinearity was tested using the Shapiro-Wilk test and the Kolmogorov-Smirnov test. Based on the overall distribution, the competency score follows an abnormal distribution. Thus, the nonparametric tests were applied. The cutoff for statistical significance was p 0.05 in two-tailed analyses. All data analyses were performed using the Statistical Package for Social Sciences, version 26 (SPSS, Armonk, NY: IBM Corp., USA).

Discussion

Table 1: Socio-demographic characteristics of emergency residents (n=96)

Study Data	N (%)
Age group	
25 – 27 years	61 (63.5%)
>27 years	35 (36.5%)
Gender	
Male	80 (83.3%)
Female	16 (16.7%)
Hospital	
Prince Mohammed bin Abdulaziz hospital	14 (14.6%)
King Fahad Hospital	24 (25.0%)
Prince Sultan Military Medical City	10 (10.4%)
King Abdullah University hospital	02 (02.1%)
King Abdulaziz Medical City	17 (17.7%)
King Khalid University Hospital	10 (10.4%)
King Saud Medical City	10 (10.4%)
King Faisal Specialist Hospital	09 (09.4%)
Working experience in emergency care	
<1 year	42 (43.8%)
1-5 years	49 (51.0%)
6-10 years	02 (02.1%)
11-20 years	03 (03.1%)
Did you do any training courses in electrocardiography?	
Yes	72 (75.0%)
No	24 (25.0%)
When was the last course? (n=72)	
1 year or less	36 (50.0%)
Between 2-5 years	33 (45.8%)
More than 5 years	03 (04.2%)
How was the course taken? (n=72)	
Online	41 (56.9%)
Face-to-face	22 (30.6%)
Partial face-to-face	09 (12.5%)
How many hours was the course? (n=72)	
Less than 10 hours	56 (77.8%)
10-20 Hours	14 (19.4%)
More than 20 hours	02 (02.8%)

This study involved 96 emergency room residents. Table 1 presents the socio-demographic characteristics of the residents. 63.5% were aged between 25 and 27 years old, with males being dominant (83.3%). Residents who were working at King Fahad Hospital constituted 25%. Regarding work experience in emergency care, 51% reported having 1-5 years of experience. The proportion of residents who attended training courses in electrocardiography was 75%, and half of them (50%) attended the course last year, mostly online (56.9%), in approximately less than 10 hours (77.8%).

Table 2: Assessment of emergency residents' competence to interpret the electrocardiogram (n=96)

Statement	N (%)
What is the correct order of ECG waves and intervals?	
P wave, QRS complex, T wave, PR interval, ST interval, U wave *	78 (81.3%)
T wave, P wave, QRS complex, PR interval, ST interval, U wave	02 (02.1%)
QRS complex, P wave, PR interval, T wave, ST interval, U wave	13 (13.5%)
I do not know	03 (03.1%)
If the p wave does not appear in an ECG, what is your first thought?	
There is a conduction problem between the ventricles	44 (45.8%)
There is a conduction problem between the atriums *	48 (50.0%)
It is normal, it does not have to appear in an ECG	04 (04.2%)
I do not know	0
You perform an ECG and observe this register. What do you think it might be?	
A third-degree heart block	01 (01.0%)
An atrial flutter *	87 (90.6%)
A supra-ventricular tachycardia	07 (07.3%)
I do not know	01 (01.0%)
You perform an ECG and observe this register. How would you act?	
Ask for help without leaving the patient alone because it is ventricular fibrillation *	74 (77.1%)
Ask for help without leaving the patient alone because it is an atrial fibrillation	19 (19.8%)
Perform another ECG because it looks like there may be interference	02 (02.1%)
You do not know how to act but you know it must be a serious problem	01 (01.0%)
A patient comes to the Emergency Department due to respiratory distress. He has 140 beats per minute. You perform an ECG and observe the following:	
It is atrial tachycardia	13 (13.5%)
It is atrial fibrillation *	51 (53.1%)
It is atrial extra-systole	30 (31.3%)
I do not know	02 (02.1%)
A patient comes to the Emergency Department with precordial pain for more than 8 hours. You perform a 12-branch ECG. After observing the ECG, what catches your attention?	
You can see pathological pauses	09 (09.4%)
You can see pathological Q waves *	61 (63.5%)
The patient has a low cardiac rhythm	19 (19.8%)
I do not know	07 (07.3%)
What pathology do you think the patient with this ECG has?	
A first-degree heart block	29 (30.2%)
He does not have any pathology	06 (06.3%)
A third-degree heart block *	56 (58.3%)
I do not know	05 (05.2%)
A hospitalized patient who had surgery due to an AMI is transferred to the emergency department to be monitored because his vital signs are unstable. You perform an ECG and observe the following:	
The patient presents with ventricular tachycardia *	77 (80.2%)
The patient presents a supra-ventricular tachycardia	18 (18.8%)
The patient presents an atrial tachycardia	0
I do not know	01(01.0%)

Table 2: Assessment of emergency residents' competence to interpret the electrocardiogram (n=96) - continued

Statement	N (%)
You are in triage and call a patient who reports medium-intensity precordial pain. He tells you that the pain appeared after leaving an important meeting two hours ago. He is 52 years old and hypertensive, and a few months ago he was diagnosed with Diabetes Mellitus II. You perform a 12-branch ECG and observe the following:	
It is a supra-ventricular tachycardia	04 (04.2%)
It is an acute myocardial infarction *	44 (45.8%)
It is an acute myocardial infarction with a pathological Q wave	47 (49.0%)
I do not know	01 (01.0%)
A 24-year-old male comes to the emergency department. He is athletic and slim. He reports feeling a pricking sensation in the left area of his chest since he finished doing exercise (3 hours earlier). You perform an ECG and observe the following:	
It is an atrial bradycardia	31 (32.3%)
He has conduction problems	23 (24.0%)
It is a normal ECG *	41 (42.7%)
I do not know	01 (01.0%)
A patient with digital intoxication comes from a hospitalization ward. Before monitoring him, you perform an ECG and obtain the following:	
You observe an atrial extra-systole	03 (03.1%)
You observe a ventricular extra-systole *	69 (71.9%)
You observe that he is carrying a pacemaker	11 (11.5%)
I do not know	13 (13.5%)
A 30-year-old woman comes to the emergency department reporting palpitations, chest tightness, and dyspnea. You perform an ECG and observe the following:	
It is a ventricular tachycardia	07 (07.3%)
It is an atrial extra-systole	19 (19.8%)
It is an atrial tachycardia *	63 (65.6%)
I do not know.	07 (07.3%)
Competence score (mean± SD)	7.80 ± 2.21
Level of competency	
Low	12 (12.5%)
Average	61 (63.5%)
High	23 (24.0%)

In Table 2, residents were confident to identify the P wave, QRS complex, T-wave, PR interval, ST interval, and U wave (81.3%). Half of them (50%) were aware that if the p wave does not appear, there is a conduction problem between the atriums. Nearly all (90.6%) were confident in their ability to distinguish an atrial flutter, and (77.1%) knew what to do in the case of ventricular fibrillation. More than half (53.1%) were confident in their ability to detect atrial fibrillation in a patient who had respiratory distress, while nearly two-thirds (63.5%) knew how to read pathological Q waves in patients with precordial pain for more than 8 hours. Approximately (58.3%) indicated that they are adept at reading a third-degree heart block in an ECG, while a great proportion (80.2%) expressed that they knew how to read ventricular tachycardia in patients who had an incidence of AMI. However, only (45.8%) of respondents knew how to read an acute myocardial infarction in a patient with medium-intensity precordial pain, and a similar proportion (42.7%) knew how to read a normal ECG in a patient who reported a feeling of pricking in the left area of his chest. Regarding a patient with digitalis intoxication, (71.9%) showed confidence in reading the ECG, which is related to ventricular extra-systole. Finally, approximately two-thirds (65.6%) knew how to read a case of palpitations, chest, tightness, and dyspnea, which is atrial tachycardia. Based on the above statements, the overall competency score was 7.80 (SD 2.21), with low, average, and high competency levels found among 12.5%, 63.5%, and 24%, respectively.

Table 3: Differences in the score of competencies in relation to the Socio-demographic characteristics of emergency residents (n=96)

Factor	Competency Score (12) Mean ± SD	Z/H-test	P-value
Age group			
25 – 27 years	7.85 ± 1.95	Z=0.471	0.638
>27 years	7.71 ± 2.63		
Gender			
Male	7.87 ± 2.31	Z=0.512	0.608
Female	7.44 ± 1.63		
Hospital			
Prince Mohammed bin Abdulaziz hospital	6.07 ± 2.02	H=33.008	<0.001 **
King Fahad Hospital	7.04 ± 0.20		
Prince Sultan Military Medical City	9.10 ± 2.47		
King Abdullah University hospital	6.50 ± 0.71		
King Abdulaziz Medical City	9.41 ± 1.80		
King Khalid University Hospital	7.30 ± 2.16		
King Saud Medical City	8.30 ± 1.64		
King Faisal Specialist hospital	8.33 ± 3.67		
Work experience in emergency care			
<1 year	7.14 ± 2.03	H=10.663	0.005 **
1-5 years	8.16 ± 2.08		
>5 years	9.80 ± 3.27		
Did you do any training courses in electrocardiography?			
Yes	7.37 ± 2.09	Z=3.579	<0.001 **
No	9.08 ± 2.06		

a. P-value has been calculated using Mann Whitney Z-test.
b. P-value has been calculated using Kruskal Wallis H-test.
** Significant at p

When measuring the differences in the score of competency in relation to the socio-demographic characteristics of the residents (Table 3), it was observed that a higher competency score was more associated with residents working in King Abdulaziz Medical City (H=33.008; p<0.001).

Discussion

This study investigated the level of competency in reading ECGs among emergency medicine residents in Riyadh, Saudi Arabia. The findings of this study showed that there was a sufficient level of competency in reading ECG results among our residents working in the emergency department. Nearly two-thirds (63.5%) were categorized as average levels, 24% were high, and only 12.5% were categorized as low levels of competency (mean score: 7.80; SD 2.21, out of 12 points). These findings are consistent among paramedic students in Riyadh [4]. According to reports, 64.2% of the students were found to be competent in ECG interpretation. This is in line with the study conducted in Spain [5], wherein a high level of electrocardiographic knowledge was seen among emergency nurses. However, several papers reported insufficient competency levels, whether they were healthcare professionals and students [7], emergency residents [8], emergency doctors [9], or internal medicine and emergency medicine residents [10]. However, in a prospective cross-sectional study done in South Africa [9], they found that although there was an improvement in the interpretation of ECGs with increased seniority, but still, a low level of accuracy exists for many of the critical ECG diagnoses. The mean score of 46.4% reported in the study was lower than other international studies from other regions where emergency medicine is a well-established specialty. A lack of knowledge about ECG interpretation is detrimental to a patient with a cardiac condition. Hence, continuous education is necessary to update their knowledge about ECG reading. The data in this study suggests that increasing years of experience are associated with increasing competency levels. Also, we found that the name of the hospital-specifically, those working in King Abdulaziz Hospital showed a significantly higher score in competency than residents working in other hospitals. These findings are almost consistent with the study of Amini et al. [7]. According to their reports, they estimated that variables such as education level, self-assessment of electrocardiogram interpretation competence, work experience, and type of hospital were able to predict the competence of ECG interpretation. However, age and gender had no significant influence on competency levels in our study. This is in contrast with the study of Rahimpour et al. [3], wherein female nurses working in the emergency unit showed higher ECG interpretation competency than male nurses (p = .042). However, they mentioned that the type of hospital participants worked in was an important factor in predicting a high competency score, which was also seen in our results. Moreover, we have learned that most of our residents attended ECG courses (75%), with half of them attending in the current year (59%), mostly online (56.9%), and for less than 10 hours (77.8%). Furthermore, attendance at ECG courses was estimated to be one of the most important predictors of increased competency levels. The impact of participating in ECG-related courses on increased competency levels in reading ECG results has been proven in the literature, specifically among healthcare practitioners or paramedic students [3,5]. On the contrary, Mobrad et al. [4], revealed that there was no significant difference in the number of points earned in regard to the time since the last course was attended, the mode of the course delivery (in-class vs. online), or the length of the course. The importance of education about ECG interpretation is vital among emergency personnel. Thus, higher authorities should encourage their staff to attend ECG-related courses to strengthen their competency levels and provide the best quality of care. Concerning the specific assessment of emergency residents' competency in reading ECG through various scenarios, we found that only two out of twelve scenarios resulted in residents scoring poorly on the correct answers, namely ECG interpretation after performing 12-branch ECG on a 52-year-old patient with hypertension and type 2 diabetes (45.8%) and reading ECG on a healthy person with pricking sensation in the left area of his chest after doing exercise (42.7%) while on the other hand, most of our emergency residents exhibited adequate competency levels among the rest of the scenarios (10 out of 12 scenarios) as they were able to correctly identify the correct answers such as determining an atrial flutter (90.6%), interpretation of ECG waves and intervals (81.3%), determining ventricular tachycardia on a patient with AMI (80.2%), action to be taken in case of ventricular fibrillation (77.1%), determining a ventricular extrasystole n patient with digitalis intoxication (71.9%), determining atrial tachycardia in patient reporting palpitations, chest tightness and dyspnea (65.6%), determining pathological Q waves after performing a 12-branch ECG (63.5%), determining a third-degree heart block (58.3%), determining atrial fibrillation on a patient with respiratory distress (53.1%), and determining conduction problem between atriums (50%). The competency levels of our residents fared better than those of Iranian healthcare professionals and students [7]. Based on the reports, a considerable number of participants couldn't determine normal sinus rhythm (77.3%), acute myocardial infarction (63.8%), or pathological Q waves (62.2%). Citing low competency levels, the author suggested training and education among their healthcare professionals as well as future ones. Another study carried out among American internal medicine and emergency medicine residents [10], indicated that internal medicine residents who had expressed interest in a cardiology career scored higher than those who did not (17.3 vs. 14.1, p=0.003). When interpreting the most critical diagnoses, they found that the mean score for ventricular tachycardia was 1.6 of 2.0, for myocardial infarction was 1.3 out of 2.0, and for complete heart block was 0.8 9 of 16 out of 2.0, adding that more than half felt their electrocardiogram training was insufficient, which necessitates more education.

Limitations: The generalization of this study was subjected to some limitations. First, our sample size was small (n=96). It could be interesting to see a bigger sample that could generate better results, which could provide a clearer view of the competency level of the emergency medicine residents regarding ECG interpretations. We cannot generalize the comparison of competency levels between male and female residents because data on gender distribution was not collected equally. Furthermore, being cross-sectional by nature has drawbacks such as cause-and-effect relationships and bias.

Conclusion

The level of competency among emergency medicine residents in reading electrocardiograms was deemed adequate. Residents who had more years of experience in emergency care and who had attended courses and training related to ECG reading tended to increase their competency levels more than the other emergency residents. The accuracy with which ECG results are read is vital in determining the cause of the cardiac condition. Thus, residents working in emergency medical services should and must have a certain level of confidence to accurately diagnose both symptomatic and asymptomatic patients with possible cardiac conditions. More research is needed to establish the competency level of emergency residents in our region.

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Quality of life among otolaryngology and head and neck surgery residents in Saudi Arabia: A cross-sectional study

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Abstract

Introduction: The surgical residency training programs have the nature of long work hours and a stressful environment that might lead to disturbances in the quality of life of the residents. Surgical residents' performance might be affected by the poor quality of life.

This study aimed to assess the quality of life of otolaryngology and head and neck surgery residents, in Saudi Arabia.
Subjects and methods

This is a cross-sectional study conducted among otolaryngology and head and neck surgery residents in Saudi Arabia. A self-administered questionnaire was distributed among the targeted residents. The questionnaire is primarily composed of the socio-demographic data and the work-related quality of life (WRQoL) questionnaire. The WRQoL was composed of 6 domains as General Well-Being (GWB), Home-Work Interface (HWI), Job and Career Satisfaction (JCS), Control at Work (CAW), Working Conditions Satisfaction (WCS), and Stress at Work (SAW).

Results: The overall work-related quality of life was good among 43.6% of the residents. Among its domains, WCS showed better results with a 55.3% high level while SAW was the least (25.5%). Older age group (≥30 years) were observed to have a significantly higher mean score in JCS (p=0.040), CAW (p=0.002) and WRQoL (p=0.027). Smoking residents showed a higher mean score in JCS (p=0.023) and HWI (p=0.001). It is interesting to note that increasing residency levels were more associated with increasing CAW scores (p=0.003).

Conclusion: The work-related quality of life among otolaryngology, head and neck surgical residents was adequate. Older residents demonstrated a better quality of life than younger residents.

ACGME competencies: Medical knowledge, Patient care, Interpersonal skills communication.

Keywords: Quality of life, WRQoL, otolaryngology, head and neck surgery, residents

Introduction

The life of a physician and especially surgeons has to be balanced between social life and work-related duties. If this balance is unstable and disorganized this may have a negative effect on the healthcare system and patient care. Surgical residency training has the nature of long work hours due to the demand of this field and the stressful environment that the resident has may damage the quality of life of the surgeons. Nevertheless, the workload is different based on the specialty and personal level of professionalism of the surgeon [1].

A review was made in 2016, suggesting that challenges and high risks of surgery are associated with a stressful environment; Furthermore, satisfaction and performance are related to this matter [2]. The close relatives of the surgeon may get involved in the stress and burnout, and it is due to the long working hours, especially among the surgical field residents [3].

Surgeons working hours and the amount of stress and burnout have been addressed recently and have gained more attention [4]. A study conducted in Germany found that the psychological stress in the surgical field has caused severe stress, more than in the other fields [5]. Another study published in 2018, revealed that depression and burnout among residents were the results of increased levels of stress [6]. Burnout may eliminate professionalism, potentiate high chances of medical errors, and may lead to substance abuse and relationship difficulty which will ultimately have an effect on the quality of life of the surgeons [7]. Some studies have shown that surgeons' distress has a strong impact on perceived medical errors with 5% to 11% higher incidences of reporting a major medical error [8].

Therefore, quality of life of the medical physician is impacted by any domain and will be reflected in the patient care which is the top priority in any medical institute. Up till now, there is no study showing or evaluating the work-related quality of life of the residents, especially ENT residents here in Saudi Arabia. The goal of this study is to assess the quality of life of ENT residents and identify the elements that influence their quality of life.

Subjects and Methods

A. Study subjects

This study is a descriptive cross-sectional questionnaire-based study design of all resident doctors in otolaryngology and head and neck surgery in all regions of Saudi Arabia, conducted from November 2021 through to February 2022. Residents were randomly selected and asked to take part in an online-based survey. The inclusion criteria included being an ORL-HNS resident aged 24-31 in Saudi Arabia.

B. Tool and sample size

The sample size is estimated to be 95 participants, large enough to reach a confidence interval of 95% as calculated using the Raosoft Sample Size Calculator (Raosoft, Inc. Seattle, WA). The study is utilized by the Work-Related Quality of Life by WRQoL valid scale first edition that measures perceived quality of life in six important domains: General Well-Being (GWB), Home-Work Interface (HWI), Job and Career Satisfaction (JCS), Control at Work (CAW), Working Conditions (WCS) and Stress at Work (SAW) Each question uses a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) developed by Simon Easton and Darren Van Laar[10], as well as adding to it the demographic data questions asking about age, gender, resident level, what city and what hospital they work in. The validity and reliability of the questionnaire was tested by the authors [14].

C. Ethical Consideration

As part of the study, all participants were adequately informed about the aim of the study. They were recruited by their acceptance. This study was reviewed and approved by the Ethics Committee for Human Research of Imam Muhammed Ibn Saud Islamic University.

D. Statistical Analysis

Categorical variables were measured as frequency and proportion (%) while continuous variables were expressed as mean and standard deviation. The difference in the overall score of WRQoL and its domains in relation to the socio-demographic characteristics of the residents was performed using Mann Whitney Z-test as well as Kruskal Wallis H-test. A P-value of 0.05 was considered statistically significant while a p-value of 0.01 was considered highly statistically significant. Normality test was performed using Shapiro Wilk test. The overall score of WRQoL and its domains follows the non-normal distribution. Thus, the parametric tests were applied. Pearson correlation coefficient was also performed to determine the correlation between the overall WRQoL among its domains. All data analyses were performed using the Statistical Packages for Software Sciences (SPSS) version 26 (Armonk, New York, IBM Corporation, USA.).

Results

Our study, a total of 94 otolaryngology and head and neck surgery residents was able to recruit 50% females vs 50% males. The most common age group was 24 – 29 years old (77.7%) with nearly two-thirds (63.8%) being single. Only 13.8% of the residents were smokers. Residents who were living in the Eastern region constituted (43.6%). In addition, 24.5% were resident level 1 and another 24.5% were resident level 2 [Table 1].

In the assessment of WRQoL, the mean score of JCS, CAW, GWB, HWI, SAW, and WCS domains were 3.61, 3.32, 3.21, 3.23, 2.66 and 3.48, respectively and the overall mean score of WRQoL was 3.17 (SD 0.39). Further details of residents' rating for each statement of the WRQoL questionnaire are given in Table 2. As explained in Figure 1, 43.6% of the respondents were considered as having a high level of WRQoL, 26.6% had average and the rest were low level (29.8%). Among WRQoL domains, WCS showed more high level (55.3%), followed by CAW (41.5%), HWI (38.3%), GWB (38.3%), JCS (38.3%) and SAW (25.5%).

There was a positive highly statistically significant correlation observed between the overall WRQoL among its domain and including JCS score (r=0.853), CAW score (r=0.484), GWB score (r=0.919), HWI score (0.749) and WCS score (0.794). On the other hand, an inverse highly statistically significant correlation was observed between WRQoL score and SAW score (r=-0.677) [Table 3].

Table 4 shows that the only significant factor of overall WRQoL was the age group in years (p=0.027), where a higher score of overall WRQoL was significantly predicted among the older age group (≥30 years). Other variables included in the test did show significant differences in the overall WRQoL score including marital status, smoking, region of the residency program and residency year level (p>0.05).

A higher JCS mean score (p=0.040) and CAW score (p=0.002) were more associated with older age group (age ≥30 years) while the differences in the scores of GWB, HWI, SAW, and WCS among the age group did not reach statistical significance (p>0.05) [Figure 2].

According to Figure 3, a raised SAW mean score was more associated with female surgeons (p=0.011) while the differences between the mean scores of JCS, CAW, GWB, HWI and WCS did not reach statistical significance (p>0.05).

JCS score was higher and more associated with smoking participants (p=0.023) while the SAW score was more associated with non-smoking participants (p=0.001) whereas the differences between the mean scores of CAW, GWB, HWI, and WCS were not significantly different (p>0.05).

A higher CAW score (p=0.003) was more associated with resident level 5 while the differences between the mean scores of JCS, GWB, HWI, SAW, and WCS were not significantly different (p>0.05) [Figure 5].

Table 1: Socio-demographic characteristics of the residents (n=94)

Study variables	N (%)
Age group	
• 24 – 29 years	73 (77.7%)
• 30 – 34 years	17 (18.1%)
• 35 – 40 years	04 (04.3%)
Gender	
• Male	47 (50.0%)
• Female	47 (50.0%)
Marital status	
• Single	60 (63.8%)
• Married	34 (36.2%)
Smoking	
• Yes	13 (13.8%)
• No	81 (86.2%)
Region of residency program	
• Central Region	25 (26.6%)
• Eastern Region	41 (43.6%)
• Western Region	24 (25.5%)
• Southern Region	03 (03.2%)
• Northern Region	01 (01.1%)
Residency year level	
• R1	23 (24.5%)
• R2	23 (24.5%)
• R3	21 (22.3%)
• R4	14 (14.9%)
• R5	13 (13.8%)

Table 2: Assessment of Work-related Quality of Life (WRQoL) (n=94)

Statement	Mean ± SD
Job and Satisfaction (JCS) score	3.61 ± 0.74
1. I have a clear set of goals and aims to enable me to do my job	4.02 ± 0.84
2. I have the opportunity to use my abilities at work	3.87 ± 0.91
3. When I have done a good job it is acknowledged by my line manager	3.45 ± 1.09
4. I am encouraged to develop new skills	3.76 ± 0.96
5. I am satisfied with the career opportunities available for me here	3.32 ± 1.13
6. I am satisfied with the training I receive in order to perform my present job	3.22 ± 1.09
Control at Work (CAW) score	3.32 ± 0.56
7. I feel able to voice opinions and influence changes in my area of work	3.10 ± 0.93
8. I am involved in decisions that affect me in my own area of work	3.52 ± 0.94
9. I am involved in decisions that affect members of the public in my own area of work	3.34 ± 0.91
General well-being (GWB) score	3.21 ± 0.51
10. I feel well at the moment	3.37 ± 1.08
11. Recently, I have been feeling unhappy and depressed	2.35 ± 0.95
12. I am satisfied with my life	3.65 ± 0.95
13. In most ways my life is close to ideal	3.05 ± 1.03
14. Generally things work out well for me	3.49 ± 0.85
15. Recently, I have been feeling reasonably happy all things considered	3.37 ± 0.92
Home-work interference (HWI) score	3.23 ± 0.79
16. My employer provides adequate facilities and flexibility for me to fit working around my family life	3.27 ± 0.96
17. My current working hours/patterns suit my personal circumstances	3.35 ± 0.96
18. My line manager actively promotes flexible working hours/patterns	3.06 ± 0.96
Stress at Work (SAW) score	2.66 ± 0.89
19. I often feel under pressure at work	2.55 ± 1.09
20. I often feel excessive levels of stress at work	2.78 ± 1.09
Working Conditions (WCS) score	3.48 ± 0.73
21. My employer provides me with what I need to do my job effectively	3.44 ± 0.89
22. I work in a safe environment	3.64 ± 0.93
23. The working conditions are satisfactory	3.36 ± 0.89
Overall WRQoL score	3.17 ± 0.39

5-point Likert scale response ranging from “strongly disagree” coded as 1 to “strongly agree” coded as 5.
* Indicates negative question.

Table 3: Correlation (Pearson-r) between overall WRQoL score among its domains (n=94)

WRQoL domains	Total WRQoL score	
	R-value	P-value
JCS	0.853	<0.001 **
CAW	0.484	<0.001 **
GWB	0.919	<0.001 **
HWI	0.749	<0.001 **
SAW	-0.677	<0.001 **
WCS	0.794	<0.001 **

** Correlation is significant at the 0.01 level (2-tailed).

Table 4: Differences in the score of WRQoL and its domains according to the Socio-demographic characteristics of the surgical residents (n=94)

Factor	WRQoL Total score (5) Mean ± SD	Z/H-test	P-value §
Age group [a]			
• <30 years	3.12 ± 0.37	Z=2.212	0.027 **
• ≥30 years	3.34 ± 0.44		
Gender [a]			
• Male	3.19 ± 0.38	Z=0.617	0.537
• Female	3.16 ± 0.41		
Marital status [a]			
• Single	3.14 ± 0.34	Z=1.040	0.299
• Married	3.22 ± 0.47		
Smoking [a]			
• Yes	3.29 ± 0.36	Z=1.524	0.128
• No	3.15 ± 0.39		
Region of residency program [b]			
• Central Region	3.16 ± 0.37		
• Eastern Region	3.23 ± 0.37	H=2.051	0.359
• Other Regions	3.09 ± 0.45		
Residency year level [b]			
• R1	3.24 ± 0.33		
• R2	3.09 ± 0.40		
• R3	3.25 ± 0.42	H=3.218	0.522
• R4	3.12 ± 0.33		
• R5	3.12 ± 0.51		

§ P-value has been calculated using Mann Whitney Z-test.
‡ P-value has been calculated using Kruskal Wallis H-test.
** Significant at p<0.05 level.

Figure 1: Level of WRQoL and its domains

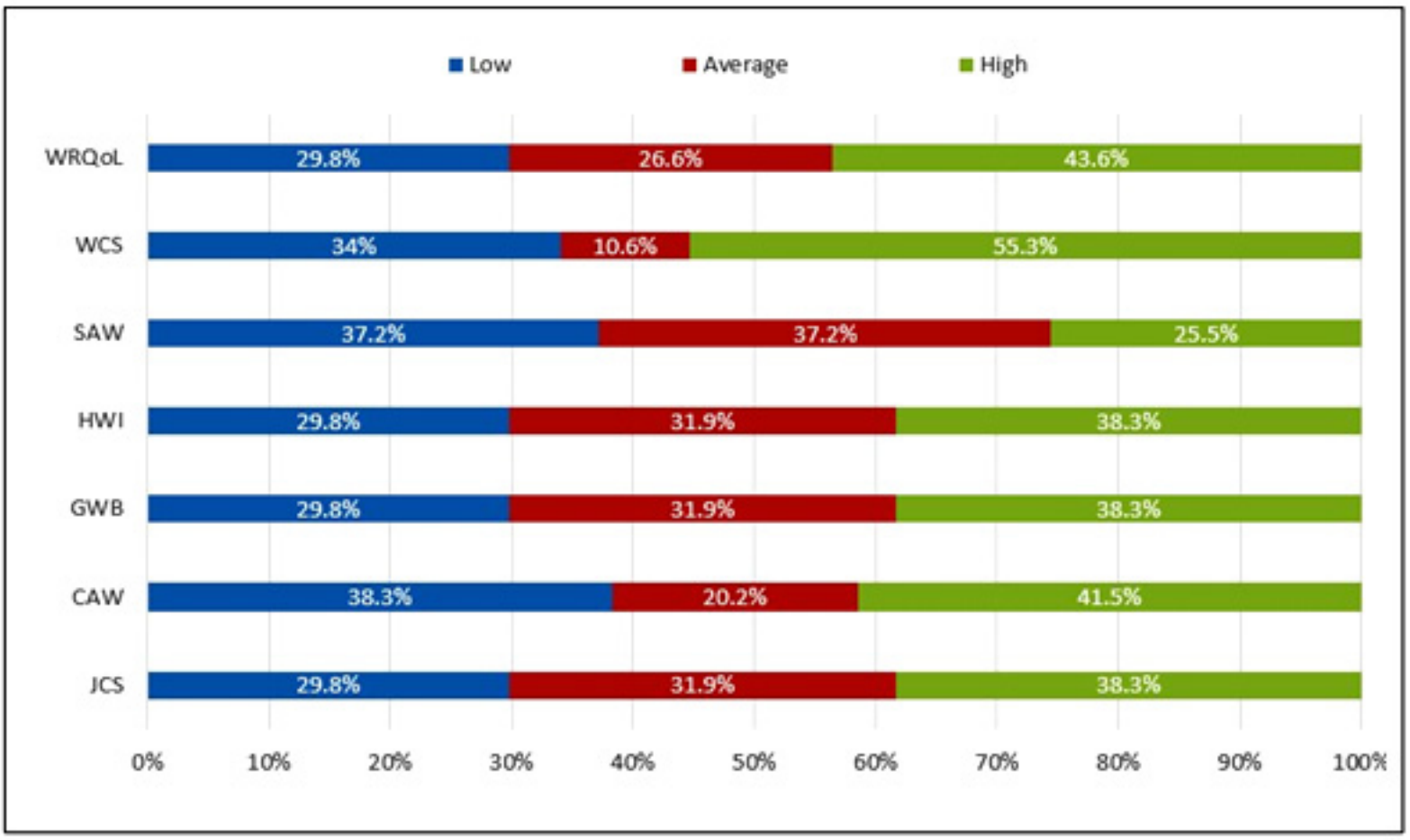


Figure 2: Comparison between mean scores of the WRQoL domains according to age group

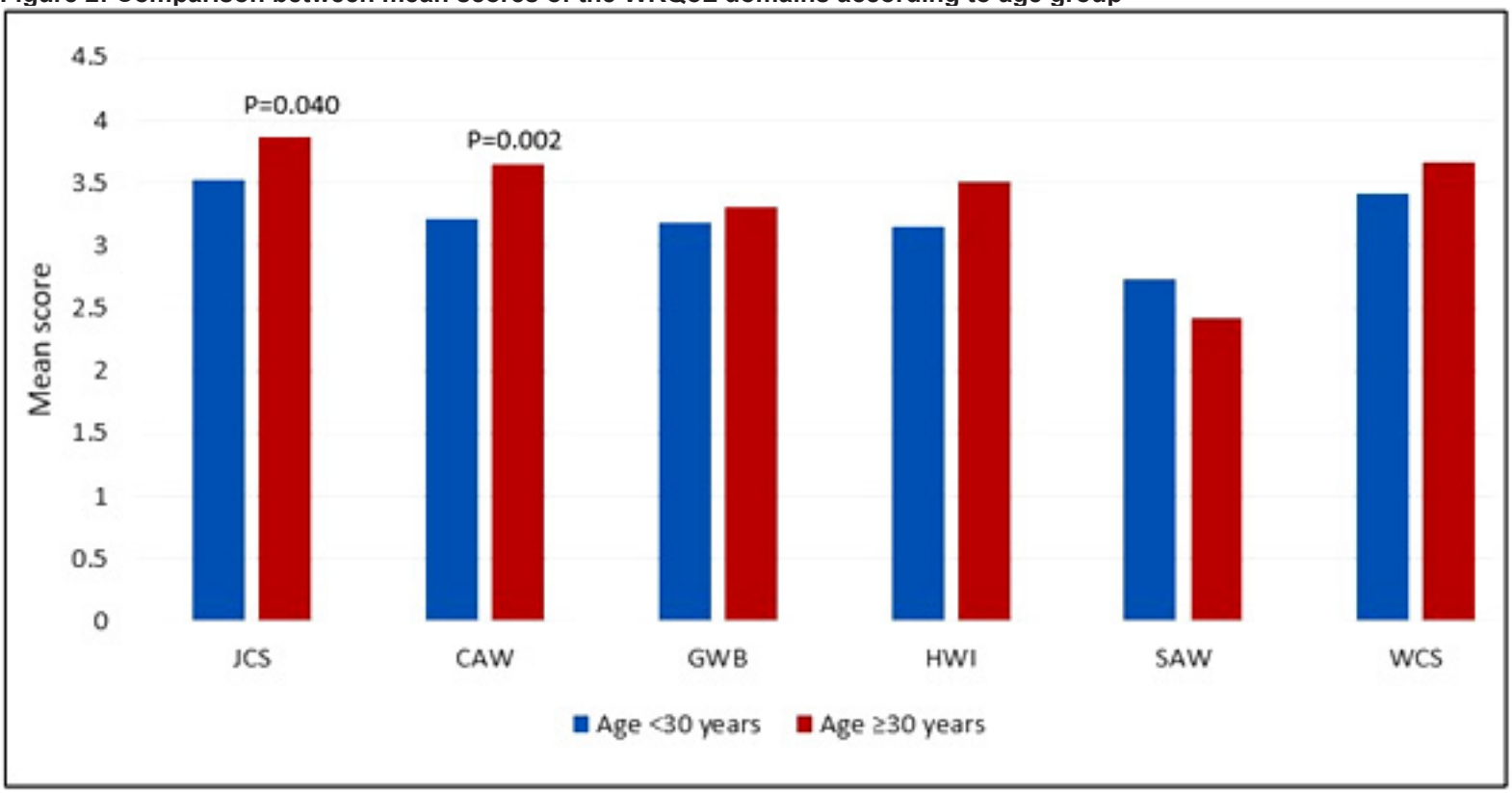


Figure 3: Comparison between mean scores of the WRQoL domains according to Gender

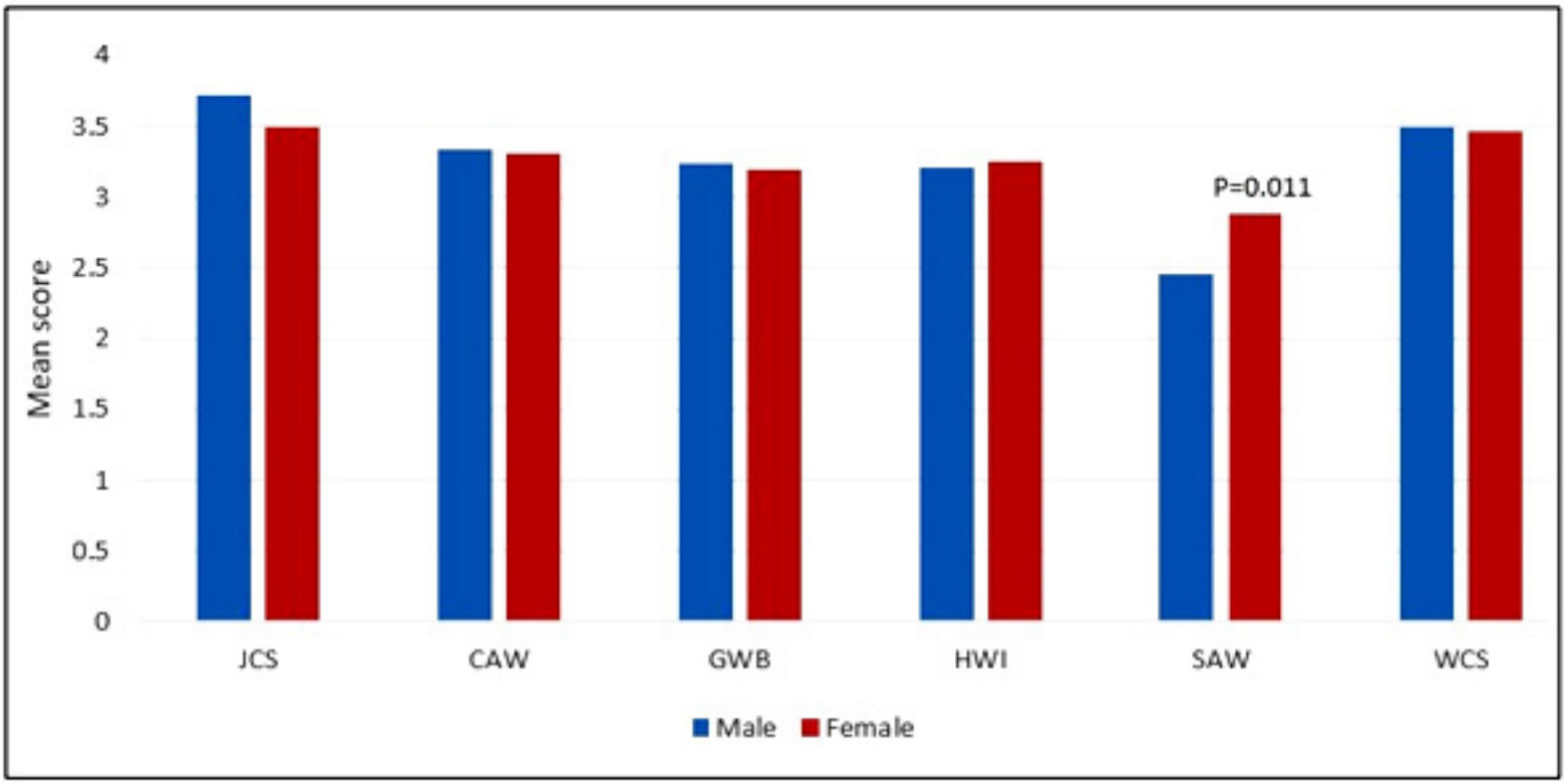


Figure 4: Comparison between mean scores of the WRQoL domains according to smoking status

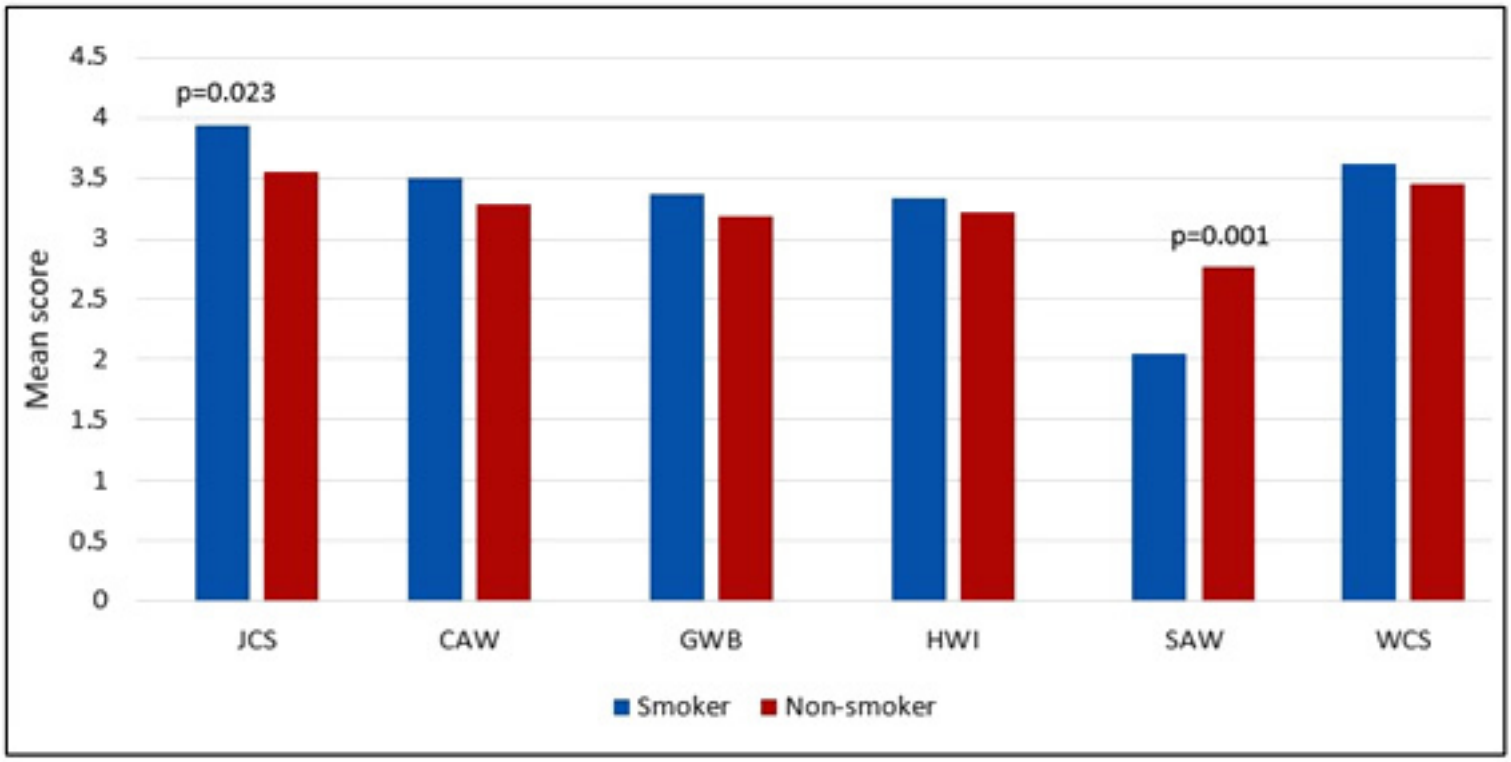
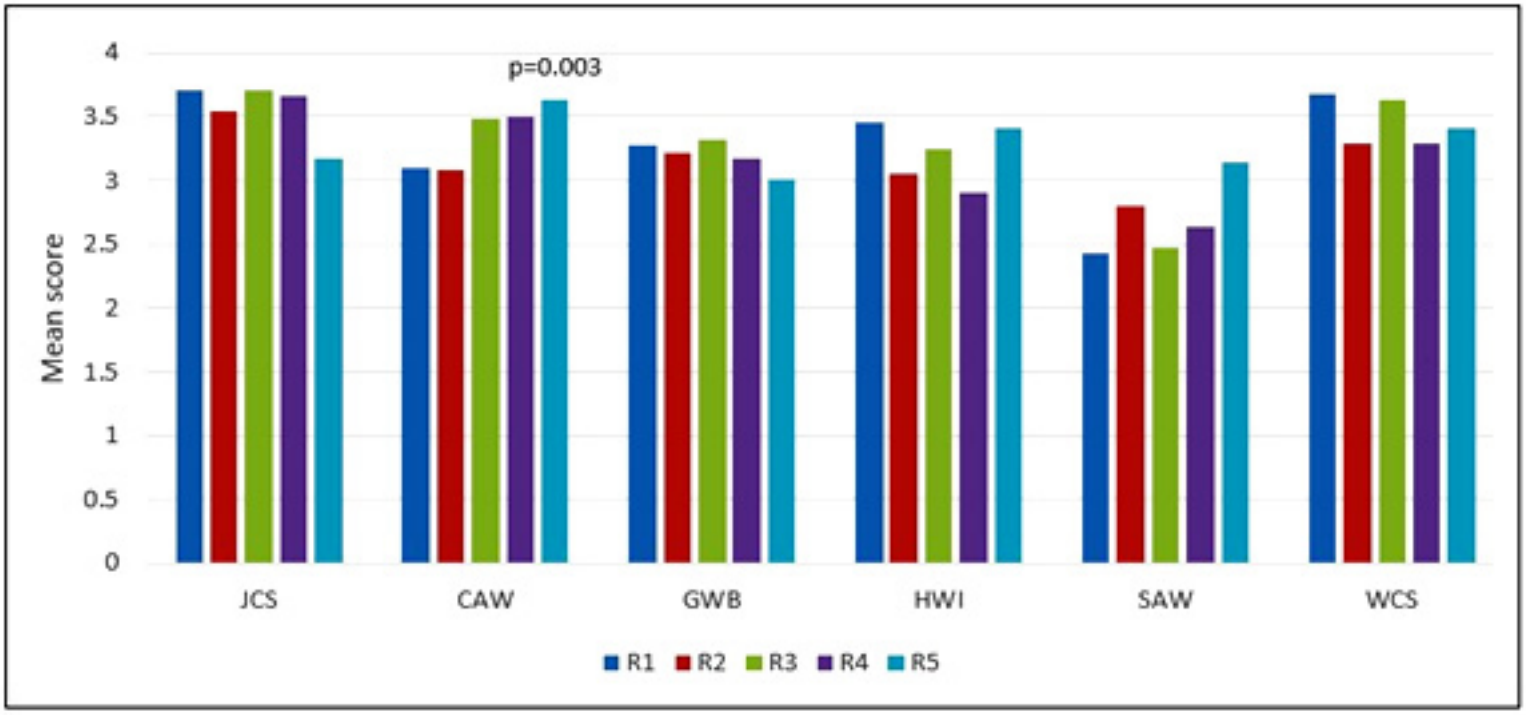


Figure 5: Comparison between mean scores of the WRQoL domains according to residency year level



Discussion

The present study was carried out to examine the work-related quality of life among otolaryngology, head and neck surgical residents. To our knowledge, this is the first study in Saudi Arabia that discussed the overall health-related quality of life among otolaryngology, head and neck residents. Since residency training is a very stressful environment that demands a lot of time, it is very important to examine their quality of life. The findings of this study will serve as a baseline subject for further investigations.

Work-related Quality of Life (WRQoL)

The overall WRQoL of residents with otolaryngology, head, and, surgery specialty was sufficient; 43.6% of the residents demonstrated a high level of WRQoL, 26.6% were average and 29.8% were considered as low level (mean score: 3.17; out of 5 points). Adequate work-related quality of life had also been reported by Somila et al. [10]. According to their reports, 76.6% of the medical surgeons exhibited a moderate level of work-related QoL. They further predicted that working hours and the number of shifts likely played a significant role in having a good quality of work-life. However, in Jeddah, Saudi Arabia [9], researchers reported that the quality of life among surgical residents was poor, as half of the residents (50.7%) demonstrated a low WRQoL. They argued that the low QoL was attributed to the poor rating in some WRQoL domains including HWI, CAW, SAW, and GWB. In a survey done among German surgeons [11], approximately 40% of the German surgeons considered their quality of life worse than the general population while the minority of them even considered their QoL lower than their patients. The authors emphasized the need to improve the working conditions of the surgeons which require collective efforts from the concerned parties including hospital administrations, insurance companies, and the German Society of Surgery. The causes of declined work-related QoL must be identified and necessary steps should be taken to address the gaps. An improved WRQoL will lead to better patient quality of care.

A higher WRQoL was significantly predicted among the older age group (≥30 years), but the quality of life did not differ significantly between gender, marital status, region of the resident program, and residency year level. A survey conducted among Brazilian otorhinolaryngology residents showed that males demonstrated better psychological scores than females, and when they measured ENT residents' quality of life, they assumed that the QoL of ENT residents in the Federal Districts is comparable to those of a healthy population, although, second-year residents yielded better quality of life results compared to first-year and third-year residents [14]. In an opposing result, Almailabi et al [9], reported that there was no difference in the work-related quality of life between males and females which did not coincide with previous results. In a study by Somila et al [10], they relate residents' minor specialties, less than eight duty shifts/week to having a better quality of life while in a study by Bohrer et al [11], they estimated that restrictions to private life hierarchical and uncooperative working environment, lack of opportunities for continuing education and inadequate salary were the independent significant predictors of poor quality of life.

Moreover, we have learned that the increase in WRQoL score is correlated with the increase in the score JCS, CAW, GWB, HWI, and WCS but not with the SAW score wherein, an inverse correlation was observed between WRQoL score and SAW score, suggesting that an increase in the score of WRQoL is likely correlated with the decrease of SAW. In other words, a better work-related quality of life is directly associated with a decrease in the burden of stress at work.

Job Career Satisfaction (JCS)

The mean score of JCS was 3.61 (SD 0.74) out of 5 points. Findings in this study suggest that 38.3% of the residents were

satisfied with their job careers, 31.9% were neutral and 29.8% were dissatisfied. Surprisingly, our results indicated that the JCS score was significantly better among smoking residents and the older age group residents (≥30 years). In the USA [16], findings indicated that junior residents showed significantly better JCS scores than senior residents. In our study, we found no significant differences in the JCS score between each residency level which was not consistent with the previous results.

General Well-Being (GWB)

There was satisfactory general well-being detected among the residents; nearly 40% were classified as having a high level of GWB, 31.9% were average and the rest were low (29.8%). The mean score of GWB was 3.21 (SD 0.51) out of 5 points. There was no relevant factor being found in regards to the socio-demographic characteristics of the residents. Consistent with our findings, Somila et al [10], reported satisfaction with residents' GWB, however, Almailabi et al [9], reported low GWB among surgical residents which opposed our results.

Home-work Interface (HWI)

Similarly, 38.3% were considered as having a high level of HWI (mean score: 3.23; SD 0.79), and a higher level of HWI was significantly predicted among smoking residents but there was no difference in other socio-demographic variables including age and gender. In a study done Zubair et al [13], they found significant differences between HWI and gender where males exhibited better HWI than females.

Control at work (CAW)

The mean score of CAW was 3.32 (SD 0.56) out of 5 points with 41.5% demonstrating a high level of CAW, 20.2% were average and 38.3% were low level. We also observed that increasing age was more associated with increasing CAW scores. Hence, this further indicates that better control at work can be shown among senior residents which were also reported by the American surgical residents [13].

Working Conditions Satisfaction (WCS)

More than half (55.3%) reported having high satisfaction with working conditions, 10.6% were neutral and 34% had low WCS (mean score: 3.48; SD 0.73). No differences were found between WCS scores according to age group, gender, marital status, smoking, region of a residency program, and residency year level.

Stress at Work (SAW)

Low stress at work was reported by 37.2% of the residents with a similar prevalence of average level (37.2%), however, approximately 25.5% still had a higher level of SAW (mean score 2.66; SD 0.89). In Thailand [10], medical residents' level of SAW was from average to low which was consistent with our reports.

Conclusion

The work-related quality of life among otolaryngology, head, and neck surgical residents was adequate. Older residents demonstrated better quality of life than younger residents. Further, the improved quality of life signifies a decreased burden of stress at work, however, stress at work is likely the biggest contributor for male residents to smoke. Further research is needed to establish the work-related quality of life among residents in otolaryngology, head and neck surgery in our region.

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All authors believe the presented manuscript is representative of their work.

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Factors influencing high school students' decision in applying to Medical School

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Abstract

Background: Many factors influence high school students' future profession choices, which differ by culture and other variables such as the students' background, social differences, and financial status, all of which culminate in a student pursuing their higher education in a single field. As a result, the factors that influenced that choice must be addressed in order to achieve better outcomes for both the educational programs and the health system.

Methods: A cross-sectional study was conducted in Riyadh city among high school students. Sociodemographic characteristics, preferred study specialties, GPA, and performances were obtained using a self-administered questionnaire.

Results: The age of the students was between 16-19 years old. Most selected specialties were medicine, followed by engineering, information technology and Nursing, however, Pharmacy was in the least selected specialty. Findings showed that the top perceived barrier was the high aptitude score required for entry into medicine (23.3%); another group of the students (23.1%) indicated that the English Language competency test/skills were the second obstacle. Offering health care and motivation were the most important factor for the majority of students. The majority had remarkably agreed or strongly agreed to the humanitarian context about studying medicine (90.4%).

Conclusion: A higher percentage of high school students choose to attend medical school, with the primary obstacles to admission being the high aptitude score required for admission, followed by English language competency examinations. Finally, there is a considerable disparity between genders when it comes to medical school preferences and reasons.

Keywords: Medicine, medical student, Saudi Arabia, healthcare, medical schools

Introduction

High school is one of the most crucial times in everyone's life in which one of the most important decisions has to be made. Choosing the future career for high school students is influenced by many factors that vary from culture to culture based on variables including the student's background, social differences and financial status which collectively end with a student pursuing their higher education in a single field. Therefore the factors that influenced that choice need to be classified to have better outcomes. A Study named "Factors Inducing Career Choice: Comparative Study of Five Leading Professions in Pakistan" have found that students consider growth opportunities, occupational charm, societal inspiration and self-esteem as the most influencing factors for a career choice [1]. In another study which done in Canada, students found there are factors that help them in career planning such as the impact of parents and teachers, taking information from programs that introduce the field to them, interviewing those who work in different fields and having a discussion with them, are helpful in making their decision [2]. In addition, Medicine is considered one of the most wanted specialties that high school students wishto apply for. Students in general find it an honorable profession with high social status. In addition, a study that was done in 2015, showed the passion of working in a team and interest in people were the main reasons for starting to study medicine [3]. Another study found Family influence, personal interests, self-efficacy, and economic aspects exerted great influence on the selection of career [4].

According to a study named "Factors Influencing High School Students' Career Aspirations" high school students have multiple factors changing their implication for future career choice, suggests major variation in term of socioeconomical status, self-efficacy, interest and outcome expectation, and also mentions the role of school counselor for mentoring students towards their ambition [5].

The school council role is far beyond encouragement and excitation; in fact students could use the help to change their study behavior along with enhancing their weak points. However, there is a lack of studies which investigate the factors that play a major role in choosing medicine as a future career for high school students in Saudi Arabia. Therefore, in this study we are aiming to explore the factors that influence high school students to enter medical school in Riyadh, Saudi Arabia.
This study also aimed to assess the factors that influence the decision of those choosing medical school as a future career alongside the motives and obstacles from the student's point of view.

Methods

A. Selection and criteria
In this research, a cross-sectional study was conducted in Riyadh among high school students in 2019-2020. The selection of high schools was done by first, dividing Riyadh city into four areas; North , South , East and West. Then we randomly selected schools from each of these areas with a minimum of two schools (one representing male students and the other one representing female students) to obtain information, and knowledge about the factors that influence the decision of high school students to enter medical school. The research aims to gain insight into the factors that help students to enter medical school and the elements that affect their choice.
The survey was directed towards male and female students in Riyadh schools. We sent the questionnaire to the principals of the selected high schools who ensured the participation of their students. The group of students who participated in the survey were senior high school students.

B. Tools Used
1. Sociodemographic characteristics: We divided the students according to the following sociodemographic characteristics Sex, Age (16-19 or 20-22 years), Nationality, Type of school and High school GPA as shown in Table 1.
2. The High school students' top three preferred study specialties: The high school students were asked to select out of a list of majors the first, second, and third top preferred specialty they would like to study as shown in Table 2.
3. The High school students perceived challenges and facilitating factors for choosing medicine as a study specialty/major as shown in Table 3.
4. The High school students perceived motives and attitudes toward choosing medicine as a first preferred major as shown in Table 4.

C. Statistical Data Analysis:
The Means and Standard Deviations were used to describe the continuously measured variables, and the frequencies and percentages were used to describe the categorically measured variables. The histograms were used to assess the Normality of the continuous variables and the Kolmogorov-Smirnov statistical test of Normality. The Chi-squared test of independence was used to determine the correlations between the high school students' sociodemographic factors with their perceived challenges in studying medicine and the association between their GPA and other relevant factors. The Multivariate Logistic Binary Regression Analysis was used to assess the combined and individual associations between student's sociodemographic and achievement factors with their odds of selecting medicine as a first choice of study. The correlations between these factors with the outcome variable were expressed as an adjusted Odds Ratio with 95% confidence Interval. The statistical significance level was considered at 0.050 level. The SPSS IBM v21 Program was used for the data analysis and the Excel program for creating figures and depictions.

D. Ethics:
The Medical Research Ethical Committee at Al Imam Mohamed Ibn Saud Islamic University approval was obtained prior to the conduction of the research. Participants signed an informed consent form which explained the purpose of the study and the rights of the participant for confidentiality and withdrawal at any time without any obligation towards the study team. Participant's anonymity was assured by assigning each participant with a code number for analysis only.

Results

Eight hundred and four high school students residing in the Saudi Capital, Riyadh City, responded to the survey. The findings came from the analysis of their sociodemographic characteristics. Table 1 suggests that most of the respondent students, (52.1%) were males, and 47.9% were female high school students. The age of the students was distributed as follows: 93.1% of the students were aged between 16-19 years old, and the remainder 6.9% were aged between 20-22 years and most of the students, (94.3%) were Saudi Nationals, and only 5.7% of them were Non-Saudi's residing in the country. Concerning the type of schools where these students had studied, most of them, 78.1%, had studied in public schools, and 21.9% studied at Private Schools. Asked to indicate their School GPA score, 9.6% of the students had a GPA<80% , another 25.8% had a high school GPA between 80%-90%, and most of them, (64.6%) had a GPA > 90%.

The Students Preferred Study Fields:
The high school students were asked to select out of a list of majors the first, second, and third top preferred specialty they would like to study; the multiple response dichotomies analysis was used to describe the students selections. With regard to the first favoured specialty the yielded analysis suggested that the top five selected items were medicine, followed by other specialties, engineering then information technology and Nursing However, the bottom-most selected specialties were: Arabic language, media and communication, education and Pharmacy then Islamic studies, as Table 2. illustrates.

Table-1: The High school student's sociodemographic characteristics. N=804.

	Frequency (%)
Sex	
Female	404 (47.9)
Male	440 (52.1)
Age	
16 - 19 years	786 (93.1)
20 - 22 years	58 (6.9)
Nationality	
Non-Saudi	48 (5.7)
Saudi	796 (94.3)
Type of school	
Private school	185 (21.9)
Public school	659 (78.1)
High School GPA	
<80%	81 (9.6)
Between 80%-90%	218 (25.8)
>90%	545 (64.6)

Table-2: The High school student top three preferred study specialties. N=804.

Table-2: The High school student top three preferred study specialties. N=804.

	Frequency (%)
Medicine	191 (22.6)
Other specialties	184 (21.8)
Engineering	144 (17.1)
Information technology	97 (11.5)
Nursing	45 (5.3)
Languages and translation	41 (4.9)
Dentistry	33 (3.9)
Applied health sciences	30 (3.6)
Islamic studies	30 (3.6)
Pharmacy	19 (2.3)
Education	17 (2)
Media and communication	12 (1.4)
Arabic language	1 (0.1)

Table-3: The High school students perceived challenges and facilitating factors for choosing medicine as a study specialty/major. N=844

	Frequency	%
What challenges and obstacles might prevent you from entering the medical specialty?		
The required high score of Aptitude Test	197	23.3
The competency in English language skills	195	23.1
The required high GPA	126	14.9
The long duration of studying	115	13.6
The high score necessary for the Achievement Test	87	10.3
Other (please specify)	73	8.6
Competitive specialty	36	4.3
Passing the interview	15	1.8
Did you choose medicine among the top three choices		
No	468	55.5
Yes	376	44.5
If medicine was a top choice, is it your own decision to choose medicine, n=315		
No	9	2.9
Yes	306	97.1
Q.10 Did anyone of your family encourage you to choose this specialty? , n=314		
No	204	65
Yes	110	35
Which member in your family influenced you to choose your specialty? , n=209		
All family members	46	22
Brothers	15	7.2
Parents	135	64.6
Sisters	13	6.2

The students were asked to select all that applied to them out of a list of challenges and obstacles that prevented them from choosing medicine as a speciality. The multiple response dichotomies analysis findings showed that the top perceived barrier was the high aptitude score required for entry into medicine as a major according to 23.3% of the students; another 23.1% of the high school students indicated that the English Language competency test/skills were the second obstacle; the third from the top perceived barriers to study medicine according to the students was the High required GPA score according to 14.9% of the students, then the long duration of study according to another 13.6% of the high school students. Also 10.3% of the students advised the high achievements test score was another obstacle to entry to the College of Medicine, however 8.6% of the students provided other reasons (likenot being interested in studying medicine, dislike and fear of medicine as well as the difficulty of the major itself), but a few (4.3%) of the students advised that medicine was a competitive primary and 1.8% of them had trouble with passing the interview.

Asked to indicate with (o/ es) whether they had selected medicine as a top preferred study choice, 97.1% of the high school students agreed. Only 2.9% disagreed, but 35% of them advised that a family member had encouraged them to choose medicine. When asked to indicate the family member who was most influential in their choice of medicine, 22% of the students advised it was all their family members who encouraged them. Another 7.2% were motivated by a brother, and 6.2%, by a sister. Most of them, however, 64.6%, were inspired by their parents.

Table-4: The High school students' perceived motives and attitudes toward choosing medicine as a first preferred major. N=315 Students

	Mean (SD)	Disagree n (%)	Undecided n (%)	Agree n (%)
Is high income is the most important factor that influences your choice of medical specialty?	3.10 (1.19)	106 (33.7%)	93 (29.5)	116 (36.8)
Helping and healing sick people is the most critical factor that influenced your choice of medical specialty.	4.46 (0.75)	7 (2.2)	23 (7.4)	285 (90.4)
Community respect and social value is the most critical factor that most influenced your choice of medical specialty.	3.98 (1.1)	25 (11.1)	51 (16.2)	229 (72.7)
Future guarantee of job availability is the most important factor that influenced your choice of medical specialty?	3.83 (1.13)	45 (14.2)	50 (15.9)	220 (69.9)
Because I am an excellent student and high achiever, I like to enter the most competitive specialty, such as the medical field?	3.62 (1.17)	65 (20.6)	59 (18.8)	191 (60.6)

To explore the high school students' attitudes toward medicine, the students who preferred medicine as a top /first major of the study were asked to respond to five indicators that measured their attitudes toward medicine, measured with a Likert-like agreement scale (1= strongly disagree to 5= strongly agree). The resulting descriptive analysis findings of their responses to these attitude indicators are listed in Table 4. To explain the main findings from the analysis, the high school students collective mean agreement with "Is high income the most important factor that influences your choice of medical specialty?" was measured with 3.10 out of 5 agreement points, which indicates the students were in general between undecided to agreeing on the economic motive to study medicine as a highly paid job in general. Still, it is evident from the descriptive analysis that most high school students, 36.8%, had agreed or strongly agreed that the high income was the main motive to select medicine as a specialty. Many of them, too, 33.7% disagreed, and 29.5% were undecided. Also, the high school students overall mean in agreement to whether "Helping and healing of sick people is the most important factor that influenced your choice of medical specialty?" was rated with 4.46 out of 5 points, which indicates a high collective agreement by those students that helping sick patients was another motive to study medicine; the majority of the students (90.4%) had remarkably agreed or strongly agreed to this humanitarian context about studying medicine.

Also, the high school students had agreed with 3.98 points out of 5 on whether "Community respect and social value is the most important factor that most influenced your choice of medical specialty?" which indicates that the high school students had collectively been undecided as to agreeing on the prestigious role of physicians in society as a career. Nonetheless, most of the students, (72.2%), had agreed/strongly agreed that the community respect for the physician's role was another good reason to study medicine/select medicine as a major of study. Not only so, but also most of the high school students, 69.9 % had agreed that the "future guarantee of job availability is the most important factor that influenced your choice of medical specialty?" was a motive to study medicine. The overall mean agreement of the high school students on the availability of job was rated with 3.83 out of 5 Likert agreement points, suggestive of a comprehensive agreement in general that finding a vacancy after graduation could be one of the reasons why those students thought of specializing in medicine in general. However, the high school students overall agreement to "Because I am an excellent student and high achiever, I like to enter the most competitive specialty, such as the medical field? " was rated with 3.62 agreement points out of 5, which is between undecided to agreeing in general, however most of the students (60.6%) had agreed that their high achievement was another ulterior/underlying drive to specialize in such a competitive study field like medicine.

Table-5: Bivariate comparison between male and female students regarding their study majors choices and attitudes toward medicine

	Female	Male	test statistic	p-value
1st choice				
Medicine	100 (24.8)	91 (20.7)	χ^2 (12)=78.66	<0.001
Other specialties	98 (24.3)	86 (19.5)		
Engineering	35 (8.7)	109 (24.8)		
Information technology	27 (6.7)	70 (15.9)		
Nursing	30 (7.4)	15 (3.4)		
Languages and translation	27 (6.7)	14 (3.2)		
Dentistry	18 (4.5)	15 (3.4)		
Applied health sciences	20 (5)	10 (2.3)		
Islamic studies	18 (4.5)	12 (2.7)		
Pharmacy	11 (2.7)	8 (1.8)		
Education	12 (3)	5 (1.1)		
Media and communication	7 (1.7)	5 (1.1)		
Arabic language	1 (0.2)	0		
Attitudes toward medicine				
Is high income is the biggest factor that influences your choice of medical specialty? Mean (SD) Likert-agreement scale	2.82 (1.17)	3.36 (1.15)	t(313)=4.03	<0.001
Helping and healing sick people are the most important factors that influenced your choice of medical specialty? Mean (SD) Likert-agreement scale	4.62 (0.602)	4.27 (0.88)	t(313)=4.17	<0.001
Community respect and social value is the most important factor that most influenced your choice of medical specialty. Mean (SD) Likert-agreement scale	3.79 (1.13)	4.24 (0.92)	t(313)=3.84	<0.001
Future guarantee of job availability is the most important factor that influenced your choice of medical specialty. Mean (SD) Likert-agreement scale	3.63 (1.15)	4.10 (1.10)	t(313)=3.53	<0.001
Because I am an excellent student and high achiever, I like to enter the most competitive specialty, such as the medical field. Mean (SD) Likert-agreement scale	3.40 (1.15)	3.90 (1.12)	t(313)=3.84	<0.001

To better understand the differences between male and female high school students on their preference of medicine and attitudes /motives to studying medicine, the analysis went further by comparing the male and female high school students responses to the analysis results. Toelucidate , the analysis findings suggested that there was a statistically significant association between the students preference to majors and their sex according to a Likelihood Ratio Adjusted chi-squared test of independence; the analysis findings suggested that the male students were found be significantly more inclined to select medicine as a first major, p<0.001, likewise the females were significantly more predicted to select medicine. Also the females were found to be less inclined to choose information technology than males, but they (females) preferred Nursing significantly more as a first preferred major as well.

The analysis findings suggested that the male students had agreed significantly more on the role of high income for medicine as a motive to select medicine as a major than females, p<0.001 according to an independent samples t-test, but female students had agreed significantly that helping and healing sick patients was a good motive for them to study medicine more than the male students, p<0.001 according to another independent samples t-test. The male students perceived community respect as a motive to study medicine significantly higher than females, p<0.001. The overall mean agreement given to community respect to choose medicine by males exceeded that agreement significantly by the females however, according to an independent samples t-test. Future guarantee to a job as a motive to select medicine as a study major was agreed significantly higher by the male high school students than females, p<0.001. Besides, the male students had agreed substantially more to the high achievement and challenges in medicine as another motive to specialize in medicine than the females, according to an independent samples t-test.

Table-6: Multivariate Logistic Binary Regression Analysis of the predictors of the high school students' top preference for medicine. N=844.

	Multivariate adjusted Odds Ratio	95% C. I for O.R		p-value
		Lower	Upper	
Age of the student>20 years	1.054	.525	2.119	.882
Sex= Male	0.780	.554	1.096	.152
Nationality= Saudi	.478	.245	.932	.030
GPA<80%-reference				<0.001
GPA=80-90%	1.637	0.742	3.611	.223
GPA>90%	3.477	1.677	7.209	.001
Other challenges	.307	.133	.706	.005
Parental influence/encouragement	3.664	2.441	5.499	<0.001
Constant	.195			.014

DV= medicine is the first top choice of study (No/Yes) -q1

The Multivariate Logistic Binary Regression Analysis was used to assess the combined and individual associations between the high school students sociodemographic and academic achievement factors with their preference to medicine as an ultimate selection. The resulting findings in table 7a showed that the age of the students did not converge significantly on their importance to medicine as a study field, (p=0.882), also the student's sex did not correlate significantly, (p=0.152), with their odds of preferring medicine as a study field accounting for other predictors in the analysis. However, the Saudi students compared to Non-Saudi students were found to be significantly less (0.478 times less, or 52.2% times less) predicted to opt for medicine as a favoured major on average, by accounting for the other predictors in the analysis. Also, the analysis model suggested that the students with a GPA between 80%-90% did not differ significantly with regards to their preference to medicine as a study field p=0.223 however, those students with a GPA>90% were found to be statistically significantly more predicted (3.48 times higher) to prefer medicine as a major than those with a GPA<80% on average, p=0.001, in Figure A. It is clear that as the students GPA had risen from below 80% to 80%-90% then higher than 90%, their mean predicted probability of preferring medicine tended to increase incrementally too regardless of the parental influence.

Also, the high school students who had other concerns and challenges to study medicine (like fear of medicine, dislike of medicine as significant and being less interested in medicine in general) were found to be significantly less predicted (75% times less) to prefer medicine compared to those who did not have such concerns on average, p=0.005. Not only so but also the students who were encouraged by their parents to major in medicine were found to be significantly more predicted (3.67 times higher) to prefer medicine compared to those not encouraged by their parents on average, (see figure-A). It is clear that students with various GPA level tended to prefer medicine more with their parental encouragement across all the levels of the students GPA categories, or levels.

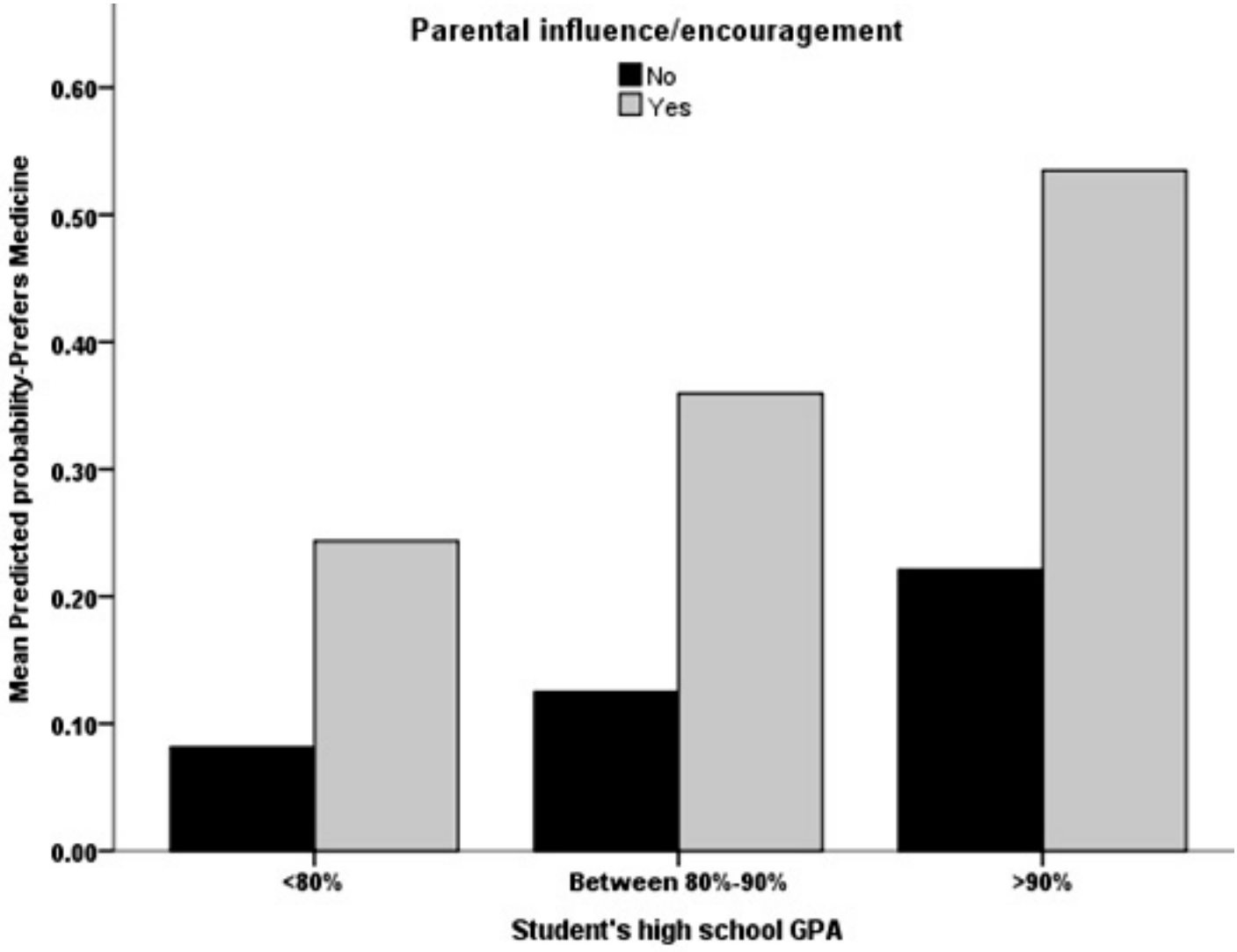

Figure-A: The association between the students high school GPA with their preference to medicine as study field with subgroup analysis of parental encouragement

Discussion

The aim of this study was to explore the factors that influence students of high school to choose medicine as their future specialty in Riyadh region, Saudi Arabia.

In this study, medical school was the most popular college of interest for students where 22.6 % of high-school students chose medical college as interested college followed by other colleges including engineering, information technology and nursing. Moreover, it was found that 55.5 % of high-school students chose medical school as one of the first three choices and 97.1 % of them reported that it is their own decision to choose medicine and 35 % reported that family encouraged them to choose this specialty, mostly by parents. Another study conducted by Ausman J., among high-school students in the United Arab Emirates, found that only 36.8 % of them chose medical school as their own interesting College however, interestingly, only 12.5 % of students who chose medical school reported that this was their own desire while 43.6 % said it was because of choices of parents and them, where the study was found to have a significant impact of parents on their children' desire for choosing medical school [6]. Moreover, in the study of Kunanitthaworn N , among a group of medical school students in Thailand, the authors found that 64.2 % of students reported that their choices of medical school was their personal choice and 11.1 % of them against their parents desires [7].

Among high-school students, the main barrier for entering medical school was the high aptitude score required for entry into medicine followed by English language competency tests and high required GPA score needed for the college as well as the long duration of the study in this college. On the other hand, helping and healing sick people was the main reason that motivated high-school students toward choosing medical school as future college followed by community respect and social value which is associated with being a physician, and future guarantee of job availability, with low interest of having a high income or their perception about their ability toachieve. In the study of Wouters A, among high-school students in Netherlands, the authors found that the desire to help people and a

scientific interest were the main motivators for high-school students to choose medical school as their future college [8]. Moreover, in a study conducted by Heikkila T, among Finnish junior physicians, the authors found that interest, vocation and a wide range of professional opportunities were the main motivators of these students to choose medical school where the authors suggested that these motivations suggested that respondents would still have chosen medicine as a profession [9]. Furthermore, in a study conducted by Zayabalaradjane Z, among high-school students, the authors found that the motivations by parents and the predicted respect that they would get in the society were the main motivations for them to enroll in medical school [10]. The importance of understanding the main motivators of students to choose medical school represented encouragement of these factors and selecting the most preferred students for these college where many studies showed that selecting of students who are more satisfied and have high encouragement and interest in medical school for different reasons would most probably lead to longer careers and better quality of care that they will provide to their patients [9,11,12]

Moreover, we tried to better understand the differences between male and female high school students on their preference of medicine and attitudes /motives to study medicine. The results of this study showed that there was a statistically significant association between the student's preference for majors and their sex where females were found to have a higher tendency to choose medical school as first choices, than males in comparison with other specialties. Furthermore, we found a significant difference between the two genders considering the main motivators leading to choosing of medical school where males are more interested in the role of high income for medicine as a motive to select medicine as a major college while female students had agreed significantly more that helping and healing sick patients was a good motive for them to study medicine. Consistent with our study, we found that many previous studies found that men and those from urban background are mostly motivated by better financial status and expanding their training, than care [13–15]. The role of gender in affecting the motivations to enter medical schools may be understood using the path model which found that gender is positively correlated with family support which is considered a significant factor in choosing medical schools where females tend to be closer to other family members rather than males [16–18]. Other factors affecting students' choices included students' GPA in which we found that students with a GPA>90% were found to be statistically significantly more predicted (3.48 times higher) to prefer medicine as a major than those with a GPA<80%, on average. This could be explained by students' perception that high GPA of entering medicine school is considered a barrier for them.

This study had some limitations. One of these limitations is depending on a self-reported questionnaire which may lead to some personal bias where some participants may answer the questions in the way of making them appear better which could explain the high percentage of students who reported that the choice of medicalschool is their own desire, over other previous studies. Moreover, the depending on closed-questions may restrict the students form explaining their own barriers or motivators which may not be found in answers provided to them.

Conclusion

In conclusion, we found that there is a higher percentage of high-school students who prefer to enter medical school where the main barriers for entering it include the high aptitude score required for entry into medical school followed by English language competency tests. Moreover, the main motivating factors for students include helping and healing sick people, community respect and social value which is associated with being a physician. Finally, there is significant difference between genders considering the preference and motivations to choose medicine school.

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Epidemiological burden of Alopecia Areata in different cities of Al Baha Region, Kingdom of Saudi Arabia: Cross-Sectional Descriptive Study

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Abstract

Background: Alopecia areata (AA) is an autoimmune disease that causes non-scarring hair loss. Significant epidemiological differences among the population observed throughout the investigation in the literature. The Kingdom of Saudi Arabia (KSA) was found to have a greater burden of disease than other countries, but the information is lacking in Al Baha region, the southwestern area of KSA .

Aim: The aim of the present study was to determine the clinico-epidemiological profile and burden of AA in the Al Baha region and to subsequently highlight the factors affecting disease prevalence.

Methodology: A well-structured quantitative questionnaire was developed and distributed using an online standardized questionnaire targeting 385 Albaha patients diagnosed with AA. The diagnosis of AA was confirmed clinically by consultant dermatology before patient recruitment into the study and resulted in sufficient accuracy. The responses were collected and analyzed using SPSS statistical analysis software. The frequency of disease prevalence, patients' ages, disease duration, impact on quality of life, risk factors, and associated diseases were analyzed.

Results: A total of 385 AA patients completed the questionnaire to achieve 100% response accuracy. Most of them were located in Al-Baha center (36.1%) followed by Baljurashi city (17.1%). The most frequent age of AA diagnosis was 21–30 years old (41.3%), and the disease duration was 3–6 months in the majority of the patients (26.8%). The most common type is patchy scalp AA in 57.1% of the patients followed by AA involving more than one site (24.4%). Diabetes mellitus and chronic anemia were the associated diseases 10.9% (for both) followed by thyroid diseases in 5.2% of the patients.

Conclusion: Overall, AA as a disease presents a significant concern for the population of Al-Baha region in Saudi Arabia considering the variable prevalence in different cities, especially in Al-Baha center itself. Onset occurs during adult working ages. Therefore, quality of life can be negatively affected, and outcomes can be severe. This study potentially adds more knowledge and theoretical understanding of AA clinico-epidemiology in our region.

Keywords: hair loss, Al-Baha, Saudi Arabia, Epidemiology

Introduction

Alopecia areata (AA) is a common immune-mediated condition of non-scarring hair loss, that presents as round or oval patches of hair loss and can appear at any age (1). The overall prevalence of AA is 2.1% of the world's population. The prevalence of AA is significantly different by area, is increasing over time, and is lower in adults than in children. Alopecia totalis, ophiasis, and universalis prevalence was 0.08% each (2). In Saudi Arabia, the prevalence of AA varies from 13.8% to 18.21%, which means AA has a higher prevalence in Saudi Arabia than other countries (3).

Regarding the pathogenesis of AA, the exact cause of AA is still unknown. It is thought to be caused by a loss of immune privilege in the hair follicle, autoimmune-mediated hair follicle damage, and an activation of inflammatory pathways (4). Several studies have indicated that autoimmune, infectious agents, hormones, diet, immunizations, genetics factors, stress and psychological disorders play a role in the pathogenesis of AA (4–7). Numerous studies have revealed strong connections between the severity of AA, atopic dermatitis, thyroid disease, and other autoimmune diseases in addition to a family history of AA (8,9).

Alopecia areata (AA) includes three main subtypes: (1) patchy AA (localized hair loss area), (2) alopecia totalis (entire scalp hair loss); (3) alopecia universalis (the complete loss of body and scalp hair); and less common appearances, including ophiasis pattern (band-like pattern of hair loss along the occipito-temporal margins), and ophiasis inversus (sisapho), a very rare band-like hair loss in the fronto-parieto-temporal area (10,11).

The diagnosis of AA is typically based on clinical findings, and additional testing is typically not required. However, a number of methods, such as dermoscopy or histology, can help confirm the diagnosis (12).

A variety of therapeutic options for the treatment of AA are available, including topical steroids, steroid injections, topical minoxidil, anthralin, phototherapies and lasers, topical immunotherapy, immunosuppressants, and cryotherapy. Factors, such as age, duration, and intensity of AA play a major role in response to treatment (7,13). Recently, the Food and Drug Administration (FDA) approved baricitinib (JAK 1/2 inhibitor) for treating severe AA. In two phase 3 trials involving patients with severe AA, oral baricitinib was better than the placebo with respect to hair regrowth at 36 weeks (14).

Disability-adjusted life years (DALYs), which include years lost to disability (morbidity) and years lost to death (mortality), are used to calculate the burden of disease. One DALY is equal to one year of lost healthy life. In 2010, 1,332,800 DALYs for AA were estimated globally (15).

Even though numerous and readily accessible epidemiological studies concerning AA from various regions in Saudi Arabia have been published, a lack of data concerning AA from the south region, particularly from the Al-Baha region, exists.

Materials and Methods

The study is region-specific research, targeting Saudi Arabia's population who reside in Al-Baha region. Al-Baha region is located in Saudi Arabia's southern region. Six towns make up the province, the most significant of which are Al-Baha center, Baljurashi, Almandaq, and Almekhwah, in addition to other smaller towns. With a population of 533,000, the province features 31 administrative centers. As discussed in the introduction, the aim of the present study was to determine the clinico-epidemiological profile and burden of AA in the Al Baha region and to subsequently highlight the factors affecting disease prevalence. The study further performed a descriptive analysis through data collection with the help of a questionnaire generated in English and then translated into Arabic so that the questions could be understood by the patients.

For the responses, the questionnaire was created on Google forms after receiving permission from the university's Research and Ethics Committee. Informed consent forms were distributed and signed by the patients. The patients with alopecia areata were targeted to collect responses in different cities of Al-Baha region, and for children the questionnaire was filled in by their parents. The questionnaire consisted of questions regarding patients' experience, assumptions, heredity, ethnicity, and other genetic variables for disease prevalence. Demographic information of the patients was collected for evaluating age, gender, and qualification-related credentials. Data collected from the study were subject to statistical analysis with the aid of Statistical Package of Social Sciences (SPSS) software.

The study included responses from 385 patients, including male and female respondents, based on a 5-point Likert scale. Patients reporting scalp radiation therapy, chemotherapy and trichotillomania, and cancer were excluded from the study before data collection. The patient's family history was an important part of the information collected from the patients through the distributed questionnaire. Questionnaire distribution was done through an online platform to save time and cost, due to limited resources and time concerns.

The results were generated in real time to maintain the credibility of the study results. The study also complied with ethical standards for which no patients' personal information was shared, and only the responses were included to obtain the demographic analysis. Patients were guided through the study objectives to avoid misconceptions and misunderstandings.

The study results showed the extent of AA burden and its determinants in Al-Baha locals in Saudi Arabia via statistical analysis, to serve as the base to analyze ethnic and demographic characteristics for the occurrence of AA in the population.

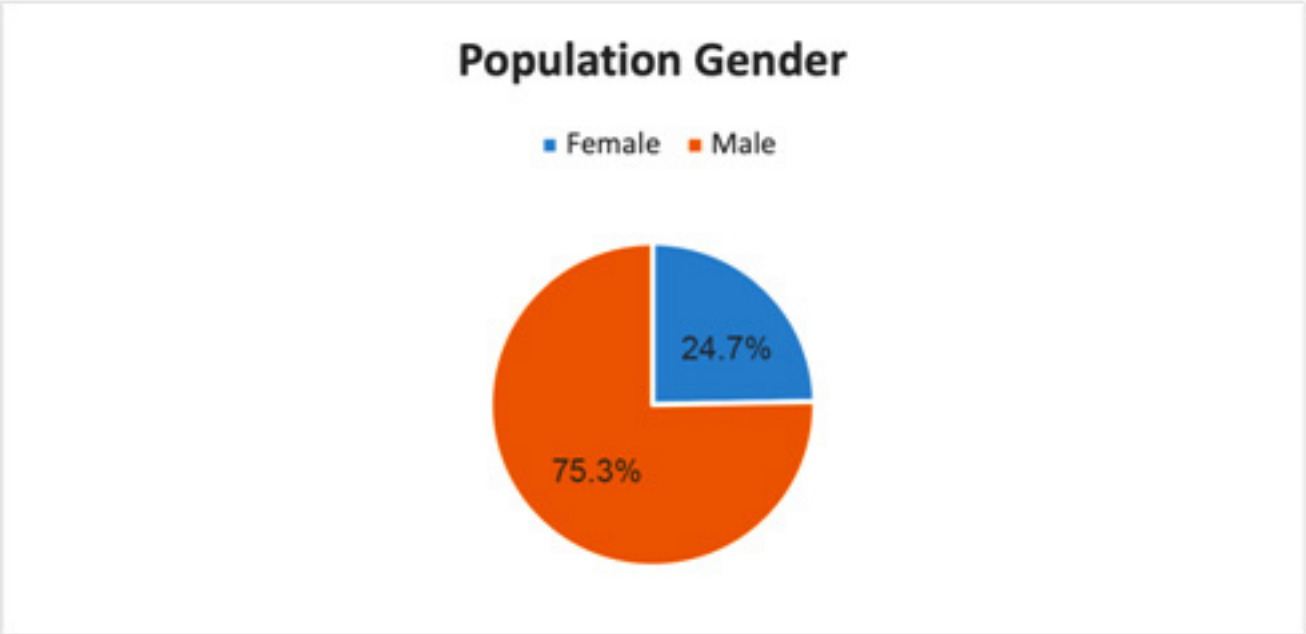
Results

Study population

After receiving the responses from 385 AA patients who completed the questionnaire, the response rate was found to be 100% since all patients responded to the survey. The patients demographic study found that responding participants included 75.3% male and 24.7% females (see Table/Figure 1). Al-Baha Center comprised the highest percentage of AA patients (36.1%) followed by Baljurashi City (17.1%) as illustrated in Table/Figure 2.

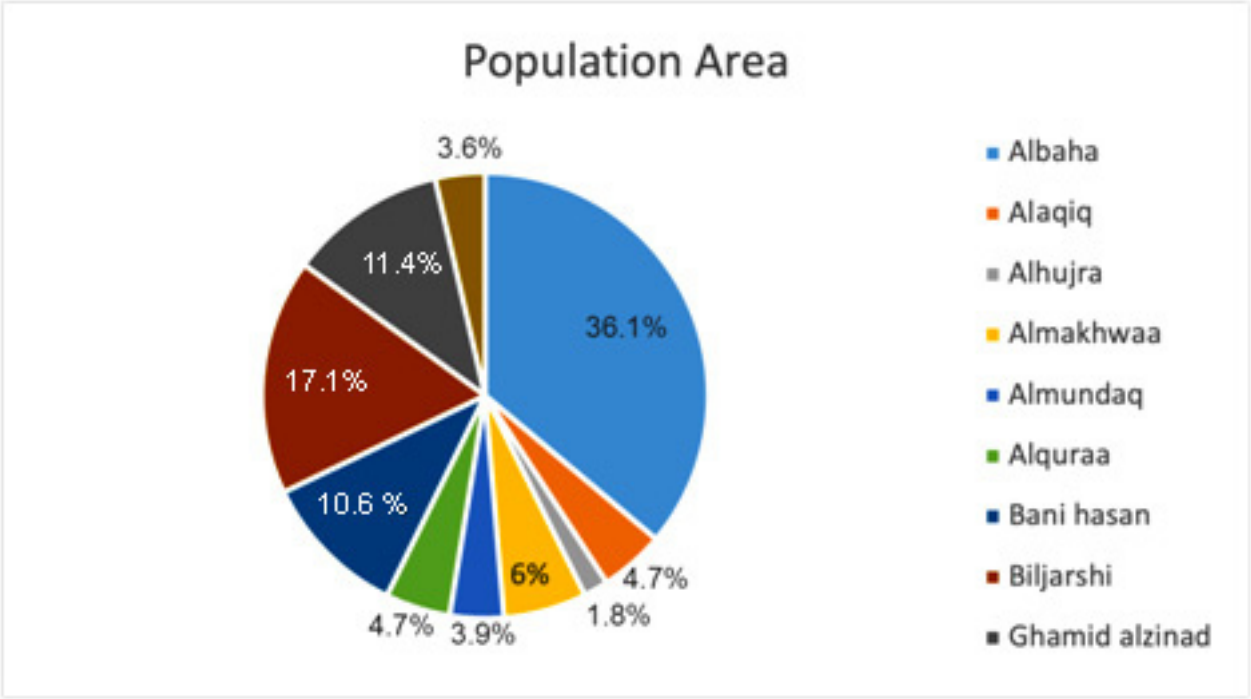
Table/Figure 1. Population Gender

		Patient Numbers	Percentage
Gender	Male	290	75.3%
	Female	95	24.7%
	Total	385	100%



Table/Figure 2. Population Area

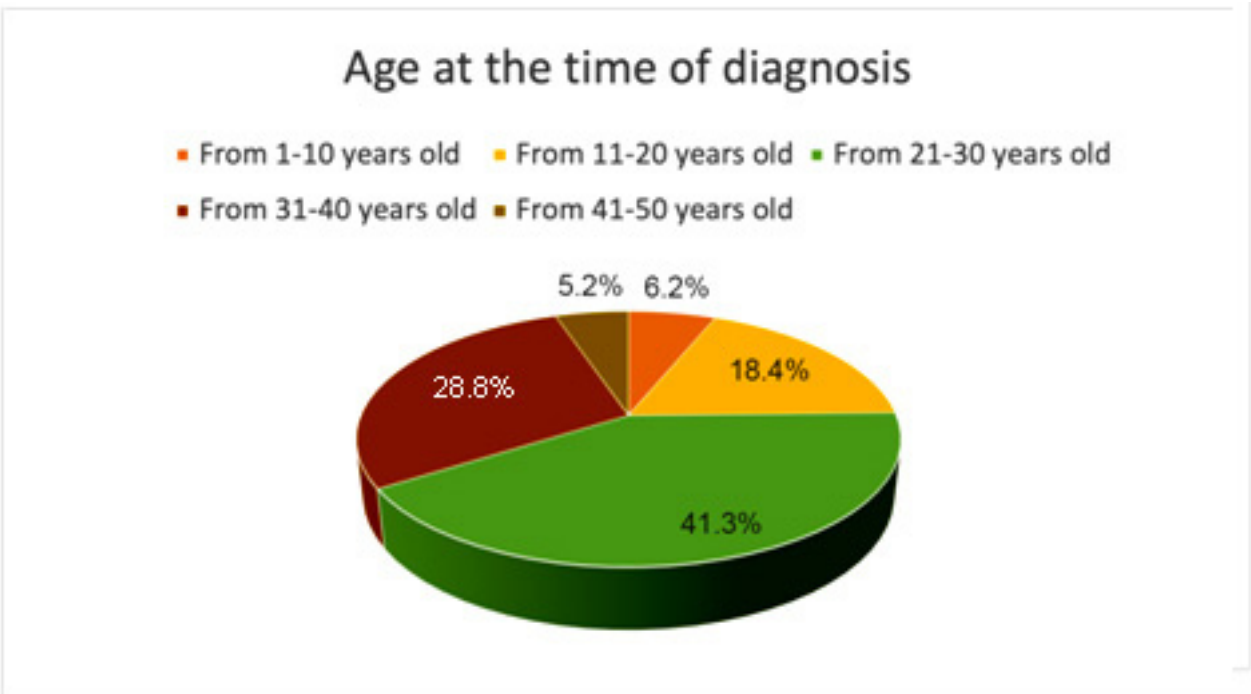
		Patient Numbers	Percentage
Cities	Al-Baha center	139	36.1%
	Baljurashi	66	17.1%
	Ghamid alzinad	44	11.4%
	Bani hasan	41	10.6%
	Almakhwaa	23	6.0%
	Alquraa	18	4.7%
	Alaqiq	18	4.7%
	Almundaq	15	3.9%
	Qilwa	14	3.6%
	Alhujra	7	1.8%
	Total	385	100%



Disease characteristics:
Most were diagnosed at the age range of 21 to 30 years old (41.3%) followed by 31 to 40-year-old patients (28.8 %); however, other age ranges during which patients were diagnosed with the disease were also found (Figure/Table 3).

Table /Figure 3. Age at the time of diagnosis

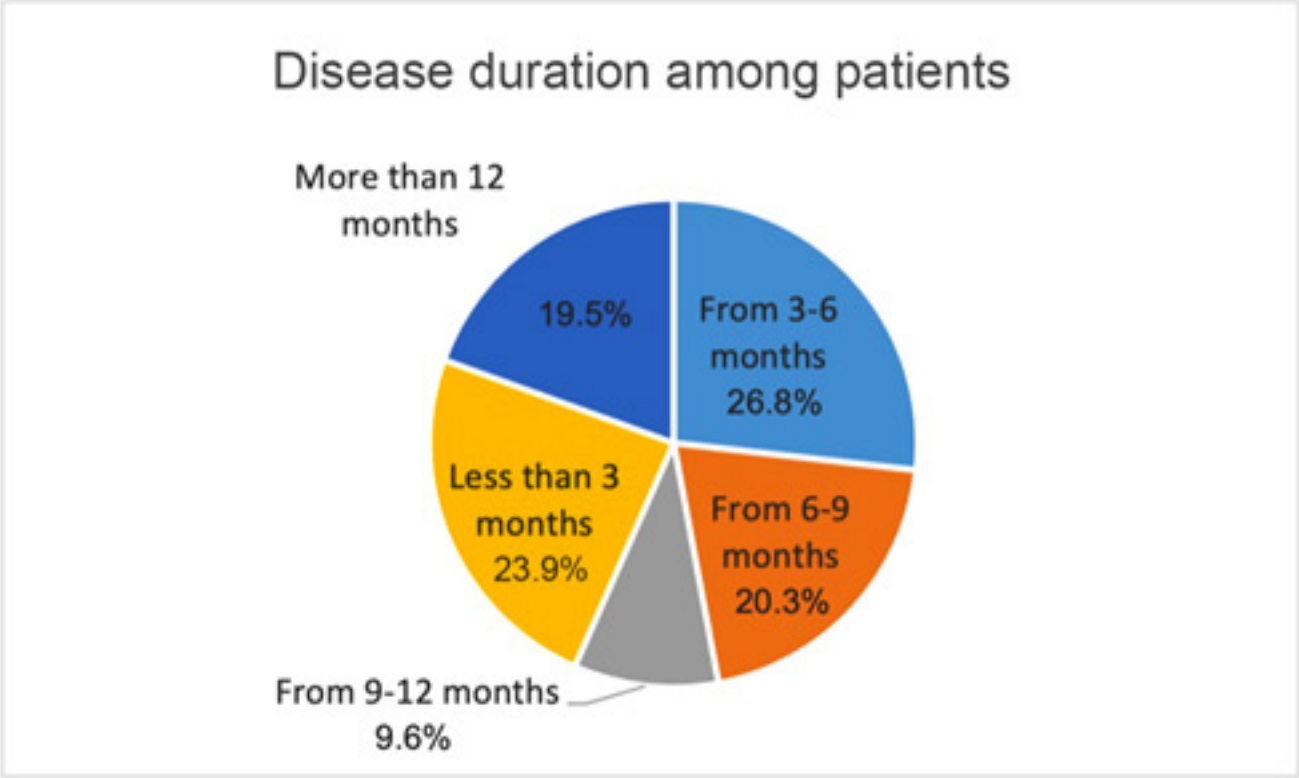
		Patient Numbers	Percentage
Age at the time of diagnosis	From 21 to 30 years old	159	41.3 %
	From 31 to40 years old	111	28.8%
	From 11 to 20 years old	71	18.4%
	From 1 to 10 years old	24	6.2%
	From 41 to 50 years old	20	5.2%
	Total	385	100%



The duration of their AA disease lasted usually around 3–6 months (26.8%) while it was present less than 3 months in about 23.9 %. A smaller percentage of patients continued to present with AA after nine months as shown in Figure/ Table 4.

Table/Figure 4. Disease duration among patients

		Patient Numbers	Percentage
Disease duration	Less than 3 months	92	23.9%
	From 3 to 6 months	103	26.8%
	From 6 to 9 months	78	20.3%
	From 9 to 12 months	37	9.6%
	More than 12 months	75	19.5%
	Total	385	100%

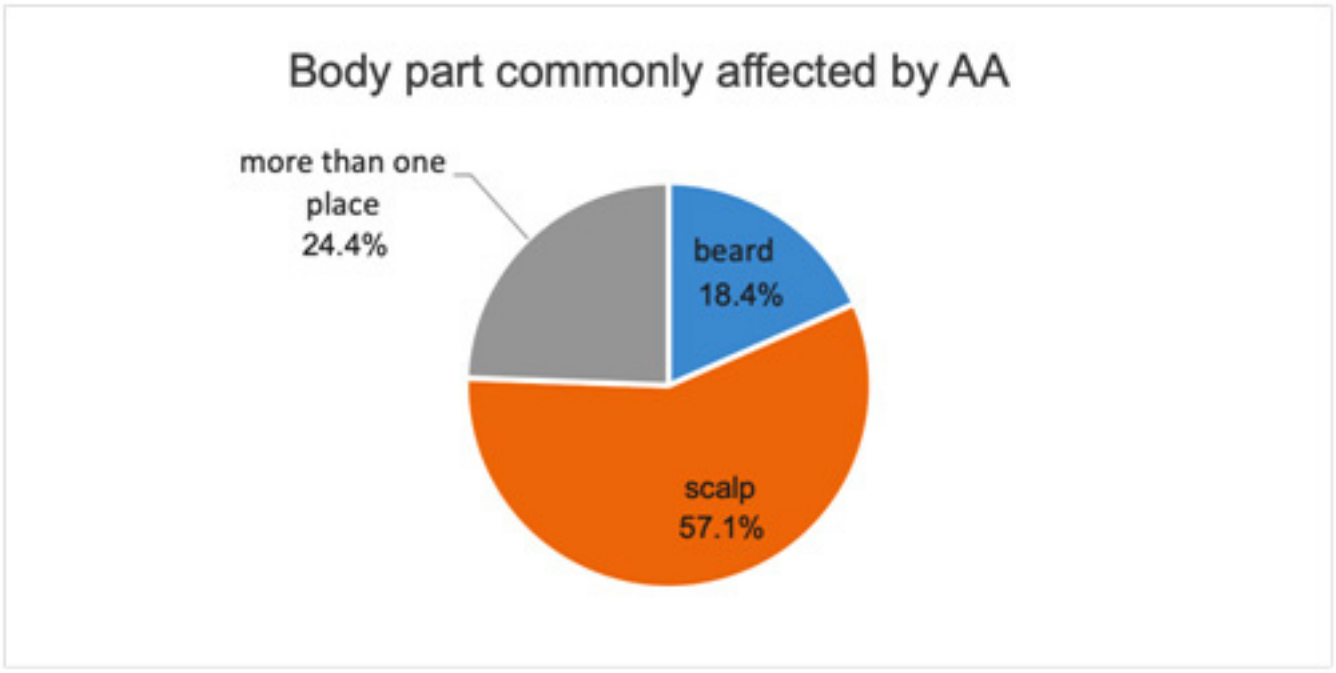


Body Site

The most common body part usually affected was the scalp in patchy type (57.1 %), and beards in male patients were involved in about 18.4%. AA affecting more than one site was found in about 24.4% of the patients.

Table/Figure 5 - Body part commonly affected by Alopecia Areata (AA).

		Patient Numbers	Percentage
Body sites	Scalp	220	57.1%
	Beard	71	18.4%
	More than one place	94	24.4%
	Total	385	100%

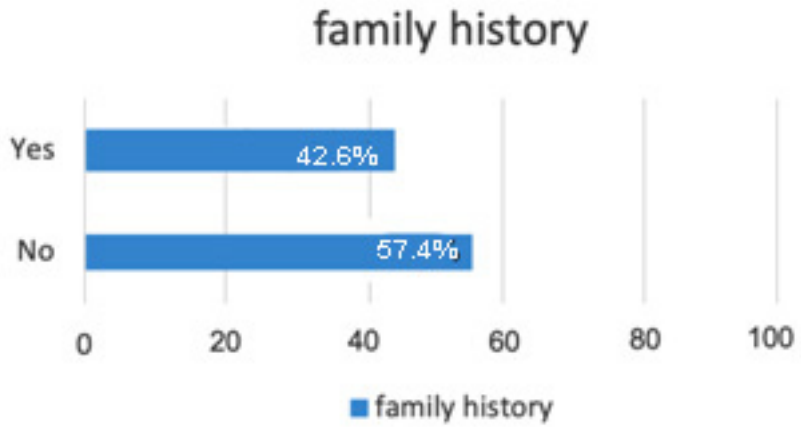


Family History

More than half (57.4%) of patients reported a negative family history of disease, while 42.6 % of patients reported a positive family history. These results may indicate the role of other factors that can cause AA in the target population.

Table/Figure 6 family history of having AA.

		Patient Numbers	Percentage
Family history	No	221	57.4%
	Yes	164	42.6%
	Total	385	100%

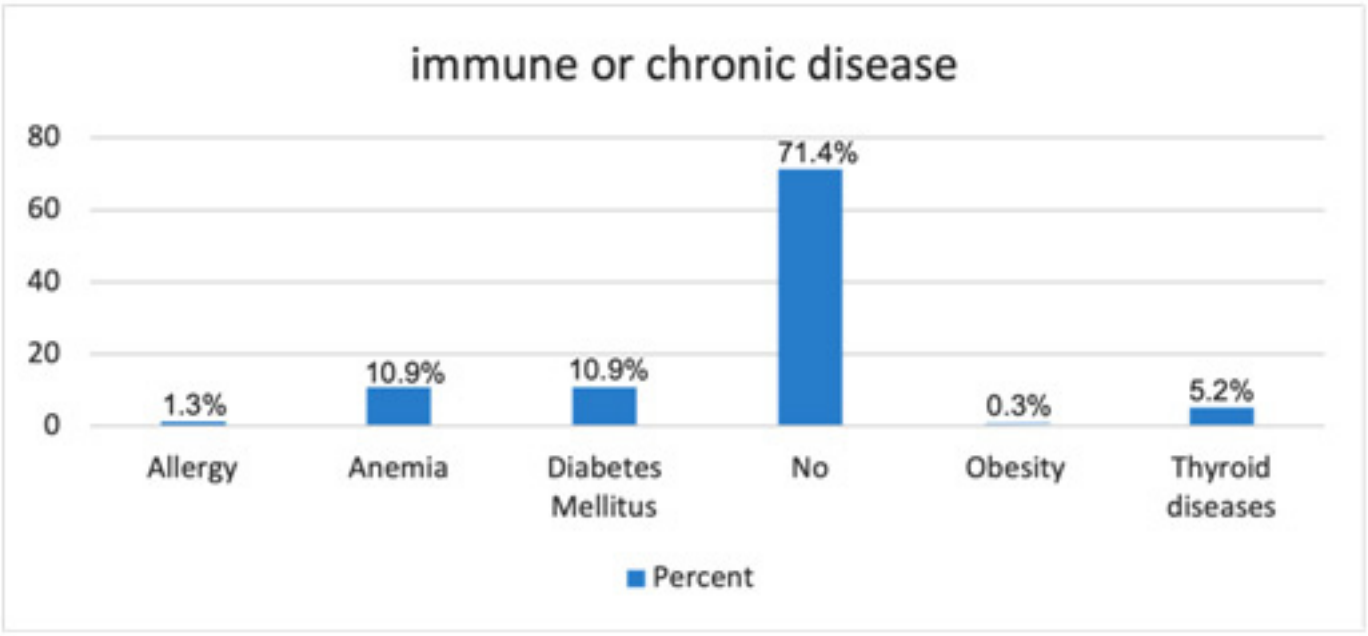


Associated immune and chronic Disease

About 71.4% of the patients did not have immune or chronic diseases, whereas 28.6% did. The most common diseases were chronic anemia and diabetes mellitus (10.9 %) followed by thyroid diseases in 5.2 %, atopic dermatitis, and obesity. The role of immune diseases must also be studied for understanding the risk of inducing AA.

Table/Figure 7 Associated chronic or immune diseases

		Patient Numbers	Percentage
Associated chronic or immune diseases	No	275	71.4%
	Diabetes Mellitus	42	10.9%
	Chronic Anemia	42	10.9%
	Thyroid diseases	20	5.2%
	Atopic dermatitis	5	1.3%
	Obesity	1	.3%
	Total	385	100%



Quality of Life

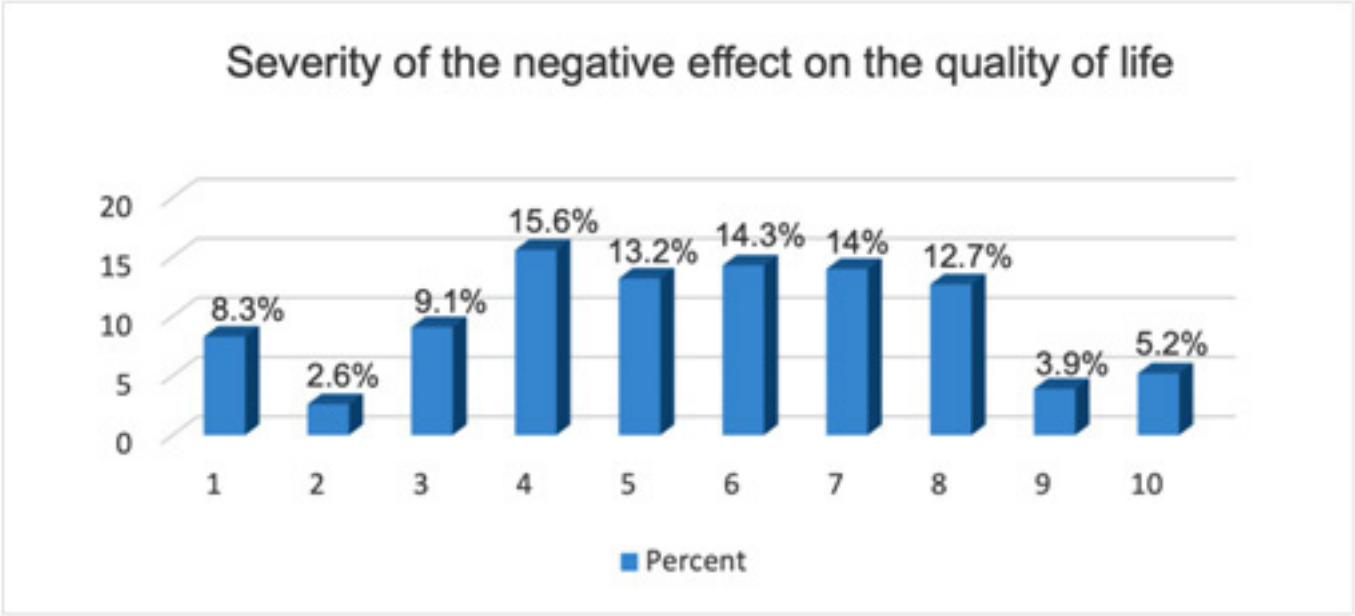
About 66.2% of patients reported that alopecia negatively affects their quality of life, raising the concerns for this disease and its consequences on an individual's daily living activities (see Figure/Table 8). On a rating scale from 1 to 10 assessing the severity of the negative impact of AA on quality of life, most patients reported the negative impact had a severity between 4 and 8, indicating that most of our patients experienced moderate negative effects on their quality of life as shown in Figure/Table 9.

Table/Figure 8. AA impact on quality of life

		Patient Numbers	Percentage
Impact on quality of life	Yes, it affected me	255	66.2%
	No, it didn't affect me	130	33.8%
	Total	385	100%

Table/Figure 9: Severity of the negative effect on the quality of life

		Patient Numbers	Percentage
Severity of the negative effect on the quality of life " 1 indicates the least severe negative effect 10 indicates the most severe negative effect "	1	32	8.3%
	2	10	2.6%
	3	35	9.1%
	4	60	15.6%
	5	51	13.2%
	6	55	14.3%
	7	54	14.0%
	8	49	12.7%
	9	15	3.9%
	10	20	5.2%
	Total	381	99%
Missing System		4	1%
Total		385	100%

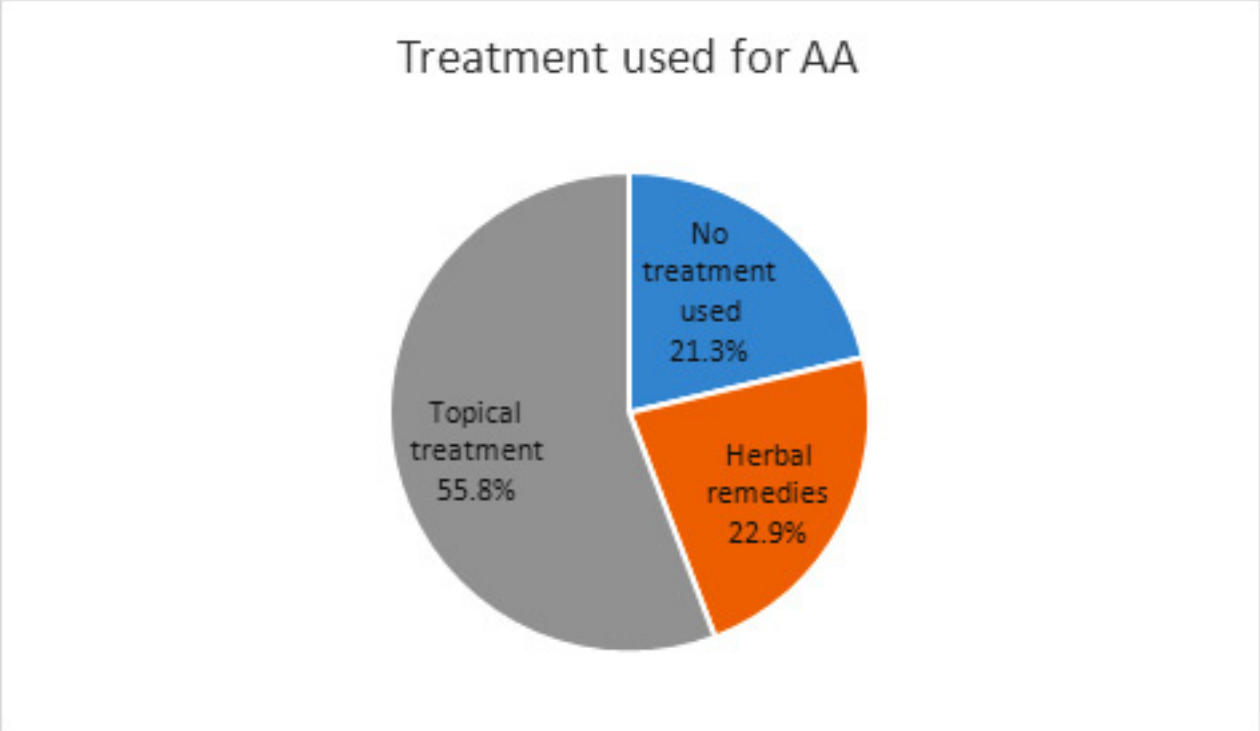


Type of Treatment

The most common treatment type reported was topical medications including local injection (55.8%). However many patients used herbal remedies (22.9%). About 21.3 % of the patients used no treatment and the condition improved with time. Minoxidil spray, topical corticosteroids, and local corticosteroids injection were the most commonly used treatment modalities.

Table/Figure 10: Type of treatment used by our patients.

		Patient Numbers	Percentage
Type of treatment	topical treatment	215	55.8%
	herbal remedies	88	22.9%
	no treatment used	82	21.3%
	Total	385	100%



Discussion

Worldwide, AA affects 2% of the global population (2). Few studies have discussed the epidemiology of the disease in Saudi Arabia and its regions like Jeddah and Riyadh (3,13,16). One study clearly highlighted that AA onset is significantly higher in Saudi Arabia than in Western countries (3).

More male patients than females participated in the study, indicating higher disease occurrences in the male population. Al-Ajlan et al. (2019) reported in a study in Saudi Arabia that more cases of females than males in the studied population were found. However, the prevalence in males was still greater than in females with males having 18% and females having 11% prevalence (3). Besides, in prevalence studies in Western regions, such as the United States (US), equal numbers of male and female patients with AA diagnoses were studied, and it was concluded that AA occurs more often in the male gender.
The age of disease onset varies among different cities of the Al-Baha region. It was noticed that patients are mostly diagnosed with AA at the age of 21 to 30 years followed by the age groups of 31 to 40 years and 11 to 20 years. These findings show that the onset of disease in the Al-Baha region occurs earlier compared to other studies. In regard to the duration of disease, our results indicated that the duration of the disease varies among male patients from less than 3 months, 3–6 months, 6–9 months up to 9–12 months. In females, the duration of onset was usually 9–12 months and more than 12 months. Both age and duration of onset can influence the severity of the disease. One study in Turkey found that ophiasis is 2.9 times more likely to occur in people with > 12 months of AA duration than those with < 12 months of disease duration (17). Such a risk of complications, therefore, necessitates the need for assessing the disease duration.

In addition, in our study, the scalp was found to be the most common region that was affected (57.1%). However, in males, beard regions were also affected in 18.4% of the patients, while in other cases of disease more than one place of the body are affected in 24.4%. Studies in the literature report that some body areas have specific signaling pathways for hair growth and development thereby making them genetically susceptible loci to AA (18). A study in Jeddah reported that disease severity can be estimated by the involvement of specific body regions such that moderate cases of AA had < 50% of the scalp region involved, whereas severe cases have > 50% involvement of scalp hair loss (16). The effects on the scalp were further studied for the influence on the quality of one's life whereby it was reported that AA incurs feelings of embarrassment and self-consciousness and impacts the choice of clothing (19).

Upon investigation of the risk factors for AA, most patients reported that they did not have a family history of AA (57.4%), while 42.6% of patients reported a positive family history. This result is the same as the findings from a very early study in the US in which 42% of AA patients had a family history of AA(20). A study in Kuwait likewise reported 51% of family history in children with AA. However, such a history was not found for first-degree relatives (21). However, earlier studies in China report a 1.6% prevalence among first-degree relatives for AA patients with a positive family history of AA (22). In the recent literature, Wang et al. (2018) studied the impact of a family history of AA identifying that family history is associated with earlier onset of the disease, severity, and AA relapses. Also, a remarkable reduction in the regrowth of hair occurs. This finding means that a family history of AA can worsen the mild conditions of patients with such a diagnosis (23). Some patients with family history of AA have reported that they have immune or chronic diseases, most commonly anemia and diabetes mellitus followed by thyroid diseases. Hence, the study of these diseases and their association with AA must also be studied. Some environmental triggers reported in the literature consist of emotional stress, pregnancy, micronutrient deficiencies, such as Vitamin D, Vitamin B9, zinc, and natural disasters(2,24).

Interestingly, a significant proportion of patients reported that AA negatively affects their lives. Literature has also studied the impact on quality of life using different scales of life quality and depression index in a Japanese population. The results showed negative effects on mental health, and social and emotional functioning of the target population (25). The scale used in the present study was based on the AA Symptom Impact (AASI) scale for assessing the impacts of AA on daily life activities (work, enjoyment, relationships, interactions, and quality of life). The scale ranging from 1 to 10 has an interpretation such that 1 indicates no interference in daily functioning, and 10 indicates complete interference (26). In this regard, the present findings show that alopecia can negatively impact the quality of life from moderate to even severe, to the extent of completely disrupting the quality of daily functioning (for those reporting 10 on the scale). It was reflected overall that Alopecia can interfere with one's quality of life and has a variable range of symptoms from mild to moderate to severe; hence, study of its management in conjunction with its etiology is concurrently important.

The present study also investigated the type of treatment received by the patients. A range of treatments, including herbal remedies, topical treatment administration, and local injections, are available. From our findings, it was revealed that most of the patients use topical treatments, including local injections followed by herbal remedies. A study in the Taif region of KSA reported that doctors referred to topical corticosteroids as the most preferable treatment for AA due to 90% effectiveness (27).

Our study presents some limitations since the online distribution of questionnaires and the focus on different cities of Al-Baha region even though the study must be fully conducted within the target region. The reasons for such activities are due to the accessibility and feasibility of research and because the aim of the study was to study the burden of the disease in the Al-Baha region, whereas other

regions of the KSA may show other significant findings for investigating this disease in the target area. Also, based on some limitations in the present study, future research can be improved in terms of its design and outcomes for attaining more effective findings.

Conclusion

Throughout the study, AA as a disease was reflected as a wide concern for the population of Al-Baha region in Saudi Arabia considering the variable prevalence in different cities, especially in Al-Baha center itself. AA was found to be more prevalent in males than in females in Al-Baha. The usual age of incidence was around 21–30 years or 31–40 years old. The duration of AA significantly varies and can influence disease severity. Both family history and environmental drivers can trigger the incidence of AA in the target population. Apart from this, the indication of a link between autoimmune disease and AA appears to exist. Finally, this study potentially adds more knowledge and theoretical understanding of AA epidemiology and risk factors in Al-Baha region, Saudi Arabia since very limited literature on this topic can be found.

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Knowledge and attitude of Princess Nourah University Students Towards Sun Protection

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Abstract

Background: Hyperpigmentation, early skin wrinkling, skin cancer, and many other serious skin problems are caused by the sun's harmful UV rays. Yet, there are many preventive ways that allow us to enjoy the sun and even take benefits from it without causing any harm to the skin. One very effective and useful way is through applying sunscreen with adequate Sun Protection Factor (SPF) and good coverage. However, the Saudi community lacks education on the importance of applying sunscreen or how to effectively use sunscreens and what could be prevented with its usage.

Objectives: This study aims to estimate PNU student's awareness and knowledge of sun safety, to compare between healthy and non-healthy students in regards to knowledge and practice, to assess the protective behaviors toward sun exposure among PNU students, and to provide the public with information regarding safe sun protection.

Methods: This cross-sectional study was conducted among 900 PNU students using convenient sampling. The study was conducted between November 2019 and March 2020. Data was collected by a paper-based questionnaire of 46 questions and all statistical analysis was done by SPSS software.

Results: A notable difference was observed among students of health colleges, vs students from non-health colleges. 71.7 % of poor knowledge was correlated with non-health students and 28.3% was associated with health students. However, both groups showed no significant differences when it came to sunscreen use and practice.

Conclusion: Sunscreen usage and utilization were substantially low among PNU students. Despite the high knowledge level that health students represented, this did not affect their sunblock application. Awareness of the importance of sun protection was low among PNU students.

Keywords: Awareness; Knowledge; Sun safety; Attitudes; Practices; Sunscreen; Sunblock.

Introduction

Ultraviolet radiation has both negative and positive effects on one's health. Under the influence of sun rays, vitamin D is synthesized in the skin, therefore adequate but protected exposure is needed. Most of the benefits are related to vitamin D and how it is involved in many metabolic activities (1). Additionally, regular sun exposure has anticancer effects by contributing to the prevention of breast, colon, prostate cancers, melanoma and non-Hodgkin lymphoma which is related to vitamin D(1). Moreover, it is involved in treating some skin diseases like psoriasis and non-psoriasis conditions, and sclerosing conditions(2). Likewise, sunbathing or tanning has good advantages such as reducing pain in fibromyalgia(2). Regular exposure promotes the production of serotonin, which is involved in the sensation of happiness, well-being and mood enhancement(2). However, acute and chronic skin damage can arise from unprotected exposure to (UV) radiation as well as infrared radiation. UV Radiation can harm skin cells and cause acute damage such as erythema, episodes of sunburn and tanning. Furthermore, it can cause chronic skin issues with long term UV exposure such as hyperpigmentation (e.g. Melasma), and premature wrinkles(3). Long-standing unprotected exposure to UV rays can increase the risk of developing melanoma and this risk increases two-fold after sunburns (4). On the contrary, chronic non-burning protected exposure reduces that risk (4). Melanoma is accountable for 75% of skin cancer deaths worldwide (5). People with fair skin tones are at higher risk of developing melanoma but individuals with darker skin tones are not saf;, they still have the risk of developing late-stage skin cancer (6). Sun protection behaviors are considered an essential step that prevents skin damage induced by chronic sun exposure(6). Avoiding sun exposure between 10 a.m. - 2 p.m., seeking shade, wearing wide-brim hats, sunglasses and protective clothing and the use of sunscreen products are the main methods for efficient sun protection (6). Throughout various countries, several sun protection campaigns have been initiated to increase the public's awareness of sun exposure risk and the encouragement of using different sun protection measures, thus; a significant improvement of the population's awareness has been observed (6). Nonetheless, compliance with sun protection remains inadequate (6). Dermatology clinics have found plenty of misconceptions and improper attitudes towards sun protection in a substantial number of patients (7). There have been few studies in Saudi Arabia regarding this matter. Not much is known about the Saudi population's understanding of the use of sun protection measures (6). For effective interventions, information from this study may be helpful. This study aims to investigate the awareness, attitudes, and behaviors among Princess Nourah University students in Riyadh, Saudi Arabia regarding sun exposure and safety. Students were chosen because they were in the age range where sun exposure habits were known to reduce skin aging and cancer (6).

Objectives

1. To estimate PNU student's awareness and knowledge of sun safety.
2. To compare between health and non-health students in regards to knowledge and practice.
3. To assess the protective behaviors toward sun exposure among PNU students.
4. To provide the public with information regarding safe sun protection.

Materials and Methods

This cross-sectional study was conducted among 900 PNU students using convenient sampling. The study was made between November 2019 and March 2020. Previous literature showed that the prevalence of regular use of sunscreens among the Saudi population was 35% with an expected difference of 10% when the level of confidence is 95% (alpha=0.05), and power of study of 80%(beta=20%). The minimal sample size needed for our study was 511 using G-power software. Data was collected by a paper-based questionnaire of 46 questions. We included 6 questions regarding sociodemographic data, one question about skin conditions, 3 questions about tanning behaviors, and 9 questions to evaluate participants' usage of sunscreen and mode of selection. Also, we wanted to know why some participants refrain from using sunscreen. Finally, we included a scale of 25 statements to estimate the knowledge of participants about the effect of the sun and sunblock. The answers were (yes, no, and I don't know). We coded yes as 1 and no or I don't know as 0, and chose a cut-off point of 13/25 or above as good knowledge and poor knowledge participants were those who scored 12/25 or less. All statistical analysis was conducted using SPSS software in terms of means, standard deviations, median and interquartile ranges which were used to describe criteria of the studied sample. Analysis of the quantitative data was made by t-test while the association of qualitative variables was by the chi-square test. A P-value of less than 0.05 was considered as statistically significant. Multivariate analysis was adopted according to results from univariate analysis.

Results

A total of 900 students at Princess Nourah university were located and agreed to participate in the study (response rate, 99%). The participants were not diverse in terms of age; the mean age of participants was 20.35 years (age range, 17-32 years, SD, 2.01). 33.9% of the participants were from health colleges, and 66.1% were from non-health colleges. The vast majority of the participants were single (92.6%). The socio-demographic records of the study population are represented in Table 1.

Table I. Group Demographics

Characteristics	N=900(%)
Age, Mean±SD:	20.35 ± 2.01
College:	
Health	305(33.9)
Non-health	595(66.1)
Marital Status:	
Single	833(92.6)
Married	67(7.4)
Socioeconomic status:	
High status	419(46.6)
Good status	401(44.6)
Low status	61(6.8)
Poor status	19(2.1)
Skin Color:	
Fair	255(28.3)
Medium	596(66.2)
Dark	49(5.4)
Skin Conditions:	
Lichen Planus	9(1.0)
Eczema	73(8.1)
Acne	261(29.0)
Rosacea	15(1.7)
Cutaneous Lupus	2(0.2)
Melasma	30(3.3)
Urticaria	7(0.8)
# Other	20(2.2)
None	483(53.7)

Psoriasis

Knowledge of PNU Students on Sunscreen.

Table 2: Comparison Between Knowledge Level And Group Demographics.

Group Demographics	Bad Knowledge	Good Knowledge	P-value
Age (Mean, SD)	20.4±2.1	20.4±1.9	0.97
College Health Non-health	 170(28.3) 430(71.7)	 135(45.0) 165(55.0)	<0.01
Marital status Single Married	 557(92.8) 43(7.2)	 276(92.0) 24(8.0)	0.65
Socioeconomic status High status Good status Low status Poor status	 272(45.3) 273(45.5) 41(6.8) 14(2.3)	 147(49.0) 128(42.7) 20(6.7) 5(1.7)	0.72
Skin color Fair Medium Dark	 159(26.5) 408(68.0) 33(5.5)	 96(32.0) 188(62.7) 16(5.3)	0.22
Skin conditions Lichen planus Eczema Acne Rosacea Cutaneous lupus Melasma Urticaria Other No	 5(0.8) 50(8.3) 179(29.8) 10(1.7) 2(0.3) 16(2.7) 4(0.7) 13(2.2) 321(53.5)	 4(1.3) 23(7.7) 82(27.3) 5(1.7) 0(0.0) 14(4.7) 3(1.0) 7(2.3) 162(54.0)	0.78

Respondents' demographics were compared to their knowledge level in Table 2. The survey showed no significant difference between the two groups regarding knowledge in terms of age. 71.7% of poor knowledge was from non-health colleges while only 28.3% were from the health colleges, therefore the difference was significant ($p<0.01$) between the two groups. However, respondents' socioeconomic status, skin color, and conditions did not show any significant difference in regard to the knowledge.

Table 3: Statements representing knowledge level

Knowledge statements	Percentage of the correct response.
There are physical and chemical sunscreens.	23.3%
Best sunscreen products are the ones with 100% SPF.	31.7%
Sunblock only protects against skin cancer.	42.1%
When tanning under the sun, no need to apply sunblock.	25.1%
Applying sunblocks prevent you from getting tanned.	41.2%
Sunblock protects against sunburns.	69.7%
Sunscreens only block UV radiation, they don't filter it.	18.9%
Sunburns increase the risk of getting skin cancer.	52.9%
Using sunscreen may decrease your skin production of vitamin D.	35.2%
Sunscreens can be harmful.	25.3%
Sunblocks protect against ultraviolet rays only.	25.1%

Table 3 illustrates the correct response to statements testing knowledge among the study group. It shows that most participants had a poor knowledge level.

Practice and attitude regarding sunscreens and sun exposure.

Table 4: Comparison Between Health And Non-Health College Students' practice and attitude regarding sunscreens and sun exposure.

Questions:	Health colleges	Non-health colleges	P-value
Question 1: How much time do you spend under the sun in a day?			0.02
< one hour (<7h/w)	190(62.3)	374(62.9)	
1-2 hours (7-14h/w)	90(29.5)	140(23.5)	
> 2 hours (>14h/w)	25(8.2)	81(13.6)	
Question 2: Which of the following sun protective methods do you often use during summer?			
Topical creams	182(59.7)	322(54.1)	0.12
Long-sleeved clothes	76(24.9)	115(19.3)	0.52
Face cover	56(18.4)	108(18.2)	0.94
Question 3: Do you use sunscreen?			0.44
Yes	183(60.0)	341(57.3)	
No	122(40.0	254(42.7)	
Question 4: How did you choose your sunblock?			0.39
By prescription	50(16.4)	112(18.8)	
Over the counter	90(29.5)	161(27.1)	
Social media	13(4.3)	29(4.9)	
Friends	50(16.4)	74(12.4)	
I do not use	102(33.4)	219(36.8)	
Question 5: Do you read labels before buying sunscreen?			0.83
Yes	97(31.8)	181(30.4)	
No	51(16.7)	89(15.0)	
Sometimes	72(23.6)	150(25.2)	
I do not use	85(27.9)	175(29.4)	
Question 6: How often do you use sunscreen?			0.72
Daily	101(33.1)	188(31.6)	
Often	75(24.6)	136(22.9)	
Rarely	38(12.5)	71(11.9)	
I do not use	91(29.8)	200(33.6)	
Question 7: How many times a day do you apply sunscreen?			0.91
Once	116(38.0)	221(37.1)	
Twice	16(5.2)	31(5.2)	
Before going out	65(21.3)	118(19.8)	
I do not use	108(35.4)	225(37.8)	

Table 4: Comparison Between Health And Non-Health College Students' practice and attitude regarding sunscreens and sun exposure. (continued)

Question 8: Where do you typically apply sunscreen?			
Face	193(63.3)	334(57.8)	0.12
Hands	78(25.6)	128(21.5)	0.17
All exposed areas	35(11.5)	70(11.8)	0.90
I do not use sunscreen	95(31.1)	200(33.6)	0.46
Question 9: In your opinion, what causes the disuse of sunscreens?			
It causespimples			
It is sticky	104(34.1)	157(26.4)	0.02
It is expensive	161(52.8)	241(40.5)	<0.01
	143(46.9)	259(43.5)	0.34
Question 10: How often do you tan?			0.44
Once a week	8(2.6)	25(4.2)	
Once a month	11(3.6)	17(2.9)	
Only on holidays	57(18.7)	95(16.0)	
I do not tan	229(75.1)	458(77.0)	
Question 11: At what time do you tan?			0.47
In the morning	45(14.8)	89(15.0)	
At noon	24(7.9)	31(5.2)	
After 3 o'clock	8(2.6)	16(2.7)	
I do not tan	228(74.8)	459(77.1)	
Question 12: How many times have you had sunburn in your lifetime?	45(14.8)	90(15.1)	0.89
Once	19(6.2)	45(7.6)	
2-3 times	10(3.3)	18(3.0)	
More than 3	231(75.7)	442(74.3)	
I never had a sunburn			

62% of the participants spend less than 7 hours per week under the sun. The practice of health college students of sun protective methods was higher by 5.6% than non-health students regarding the usage of topical creams and long-sleeved clothes. Unfortunately, nearly 40% of both groups show a negative attitude regarding sunscreen application. Students favor to choose sunblocks on their own rather than following a prescription. More than 55% of the participants in both groups have a positive attitude in regards to reading sunscreen labels before purchasing. The majority show a positive practice regarding how often they apply sunscreen. Participants tend to apply sunscreens once a day as well as prior to sun exposure. Yet, only 5.2% of sunscreen users apply it two times a day. We asked the participants about their opinion on why people would deter from using sunscreen, the answers were; due to its sticky texture (52.8%,40.5%), it is overpriced (46.9%,43.5%), it provokes acne (34.1%,26.4%). A significant difference is seen by the two groups regarding sticky texture. Positively, the survey shows that three-quarters of the participants in both groups do not practice tanning. Fortunately, about three quarters of the participants in both groups have never had sunburn in their lifetime. While only about 3% of them have experienced a sunburn more than three times. In regards to the practice, Table 4 has not illustrated any remarkable difference between the two groups.

Table 5: Comparison Between participants application of sunscreens

Characteristics	Using Sunscreen	Not using Sunscreen	P-value
Socioeconomic status			0.26
High status	250(47.7)	169(44.9)	
Good status	231(44.1)	170(45.2)	
Low status	36(6.9)	25(6.6)	
Poor status	7(1.3)	12(3.2)	
Skin color			0.30
Fair	145(27.7)	110(29.3)	
Medium	355(67.7)	241(64.1)	
Dark	24(4.6)	25(6.6)	
Skin conditions			0.22
Lichen planus	4(0.8)	5(1.3)	
Eczema	43(8.2)	30(8.0)	
Acne	157(30.0)	104(27.7)	
Rosacea	11(2.1)	4(1.1)	
Cutaneous lupus	1(0.2)	1(0.3)	
Melasma	22(4.2)	8(2.1)	
Urticaria	6(1.1)	1(0.3)	
Other	14(2.7)	6(1.6)	
No conditions	266(50.8)	217(57.7)	
Question: How much time do you spend under the sun in a day?			0.65
< one hour (<7h/w)	328(62.6)	236(62.8)	
1-2 hours (7-14h/w)	138(26.3)	92(24.5)	
> 2 hours (>14h/w)	58(11.1)	48(12.8)	
Question: Do you tan?			0.75
Tanning	126(24.0)	87(23.1)	
Not tanning	398(76.0)	289(76.9)	
Question: Have you had a sunburn in your lifetime?			0.09
Sunburned before	143(27.3)	84(22.3)	
Never sunburned	381(72.7)	292(77.7)	

The sunscreen usage behavior was compared between the demographics, time of sun exposure, tanning and having previous sunburns. Despite using and deterring from sunscreen, socioeconomic status does not affect sunscreen utilization. Surprisingly, skin color and skin conditions had no noticeable impact concerning the use of sunscreen. Nevertheless, the table displays that the number of individuals with a skin condition who use sunscreen is higher than those who have a condition but they do not use sunscreen. For example, most of the affected participants with rosacea, melasma, and urticaria use sunscreen compared to those who do not use it. 11 of 15 of rosacea patients, 22 of 30 of melasma patients, and 6 out of 7 urticaria patients use sunscreens. Yet, the variance is not considerable. More than half of the participants get less than 7 hours of sunscreen exposure a week, and only 328 of them use sunscreens compared to 236 who do not use it. Time spent under the sun, tanning and previously sunburned individuals had no significant difference regarding the application of sunscreen.

Discussion

Knowledge of PNU students on sunscreen use.
Several studies have been conducted in Saudi Arabia to assess the knowledge and attitude of the general population on sunscreen. However, this study is the first to be conducted exclusively on students of Princess Nora University. The knowledge and awareness of the students varied according to their majors; the study shows that health students are more aware of the importance of sunscreen than non-health students are. Almost seventy-six percent of students both health and non-health combined are not aware that there are different types of sunscreen like physical and chemical. Physical sunscreens work by reflecting the rays before penetrating the skin(8). However, chemical sunscreens work by absorbing UV rays, converting them into heat then releasing them before they induce skin damage (8). That could be due to the lack of interest and poor sources of information about sun protection in Saudi Arabia. In fact, we did not know about this valuable information until we started working on this research, which proves that more public education on this matter is needed. The study indicates that 68% of participants believe that 100 SPF is the most effective type of sunscreen which could be considered wrong as the difference is very unremarkable once the SPF gets past fifteen(9). It appears that 57% of respondents think that sunblocks only protect from cancer, which is very wrong. The Food and Drug Administration has approved Sunscreens for use in the prevention of sunburn, photo-induced pigmentation, aging, and carcinoma (10). With this in mind, a large number of students believe that there is no need to apply sunblock when tanning. Having said that, 58% of the respondents believe that sunblock prevents tanning which is considered low compared to the results found in a study in India where almost 80% agree on that(11). Furthermore, sixty-four percent of participants think using sunscreen may decrease the skin's production of vitamin D which was surprisingly high when compared to a study done in King Abdulaziz University where only 30% agreed with that(6). Nonetheless, ultraviolet B rays are shortwaves from the sun that generate vitamin D in the skin; they are blocked by sunscreen usage(12). However, because most users apply lower than the recommended amount of sunscreen they are not deficient in vitamin D (12). In addition, almost 71.1% of respondents agree that sunblocks can be harmful while only 26.2% do not agree. Sunscreens are safe, however, the FDA issued a proposed rule that asks manufacturers to provide more data about the ingredients they use in their sunscreens for further inspection (10). More importantly, 52.9% of students believe that getting sunburned increases the risk of getting skin cancer. This is considered similar to a previously conducted study in 2010 with almost 55%(13).

Practice of sunscreen use in PNU students.
Based on the results of our survey 60% of health students and 57.% of non-health students are using sunscreen, which is considered substantial only in comparison to the rates of the previous studies done in Saudi Arabia. For instance, a study conducted on female students of King Abdulaziz University in Jeddah concluded that only 23% of their respondents were using sunscreen(6). Furthermore, a cross-sectional survey done in Al-Qassim demonstrated a shockingly low rate of 8.3%(13). We speculate that this low rate might be a result of the incorporation of both genders in the Al-Qassim study, as prior research substantiates the belief that the female gender is associated positively with the practice of using sunscreens(14). 62% of our health and non-health participants have been estimated to spend 7 hours or less under the sun weekly. On the other hand, the study done in Al-Qassim estimated an average sun exposure of 19 hours a week (13). This seems to be the same case as the rate of sunscreen use, being attributed to genders and the difference in their behavior. One explanation for the low rate of sun exposure in our results could be the indoor lifestyle that is highly predominant in Saudi Arabia, which could be a result of the hot climate. Health authorities globally have recommended the re-application of sunscreen to increase its effectiveness in preventing sun damage. It has been proved that the combination of two applications of sunscreen gave on average 2 times more protection from Ultraviolet Rays than a single sunscreen application per day (15). With that in mind, only 5.2% of our respondents stated they used a double application of their sunscreen. However, this result appeared to be consistent with other study results, which stated that 3.7% of their respondents were applying their sunscreen twice(6). Upon gathering information from the participants on what discourages people from applying sunscreen, the sticky texture of the sunscreen and the overpricing were mostly chosen. A similar pattern of results was obtained in a prior study that showed sticky texture and overpricing were the most chosen reasons (46%,35%)(11). One finding we found was that most of the students with conditions like melasma, rosacea, and urticaria were using sunscreen. Only 30% of both colleges admitted to reading labels before purchasing sunscreen, which might explain the little knowledge the respondents had on SPF. According to the Skin Cancer Organization, it is recommended to apply sunscreen on all parts exposed to the sun(16). However, only 11% of both colleges were adhering to that recommendation. After analyzing the practice of health and non-health students, it came to us as a surprise that the rate of sunscreen application between the two colleges was awfully similar in spite of the health students scoring a higher knowledge level.

Recommendations

According to WHO, the global incidence of melanoma occurrence has reached 130,000 cases yearly(17). This rate is expected to increase to 4,500 more cases with the further depletion of the ozone levels and the decreased filtration of UVR by the atmosphere. The skin cancer organization has found that sunscreen decreases the risk of squamous cell carcinoma by 40% and melanoma by 50% (16). Based on the results of our research and prior studies in Saudi Arabia, the knowledge of the Saudi population on sunscreen use and benefits is markedly low. To improve this knowledge, we need to implement nationwide sun safety strategies. The first objective of such

strategies should focus on the awareness and compliance of parents in particular. Parents and caregivers are the primary role models of the next generation and have the biggest influence on their behavior and attitudes. Secondly, public facilities and schools principally should ensure the availability of shade, particularly during outdoor activities. Educational facilities are also required to plan flexible timing of outdoor activities reducing the time spent in the sun between 10 AM and 2 PM. The third objective should promote the use of sun-protective clothing such as hats and long sleeves. Lastly, there should be large-scale sunscreen awareness campaigns focusing on schools, shopping malls, and social influencers.

Conclusion

This cross-sectional study reported that the knowledge and awareness of sunscreen practices among PNU students are higher in health students than non-health students. However, the use of sunscreens and other methods of protection was low with no significant difference between the two groups, which emphasizes the need to raise awareness of the public.

Limitations And Strengths

Conducting this study in PNU campus has led to a few limitations including; the study being done in a convenient sample, the representation of health students was lower than non-health students, males are not represented because the study was conducted in a female-only university, and due to conducting the study among students, the age group was narrow. However, the results provide valuable information on the awareness of Saudi female university students about sun protection.

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The prevalence and risk factors of micro and macroalbuminuria among diabetic patients in Taif

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Abstract

Background: Diabetes mellitus is a global public health concern and an important cause of morbidity and mortality. There has been a marked rise in the prevalence and incidence of end-stage chronic kidney disease in Saudi Arabia over the last 3 decades.

Objectives: This work aimed to measure albumin creatinine ratio, calculate the prevalence of diabetic nephropathy, and assess risk factors of micro and macroalbuminuria.

Methods: This is a cross-sectional study that included records of Type 2 diabetes patients who visited the Diabetic Center of King Abdulaziz pecialist Hospital for laboratory investigations starting from October 2018 to January 2019.

Results: 571 type 2 diabetic patients were studied and the overall prevalence of microalbuminuria and macroalbuminuria was found to be 19% (109 cases) where microalbuminuria accounted for 73.39% of all cases (80 cases) and macroalbuminuria accounted for 26.61% of all cases (29 cases).

Conclusion: The prevalence of albuminuria in Type 2 diabetic patients was found to be high, which calls for the need for increasing awareness among type 2 diabetes patients.

Keywords: prevalence, risk,
micro, macroalbuminuria, diabetic, Taif

Introduction

Diabetes mellitus (DM) is a chronic, metabolic disease characterized by hyperglycemia as a result of insufficient insulin production or action or both as reported by WHO. There are more than 422 million people who have diabetes worldwide, and it is a primary cause of death globally (WHO). Diabetic nephropathy (DN) is a major complication of diabetes mellitus, and it is one of the leading causes of end-stage renal diseases (ESRD) (1).

DN is a major concern because it decreases the life expectancy of diabetic patients (2). Without proper management of Type 2 diabetic patients, 20 to 40% with microalbuminuria (MA) progress to develop nephropathy after 20 years from the onset of diabetes, where 20% develop ESRD (3).

DN is a microvascular complication of DM and is known to be the leading cause of ESRD worldwide (4). Diabetic patients who develop albuminuria, are at risk of developing diabetic nephropathy (DN). In this condition, DN can progress from MA to macroalbuminuria. MA is considered an early marker of DN and a predictor for cardiovascular diseases (5).

The progression of DN from proteinuria to renal failure is irreversible (6). Therefore, the early detection of MA is crucial. The American Diabetes Association (ADA) recommends that all Type 2 diabetic patients should have an annual MA urine test, starting at the time of diagnosis (7).
In Saudi Arabia, the rate of MA among Type 2 diabetic patients attending the outpatient clinic for the internal medicine department at King Fahd University Hospital, Al-Khobar was 36.8% (8). Another study was conducted at the Primary Health Care Clinics at King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia on 1,416 Saudis with type 2 diabetes. Microalbuminuria was present in 33.2% of DM patients (9). A cross-sectional study, where 54,670 Saudi Type 2 diabetic patients were selected from the Saudi National Diabetes Registry found that the prevalence of DN was 10.8%, divided into 1.2% MA, 8.1% macroalbuminuria, and 1.5% ESRD (10).

In the United Kingdom, the Prospective Diabetes Study (UKPDS), for newly diagnosed patients those with type two diabetes who progressed from normal, to microalbuminuria to macroalbuminuria and renal failure were 2 to 3% annually

(11). And after 15 years in median of follow up for four thousand diabetic patients, almost 40% developed albuminuria, and almost 30% developed renal failure (4). In Japan, the number of new patients who started renal replacement therapy due to diabetes has increased 7 fold, accounting for 40% of overall newly diagnosed patients (12). Also, NICE guidelines recommend using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) creatinine equation to estimate GFR creatinine (13).

Another cross-sectional study was done in 33 countries which evaluated more than 32,000 type 2 diabetic patient and 39% of them were found to have microalbuminuria, where the prevalence increased with aging, presence of hypertension and the duration of diabetes itself (14). Also, DN increases the morbidity and mortality universally among diabetic patients, and it is the largest cause of chronic renal diseases (15).

The complication of DN has been a major burden on developing countries and their health care systems. Kingdom of Saudi Arabia (KSA) is one of the highest countries in the prevalence of diabetes and its complications (16). Almost one-third of the patients who were diagnosed with type two diabetes have nephropathy (12). Additionally, in 2011 more than 40% of the ESRD cases in KSA were associated with diabetes (17).

Subjects and Methods

Study design, setting and time: This was a cross-sectional study that included records of 571 Type 2 diabetes patients who visited the Diabetic Center of King Abdulaziz Specialist Hospital for laboratory investigations starting from October 2018 to January 2019. Only patients having micro or macroalbuminuria were included. Exclusion criteria included patients with type 1 diabetes and patients with an uncompleted or inaccessible files during data collection.

Data collection: The data was gathered from patients' laboratory records. Data comprised Lab results, which were collected from the lab database of the Diabetic Center, while risk factors assessment was taken from patients' files according to doctors' history taking and notes.

Collected data included last reading of measured Albumin creatinine ratio, Fasting Blood Glucose, Hemoglobin A1C and Lipid Profile (HDL, LDL, Triglyceride, Cholesterol), Risk Factors of Micro and Macro albuminuria (Age, Smoking, Weight, Height, BMI, duration of DM) complications of long-standing T2DM (nephropathy, neuropathy, vasculopathy, retinopathy) and associated diseases with T2DM (HTN, Hyperlipidemia, IHD).

Microalbuminuria was considered if the patient had an albumin creatinine ratio (ACR) >30 and <300, while macroalbuminuria was considered from 300 and above ACR.

Statistical analyses: Data were represented in terms of frequencies (number of patients/ cases) and valid percentages for categorical variables. Mean, standard deviations (SD), minimum and maximum values were used to describe a numerical variable. IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) was used to perform all statistical calculations, version 22 for Microsoft Windows.

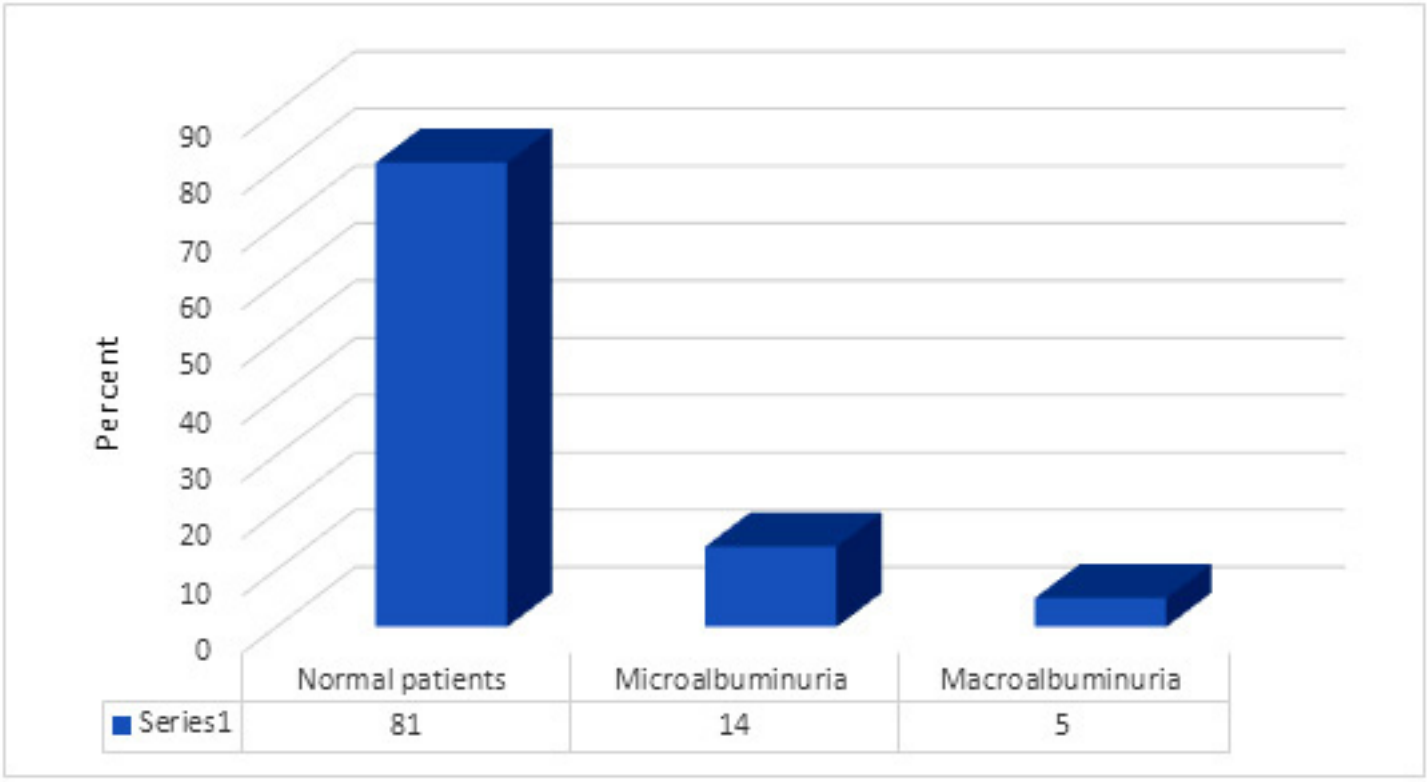
Ethical considerations: Institutional research ethics board approval was acquired before conducting any study procedure. The study was approved by the Ethical Committees at Taif University and KAASH.

Results

In this study, data from 571 patients' records was collected retrospectively. Data included patients' symptoms and laboratory findings.

Among 571 patients, 109 patients had positive ACR, where 80 of them had microalbuminuria and 29 had macroalbuminuria as shown in Figure 1.

Figure 1.:Prevalence of ACR among studied patients



Descriptive Analysis

Among 80 patients with microalbuminuria, 66 (82.5%) were above 50-years-old. Also, out of 70 of microalbuminuria patients, 44 (62.85%) had diabetes for less than 16 years. The mean HbA1c for microalbuminuria patients was 8.61% but only 71.25% of them were on insulin therapy. 67 of the microalbuminuria patients had comorbidities, 47 (70%) had hypertension, 15 (22.4%) had hyperlipidemia, 5 (7.5%) had nephropathy, 3 (4.5%) had ischemic heart disease, and 2 (3%) had benign prostate hypertrophy.

The other 29 patients with macroalbuminuria had a mean level of HbA1c 9.2. Out of the 29 macroalbuminuria patients, 27 patients had diabetes for less than 18 years. 82% of them were on insulin therapy. Regarding macroalbuminuria complications, 6 (28.6%) had nephropathy, while 5 (23.8%) had neuropathy, 6 (28.6%) had vasculopathy, 5 (23.8%) had retinopathy and only 1 (4.8%) had combined nephropathy, neuropathy, vasculopathy, and retinopathy. A full description is detailed in Table 1.

Table 1. Differences between microalbuminuria and macroalbuminuria according to quantitative data (Age, creatinine, HbA1c, LDL, HDL, Triglyceride, cholesterol, duration of diabetes)

Variable	Microalbuminuria	N (%)	Missing data	Macroalbuminuria	N (%)	Missing data
Age	59.2	80	0	61.4	29	0
Creatinine	1.195	63	17	1.750	23	6
HbA1c	8.61	80	0	9.20	29	0
LDL	99.67	75	5	97.45	26	3
HDL	40.38	69	11	36.76	25	4
Triglyceride	155.18	72	8	204.25	24	5
Cholesterol	166	71	9	172	24	5
Duration of diabetes	13.2	70	10	15.5	27	2

Discussion

In the present study, 571 type 2 diabetic patients were studied and the overall prevalence of microalbuminuria and macroalbuminuria was found to be 19% (109 cases). where microalbuminuria accounted for 73.39% of all cases (80 cases) and macroalbuminuria accounted for 26.61% of all cases (29 cases).

Comparing means of results, age, levels of creatinine, fasting blood glucose, HbA1c, triglyceride, cholesterol, duration of diabetes and systolic blood pressure are higher in patients with macroalbuminuria than microalbuminuria, however, diastolic blood pressure did not show a significant difference in patients with and without microalbuminuria, with a mean of 77.

In a prior study, it was discovered that microalbuminuria was substantially correlated with aberrant HbA1c levels, hypertension, and excessive serum creatinine. There was no difference between patients with and without microalbuminuria in terms of mean age, BMI, or cholesterol levels (18).

Age-related differences in albuminuria incidence have been the subject of some research (19, 20). Even after adjusting for the length of the illness, Bruno et al. observed that growing older was independently linked with microalbumiuria in an Italian population (19). In contrast, even in univariate analysis, our study design in the Iranian population was unable to confirm a connection between age and albuminuria. Additionally, in an Afro-American sample, there was no correlation between age and albumin excretion rate (20).

The study showed a strong correlation between the prevalence of albuminuria in general and hypertension where hypertension was diagnosed in 70% of all patients who have micro or macroalbuminuria. This finding is consistent with past research in which albuminuria has been linked to essential hypertension, dyslipidemia, obesity, poor glucose tolerance, insulin resistance, and other characteristics of the metabolic syndrome (21,22,23).

The study also showed a strong correlation between the prevalence of albuminuria and the duration of diabetes where 71% of all patients who have micro or macroalbuminuria had diabetes for more than 10 years. The same result was revealed from previous studies (24,25).

Yet, there was a non-significant correlation between the prevalence of albuminuria and gender, fasting blood glucose or HbA1c. The risk of diabetic microvascular problems is strongly predicted by the HbA1c level, and glycosylated haemoglobin level has been the focus of diabetes care. There is some evidence that intensive glycemic management can postpone the progression of DKD and albuminuria (26).

Limitations

The present study has some limitations. First, the cross-sectional design and poor history taking and documentation of risk factors of diabetes patients by doctors could affect the internal validity of the study. Also, the limited access for the data and some missing files affected the reliability of the produced outcomes.

Conclusion

The prevalence of albuminuria in Type 2 diabetic patients was found to be high, which calls for the need of increasing awareness among type 2 diabetes patients and developing strategies among physicians for prevention, detection and treatment of diabetic nephropathy.

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Association between infantile nephrotic syndrome and Intussusception, case report

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Abstract

Intussusception refers to the invagination (telescoping) of a portion of the intestine into itself. It is the most frequent abdominal emergency among children. Infantile nephrotic syndrome is a triad of proteinuria, hypoalbuminemia, and oedema that present between the age of 3 month to 12 month of age. Although both intussusception and infantile nephrotic syndrome are common in early childhood, there coexisting is unusual. We present here a rare case of 8-month-old, baby girl, known case of infantile nephrotic syndrome that was admitted due to distended abdomen, irritability and poor oral intake. Upon examination she was active, well hydrated, slightly tachypenic and distressed. Abdominal exam showed distended yet soft and fluctuant abdomen. Laboratory investigation upon admission showed leukocytosis, thrombocytosis, high serum creatinine and urea with low albumin. Abdominal ultrasound reveal ileocolic intussusception. Patient was treated with fluoroscopy and barium enema. Patient's original disease was treated conservatively and two doses of albumin infusion was given.

Keywords: intussusception, case report, infantile nephrotic syndrome

Introduction

Intussusception refers to the invagination (telescoping) of a portion of the intestine into itself. It is the most frequent abdominal emergency among children. Intussusception typically presents between 6 and 36 months of age. It usually presents with a classic triad of symptoms: paroxysmal abdominal pain, bloody stool, and vomiting. However, this classic triad appears only in 10–20% of intussusception cases. Many patients present with only irritability or other non-specific complaints.

Infantile nephrotic syndrome is a triad of proteinuria, hypoalbuminemia and oedema that presents between 3 months to 12 months of age. In contrast to idiopathic nephrotic syndrome presenting in children >12 months of age, the renal outcome of infantile nephrotic syndrome is generally poor with the majority developing chronic kidney disease stage 5, although the age at which this develops can be variable.

Case Report

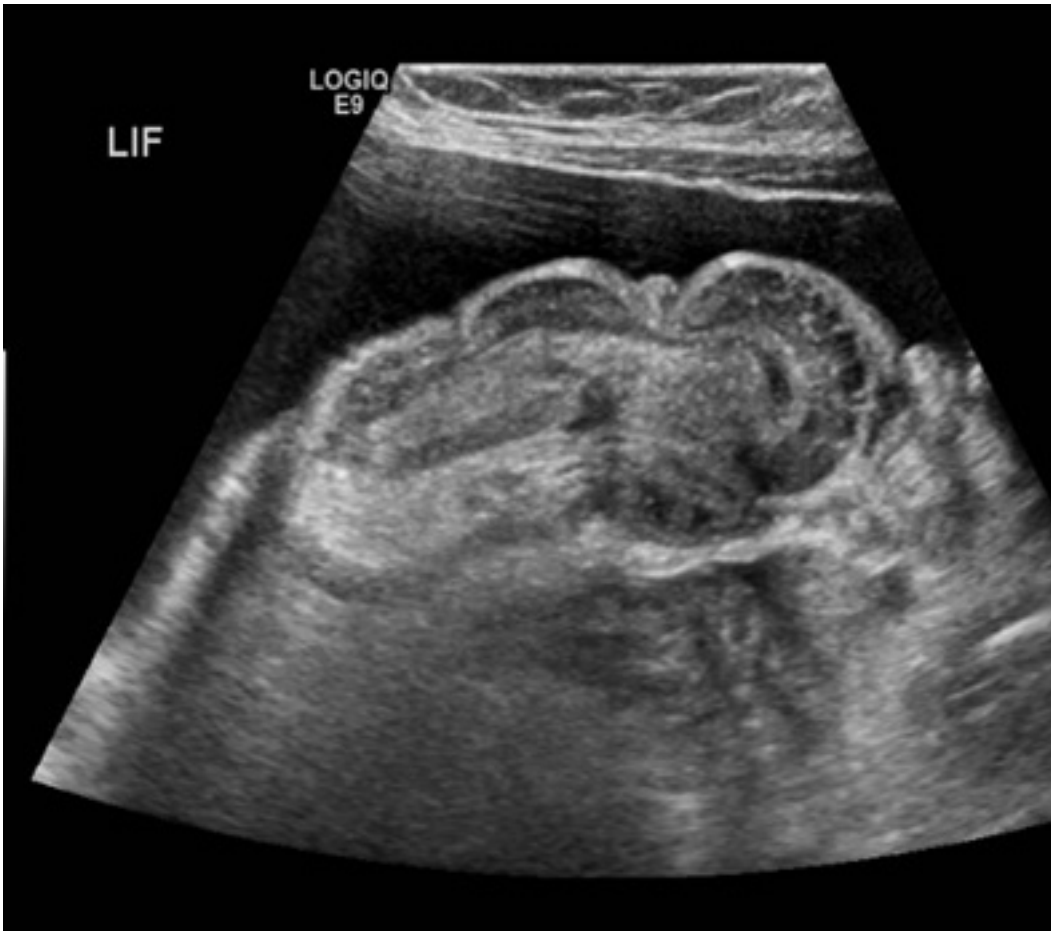
An 8-month-old baby girl, full term, was delivered via C-Section after uneventful pregnancy. No neonatal intensive care unit (NICU) admission, No family history of any renal, autoimmune, or genetic disease. She was diagnosed as Nephrotic syndrome on October 2022, and started on Prednisolone. Percutaneous renal biopsy was performed on November 2022 and demonstrated features consistent with diffuse mesangial sclerosis. The diagnosis of infantile nephrotic syndrome was established, and prednisolone was tapered.

In December 2022, patient was admitted due to abdominal distension (abdominal girth = 63.8 cm), lower limb oedema, cushioned face with excessive crying, irritability and poor oral feeding. Upon examination, she looked well, active, slightly tachypnic, in distress with normal oxygen saturation. She was well-hydrates, afibril , not pale, with normal capillary refill and warm extremities. Her length was 68cm and her weight was 11.5kg, Her Blood pressure was on the 90th blood pressure percentile for her age and length. she had moon face (cushingoid face) with no other dysmorphic feature. She also had mild periorbital oedema, bilateral lower limb pitting oedema reaching her knee and no labial or sacral involvement. abdominal examination revealed distended, round, symmetrical contoured abdomen with no scarring on inspection. On palpation, abdomen was soft and fluctuant with no guarding. Chest exams revealed clear chest with normal breath sound. Cardiac exam was normal.

Laboratory tests showed leukocytosis (WBC = 25.07 10^9/L) normal range (6.0-17.5), thrombocytosis (PLT =737 10^9/L) normal range (150-450), high serum creatinine (CREA = 87 mcmol/L) normal range (14 -34), high urea (18.3 mmol/L normal range 2.8 -8.1) and low albumin (26 g/L normal range 38-54). Urine analysis showed (UA WBC= 25.40mcl, normal value is equal or below 5.01) and (UA Cast =2.88mcl, normal value is equal or below 2.0) urine culture was positive to two type of bacteria, Escherichia coli and Enterobacter asburiae. Patient was diagnosed with urinary tract infection (UTI) and full course of intravenous (IV) antibiotics was given according to her culture and sensitivity. During her admission, patient defecation decreased in frequency and became harder in consistency. A few days later, patient passed currant jelly stool. Abdominal ultrasound (US) was requested and showed a mass of intussuscepted bowel loops seen in all 4 quadrants of the abdomen demonstrating a target sign. The intussuscepted bowel loops were thickened. Color Doppler of interstitial septal bowel loops showed preserved color vascularity. There were a large amount of ascites. No identifiable debris or septation of the ascites was visualized. These findings are suggestive of ileocolic intussusception (likely in the long segment).

Pediatric surgery team was consulted, and water-soluble contrast enema examination was performed via 16 Fr Foleys catheter utilizing 100 cc of Telebrix contrast. Scout image of the abdomen and pelvis showed paucity of bowel loops which were displaced to the left side. During the filling stage, contrast passed through the rectum and intussusception was identified in the proximal sigmoid colon. Afterwards, contrast passed slowly, and pushed the intussusceptum through the colon. The cecum was located medial to the midline, no focal stricture, fistula or contrast extravasation were noticed. The contrast was refluxed into the terminal ileum. The procedure went smoothly, and reduction of ileocolic long-segment intussusception was achieved by fluoroscopy with barium enema. The patient recovered well and was further managed for nephrotic syndrome with albumin infusion and conservative management.

Abdominal ultrasonography showing target sign of the intussusception in transverse plane associated with adjacent free fluid.



Telescoping of bowel loops with alternating hypoechoic and hyperechoic layers resulted in pseudo-kidney sign on the longitudinal plane.

Discussion

The top differential diagnosis for abdominal pain in nephrotic syndrome patient is usually UTI (25- 66.7%)1 or spontaneous bacterial peritonitis (10.8%)2. Although only few cases of intussusception in association with nephrotic syndrome were reported worldwide, the association between these two diseases is not absurd. Hence nephrotic syndrome causes hypoproteinemia which sequentially will result in ascites. This may cause functional bowel obstruction, disturb normal bowel peristaltic and then intussusception. Furthermore, nephrotic syndrome affects potassium secretion which causes hyperkalemia and other electrolytes disturbances which could also result in disturbed bowel movement. Finally, nephrotic syndrome patients with ascites have a high risk of peritonitis and that means multiple infections then fibrosis, which can work as an anatomical leading point, then intussusception.

Ultrasound abdomen is highly sensitive and specific in the diagnosis of intussusception. It is also safe for the pediatric age group. It has a crucial role in ruling out any anatomical source of abdominal pain, bowel disease, or urinary tract abnormalities which could be associated with UTI, and it is also helpful in confirming the presence of ascites fluid.

Conclusion

We presented a rare case of Intussusception in an infant with nephrotic syndrome. High index of suspicion with early consideration of abdominal US are crucial in diagnosing this rare presentation.

Consent for publication

Informed consent was obtained from the patient parents to publish this case report in a medical journal.

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The Extent of Parents' Awareness Towards Absence Seizures Among Children in Al Baha Region, Saudi Arabia

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Abstract

Introduction: Absence seizure (AS) is a brief transient change in consciousness leading to unresponsiveness associated with staring, eye flutter, and characteristic changes in the EEG (3-Hz spike-and–slow-wave in typical AS). It is usually short, and lasting for a few seconds but can occur many times per day hence affecting the school performance of the child. Assessing and improving public knowledge plays an important role in controlling the condition.

Methodology: This is a cross-sectional, prospective, community-based study that aimed to assess the level of parents' knowledge toward absence seizure. Data was collected through an electronic questionnaire using a convenience sampling technique. The parents' knowledge was categorized as sufficient, medium, and insufficient using a scoring system.

Results: Our study showed that knowledge about absence seizure among participants is very poor with 91.5% of the participants having insufficient knowledge about AS.

Conclusion: Our study found that knowledge about absence seizure among participants is very poor, especially concerning its causes, clinical manifestations, and diagnosis. This poor awareness may be attributed to the rarity of the condition.

Keywords:
Absence, seizure, knowledge, awareness

Introduction

Absence seizure (AS) is characterized by a temporal change in consciousness accompanied by short, repeated staring spells, together with particular EEG changes. Infrequently, it may be associated with automatism or eye flutter (1,2). Episodes typically are multiple, occurring repeatedly during the day, and usually last a few seconds (2–10 s) despite some patients having relatively prolonged episodes (>10 s). Ictal episode description involves sudden cessation of motor activity and blank staring with loss of response, followed by resumption of the previous motor activity as well as visual response (3).

Absence seizures were first discovered and reported in detail by Poupart, while Calmeil was the first who used the terminology “absence” (4). Absence epilepsy accounts for 2%-10% of all cases of epilepsy in children (5). It typically occurs between 4 and 10 years and peaks between 5 and 7 years (6).

Absence seizures are usually categorized into two types, typical and atypical absence seizures depending on clinical presentation and EEG changes (7). Typical absences are short (take seconds) generalized seizures that started and terminated all of a sudden. They consist of two main parts: clinically, the altered consciousness (absence) and the characteristic electroencephalogram (EEG) finding (generalized 3-Hz spike-and–slow-wave) electrical discharges.

Contrary to typical absence, atypical absence seizures almost always coincide with severe symptomatic or idiopathic epilepsies in children with learning disorders who have further types of convulsions like myoclonic, tonic, and atonic seizures. They don’t start and end abruptly and are commonly accompanied by changes in muscle tone. Intra-ictal EEG is usually manifested by slow < 2.5 Hz spike and slow wave (8).

Consequences of absence Epilepsy in children include attention deficit, social isolation, and abnormal mood as well as other co-morbidities, especially learning disorders, that usually influence the ability to read. (9-11). These learning disorders usually interfere with writing, reading, mathematics skills, and hence academic achievements (12). In addition, children with epilepsy and their families usually suffer from discrimination and social stigma in a lot of countries worldwide (13).

Common drugs used to treat absence seizures in children and adolescents include ethosuximide, lamotrigine, and valproate (14). Ethosuximide is the drug of choice as first-line monotherapy for typical absence seizures, while sodium valproate is the drug of choice for absence seizures when there is associated generalized tonic-clonic seizure (15).

Although this disorder is common in Saudi Arabia, we didn’t find an article that has studied the awareness of absence epilepsy among parents in Saudi Arabia, therefore we carried out this research to measure the level of parents’ awareness and knowledge of childhood absence seizures in Albaha region.

Materials and Methods

This descriptive cross-sectional study was conducted in Albaha region between December 2021 and October 2022. The target population was parents in Albaha area above 18 years old whether a father or a mother. The questionnaire was constructed and standardized according to the study’s specific objectives. It consisted of three parts; the first part addressed sociodemographic data. The second part included questions regarding the family history and familiarity with absence epilepsy. The third part assessed the awareness of absence seizures (52 items).

The questionnaire was reviewed and revised by the research committee. Thereafter, we conducted a pilot study on 15 participants who were excluded from the results. We carried out this pilot study to assess the applicability and reliability of the questionnaire; the reliability coefficient (Cronbach’s Alpha) of the questionnaire was 0.933.

The sample size was estimated using the website (Sample Size Calculator) at a 95% level of confidence and a 5% margin of error. Al-Baha area population is approximately 400,000.

Then the questionnaire was translated into Arabic, designed on Google Forms, and distributed to the target population electronically. Informed consent was included as a first must-step before proceeding to the rest of the questionnaire, so informed consent was taken from all participants who filled out the questionnaire.

A scoring system was applied to assess the level of awareness of each participant; 1 point was given for each correct answer, and 0 points for an incorrect answer with a total of 52 items for assessment of awareness. The minimum participant`s score was 6 points and the maximum was 42 points with a mean score of 21 points. The participants were grouped into 3 categories according to their awareness score:

- Insufficient awareness (< 32points, > 60%)
- Moderate awareness (32-41 points, 60-79%)
- Sufficient awareness (≥ 42 points, ≤ 80%)

Analytical Methods:

After finishing the collection of the data, it was entered into SPSS, and the variables were coded then the data was analyzed using the IBM SPSS statistics version 28. Frequency and percentages were used to describe the sociodemographic characteristics and items of awareness. The association between the awareness and sociodemographic variables was evaluated using the T-test and ANOVA test. Data were considered to be statistically significant when the P-value ≤ 0.05.

Ethical considerations

- Ethical approval of the study proposal was granted by the ethical committee of the Faculty of Medicine, Albaha University.
- Informed consent was taken to obtain participants’ acceptance.
- The privacy of the participants was ensured, and they were reassured that their data will be used only for research legally and ethically.

Results

We received 386 responses; all participants filled out the questionnaire completely. The majority of the participants (85.5%) were female, and Saudi nationality 374 (96.9%). Most of the participants belong to the age group 36-45 years (40.9%), 158 (40.9%) were from Albaha, and the remaining 59.1 % were from the other provinces of Albaha region. The sociodemographic features of the participants are shown in Table 1.

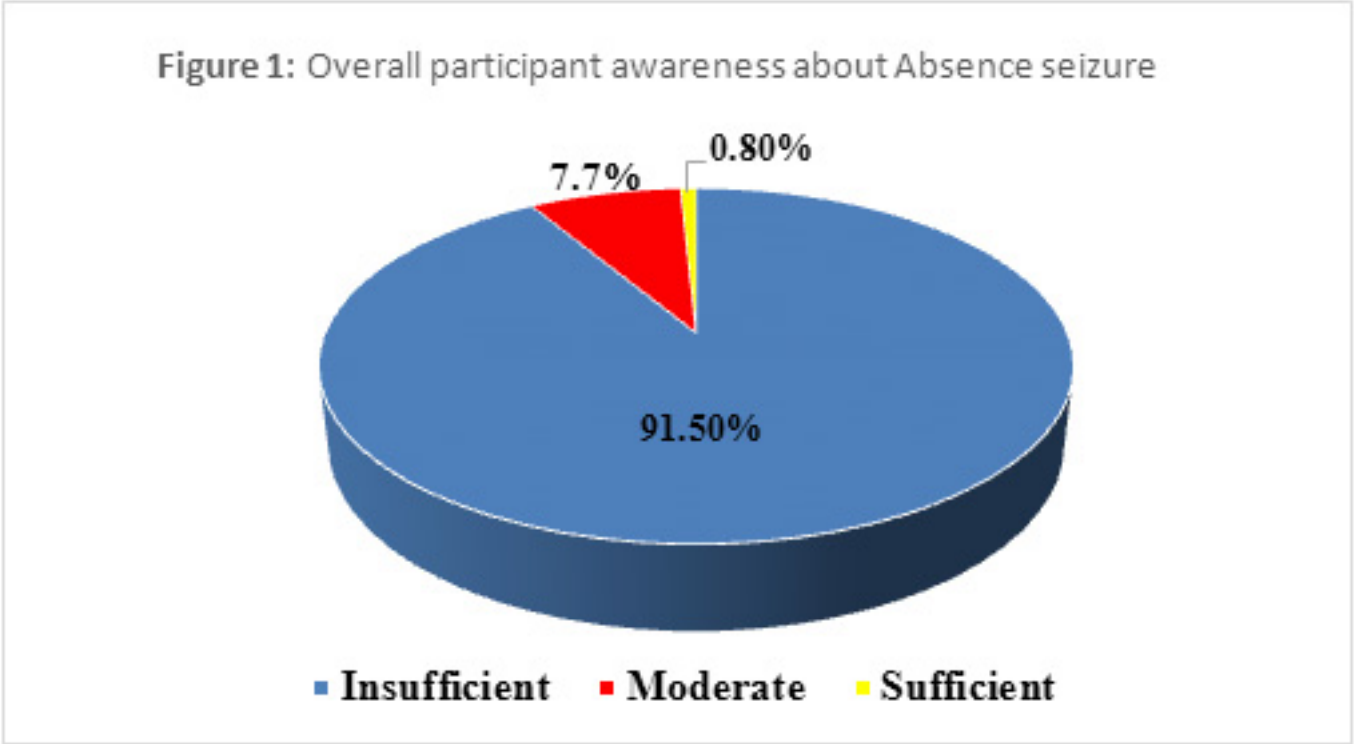
Table 1: Sociodemographic characteristics (n=386).

Item	Variables	N (%)
Gender	Male	56 (14.5%)
	Female	330 (85.5%)
Nationality	Saudi	374 (96.9%)
	Non-Saudi	12 (3.1%)
Age (Years)	18-25	49 (12.7%)
	26-35	51 (13.2%)
	36-45	158 (40.9%)
	64-55	121 (31.3%)
	More than 55 years	7 (1.8%)
Region	Albaha	158 (40.9%)
	Baljurashi	27 (7.0%)
	Al-Qara	89 (23.1%)
	Al Mandaq	26 (6.7%)
	Beni Hassan	6 (1.6%)
	Al Aqiq	5 (1.3%)
	Al Mikhwah	4 (1.0%)
	Qilwah	1 (0.3%)
	Ghamed Alzenad	4 (1.0%)
	Others	66 (17.1%)
Fathers Education level	Not educated	18 (4.7%)
	Primary school	27 (7.0%)
	Middle school	27 (7.0%)
	High school	92 (23.8%)
	College / University	198 (51.3%)
	Higher studies	24 (6.2%)
Mothers Education level	Not educated	44 (11.4%)
	Primary school	16 (4.1%)
	Middle school	11 (2.8%)
	High school	58 (15.0%)
	College / University	239 (61.9%)
	Higher studies	18 (4.7%)

We found that only 30.8% of the participants had heard about absence seizures while 69.2 % were not familiar with this condition. 4.9 % of the participants had a child with epilepsy, whereas 13.7% had a relative's child suffering from epilepsy.

As for the participants' sources of information about epilepsy, 25.3 % reported that they knew a child with an absence seizure, followed by social media (21.5%), TV (15.9%), online medical websites (15%), books (12%), and an educational campaign (10.3%).

The overall assessment of awareness of absence seizure revealed that there was very poor parent awareness with the vast majority of the participants (91.5%) having insufficient awareness regarding AS and only 1% having sufficient knowledge about this condition Figure 1.



More than half of the participants (54.7%) stated that absence seizures are a special type of epilepsy in children, and 56.2% reported that absence seizures may affect what the child does (daily activity), such as playing, eating, studying, and others. And 74.6% thought the child suffering from absence seizures needs to be supervised or under observation during daily activity. Most of the participants 94.8% reported that the child has a loss of consciousness during absence seizures whereas 56.2% knew that the child suddenly stops perceiving his surroundings during the seizure.

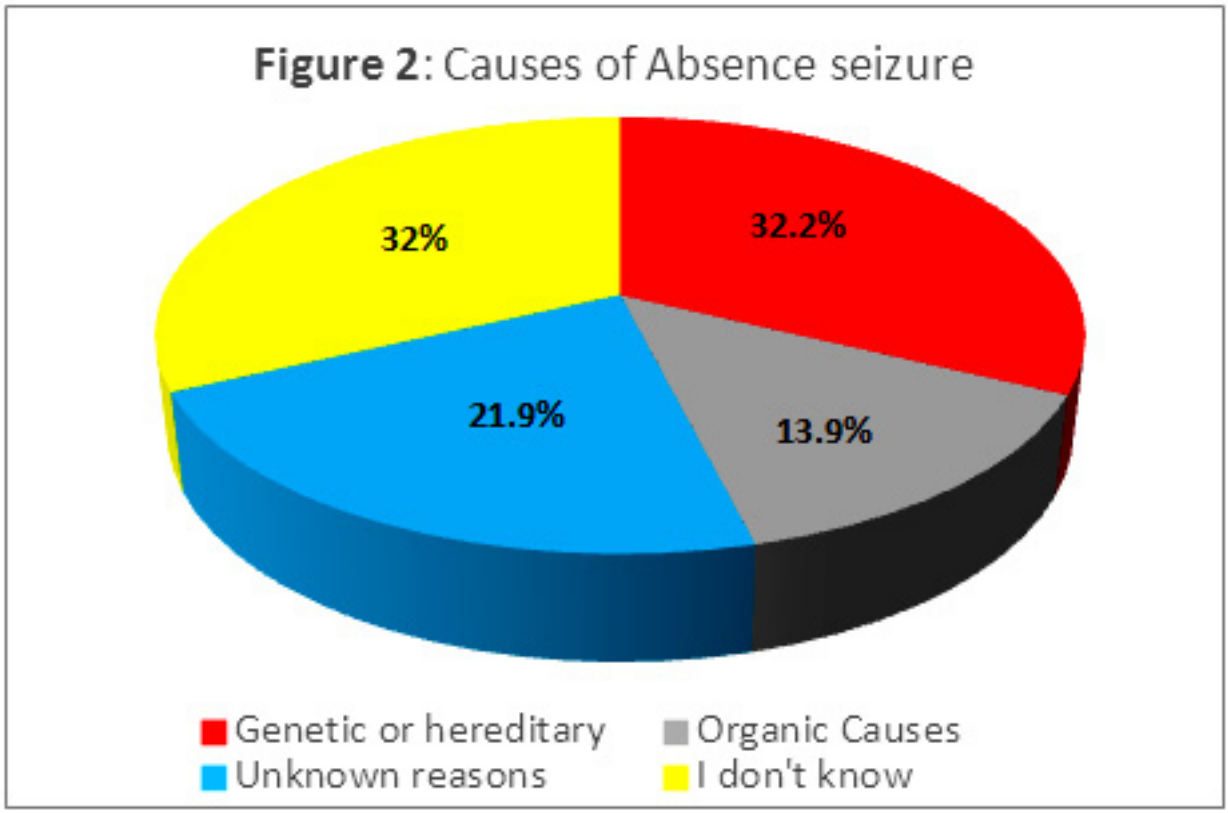
The majority of participants weren't aware of the following: duration of the episodes (81.3%), age of occurrence (81.1%), and being common in females (92.2%). About half of the participants 46.1% believed that parents or observers may mistakenly understand the symptoms as just daydreaming or inattention. Regarding types of absence seizures, 39.9% knew there is more than one type.

The percentages of participants who were able to identify the signs and symptoms of an absence seizure were as follows 36.5% (for Eyelid fluttering), 42.2% (for Lips biting), 45.9% (for Involuntary movements in all parts of the body), 50.8% (for Staring for a while) to 64.5% (for Involuntary movement in one or both hands). Table 2.

Table 2: participants' awareness regarding symptoms and signs of AS (n=386)

Item	Correct answer N (%)	Incorrect answer N (%)
Signs & symptoms: Staring for a while	196 (50.8 %)	190 (49.2%)
Lips biting	163 (42.2 %)	223 (57.8%)
Eyelid fluttering	141 (36.5%)	245 (63.5%)
Involuntary movement in one or both hands	249 (64.5%)	137 (35.5%)
Headache	305 (79.0 %)	81 (21.0%)
Involuntary movements in all parts of the body	177 (45.9%)	209 (54.1%)
Dizziness	260 (67.4%)	126 (32.6%)
Rubbing fingers	342 (88.6%)	44 (11.4%)
Expressionless face	81 (21.05%)	305 (79.0%)
Nausea and vomiting	331 (85.8%)	55 (14.2%)
High temperature	333 (86.3%)	53 (13.7%)

Regarding the causes of absence seizures, the participants attributed AS due to genetic or hereditary (32.2%), unknown reasons (Idiopathic) (21.9%), and organic causes (13.9 %), and 32% stated that they don't know the cause Figure 2.

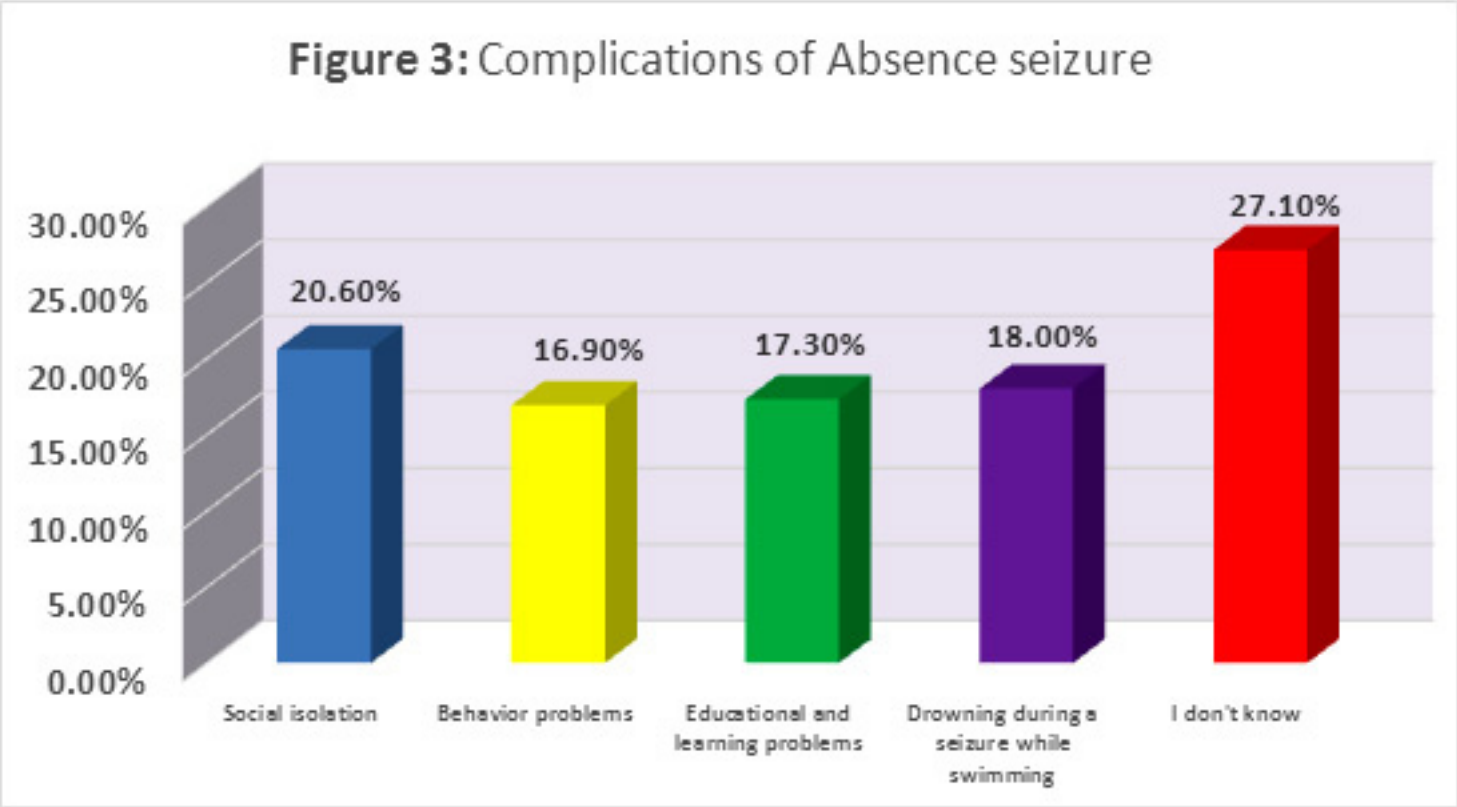


Only 8.5% believed that the first evidence that a child has absence seizures is when he often starts having trouble at school.

As regards the diagnosis of the absence seizures, 43% of the participants mentioned that the electroencephalogram (EEG) is important for diagnosis while 30.3% of them assumed that an accurate and careful description of the seizures is also necessary for diagnosis.

More than half of the participants 54.7% reported that treatment with some medications can help to control the attack of absence seizures

Regarding awareness of complications, they were as follows: social isolation (20.6 %), drowning during a seizure while swimming (18%), education and learning problems (17.3 %), behavior problems (16.9%), while 27% of the participants didn't know the complications Figure 3.



More than half of the participants (54.7%) thought most children eventually outgrow the condition without complications when they are adherent to proper treatment, and 28.8% reported that the prognosis of most children with absence seizures can be very good, whereas only 16.3% stated that there is no long-term effect on brain development, brain function, or intelligence among most of the cases of absence seizures.

Discussion

Assessing the level of awareness of absence seizures is of critical importance to raise the awareness of the parents, encourage the parents to seek treatment early, and reduce the disease stigma, and misbeliefs. This, consequently, will reduce the burden of the disease on the family and the child, improve the school performance of students, and the quality of life for both parents and patients.

The parent's awareness towards absence seizures among children is an important factor in assessing the incidence of absence seizures and its outcomes in our society. Overall, parent's attitudes toward children with epilepsy are influenced by the degree of awareness of the condition, Therefore, misconceptions and misinformation should be identified and corrected for good care and management (16).

We found no studies done concerning awareness of absence seizures, but we can compare it to the parents' awareness of epilepsy. In general, the majority of the participants (91.5%) had insufficient awareness regarding absence seizures. This is consistent with a study conducted in Jeddah KSA which showed that KAP was inadequate among 78.2% of parents (17). This is in contrast with a study done in Abha city KSA which showed that the knowledge of most of the respondents was adequate (68.2%) regarding awareness of epilepsy (18).

Our study shows less level of knowledge while it compared with a study conducted in Sululta Woreda, Ethiopia. which showed (59.8%) of the participants had good knowledge (19)

There was no statistically significant association between the participants' knowledge and their level of education (P-value 0.91). It is evident also by finding that 93% of the mothers and 89.6% of fathers with university or higher education had poor knowledge. Furthermore, no significant effects of monthly income on the participants' awareness were noticed in this study (P-Value 0.632).

Our results showed that most of our participants had poor awareness of specific aspects of absence seizure, namely the duration of the episodes (81.3%), age of occurrence (81.1%), and being common in females (92.2%). Results also showed poor awareness about the types of the disease (typical or atypical), and the prognosis but moderate awareness regarding diagnosis, and complications (30.3% and 34.7 respectively). Public awareness of these aspects of the disease is of great importance.

Our study has shown little to average participant' knowledge regarding the causes of absence seizure when compared with the very poor awareness found in a study done by Frank-Briggs et al. in Nigeria which found that the cause of the disorder is not known by the majority (93.93%) of the parents (20). which may delay the diagnosis and the management. In contrast to our results, (88.3 %) of Serbian parents of children with epilepsy were familiar with epilepsy

and some parents correctly answered all questions regarding epilepsy knowledge, unlike ours.

Better awareness was significantly associated with being male (P- value 0.001), being of a young age (P- value 0.001), having a child in the family with epilepsy (P- value = 0.001), having a relative with epilepsy (P- value 0.007), and had previously heard about absence seizures (P-value 0.001). This is shown in Tables 1 and 2.

Conclusion

Our study showed that there was insufficient knowledge about absence seizure in 91.5% of the participants especially concerning its causes, clinical manifestations, and diagnosis. This poor awareness has a negative impact on people with epilepsy, their families, communities, and the healthcare systems. There is an urgent need to regulate educational campaigns and mass media awareness programs to fill the gaps in community knowledge about this condition.

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Ethical Approval code: This study was approved by the ethical committee faculty of medicine Albaha University under the approval code No. : REC/PEA/BU-FM/2021/0110R
Data and material Availability: All data associated with this study are present in the paper.
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Primary school teachers' knowledge, attitude, and practice toward students with epilepsy in Ha'il region, Saudi Arabia

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Abstract

Background: Several studies found that despite improvements in perception and attitude towards epilepsy, there are still misconceptions and deficient knowledge and practice among teachers.

Objectives: to assess knowledge, attitude and practice toward children with epilepsy among primary school teachers in Ha'il region, Saudi Arabia.

Methods: a cross-sectional study on 459 primary school teachers. A questionnaire was used to collect data about their demographics, knowledge, attitudes and practice towards epilepsy.

Results: 99.6% of teachers had heard of epilepsy, and 39.4% assumed it was a mental illness. In terms of attitude, 28.7%, 48%, and 23.8% of instructors disagreed that epilepsy interferes with marriage, having children, or working full-time, respectively. Furthermore, 5.5%, 30.8%, and 38.2% of respondents disagreed that epilepsy affects driving, sports, leisure activities, and learning. Only 7% indicated they can adequately handle an epileptic seizure in a child. Teachers with poor, fair, and good knowledge levels were discovered in 63.4%, 35.7%, and 0.9%, respectively. In terms of attitude, 59%, 30.1%, and 10.9% had a bad, fair, or good attitude, respectively. When it came to adolescent epilepsy, the vast majority (92.8%) had poor practice, whereas 7.2% had fair practice. Teachers with a fair practice were significantly 35-44 years old, married, or did not have a child with epilepsy in their classroom. There was also a significant positive correlation between knowledge and practice scores.

Conclusion: Teachers' knowledge and practice of epilepsy in children is inadequate. Health education programs and training sessions for Saudi teachers are needed.

Keywords: teachers, knowledge, attitude, practice, epilepsy, Ha'il

Introduction

Seizures are one of the most common medical problems affecting children, and epilepsy is the most common chronic neurological condition in children (1). According to the International League Against Epilepsy (ILAE) one of three inclusion criteria to diagnose epilepsy, is the presence of at least two unprovoked seizures occurring >24 hours apart (2). One seizure does not signify epilepsy (up to 10% of people worldwide have one seizure during their lifetime) (3).

A seizure provoked by a reversible insult (e.g., fever, hypoglycemia) does not fall under the definition of epilepsy because it is a short-lived secondary condition, not a chronic state (4). Epilepsy affects around 50 million people worldwide. Three quarters of people with epilepsy living in low-income countries do not get the treatment they need (2). The prevalence of epilepsy in Saudi Arabia is 6.54 per 1000 (5).

Epilepsy has multiple psychological and social consequences due to the ignorance and misconceptions regarding epilepsy among the population. In many cultures stigma cause a limitation and discomfort for people with epilepsy (4,5).

Some studies have mentioned most teachers have wrong beliefs that epilepsy is caused, for example, by "jinn" or "devil" and can be managed either spirituality by the Quran or traditional medicine (6,7,8). Consequently, these beliefs must be corrected in the child's interests and for society as a whole. Moreover, children with epilepsy need to practice their life normally at school and be treated like other classmates (6,7). This can reflect positively on the child's health status and raise the awareness level towards epilepsy and especially among teachers (7,8).

Schools are one of the social situations where epileptic children face the consequences of societal misunderstanding of epilepsy and how to deal with it, as the teacher will be the source of the first health care provided in this situation (1,3,5). The present study aimed to assess knowledge, attitude and practice toward children with epilepsy among primary school teachers in Ha'il region, Saudi Arabia.

Subjects and Methods

Ha'il University Ethics Committee approved the project. The study was conducted in the Ha'il region of north-western Saudi Arabia, with a population of approximately 413,000. A descriptive cross-sectional study was conducted from October 2022 to November 2022. Raosoft online sample size calculator was used with a (95%) confidence level to calculate the sample size. The minimum meaningful sample size was 384 and we were able to obtain 459 responses. Data collection was performed using a self-administered online questionnaire distributed to target groups meeting the inclusion criteria. The questionnaire consisted of 23 questions. We covered four topics: (1) demographic information; (2) Knowledge. (3) teacher attitudes towards epilepsy and (4) practice.

Knowledge was assessed with eight questions. For 7 questions only one answer was correct and was given a score of "1". And for the incorrect answers a score of "0" was given. For causes of epilepsy, every correct answer was given a score of "1" leaving a total knowledge score ranging from 0-12. The attitude questions were ten questions and for the correct answer, a score of "1" was given leaving a score ranging from 0-10. The practice was assessed by four questions, and for the correct answer a score of "1" was given, and for the question of epilepsy management in classroom two answers were correct leaving a total score of 0-5. The participant was categorized as having a low knowledge level if they answered less than 50% correctly, a fair knowledge level if they answered between 50% and 75% correctly, and a strong knowledge level if they answered more than 75% correctly. The attitude scoring was conducted in the same manner (9).

Data analysis: data were analyzed statistically using (SPSS) version 26. To assess the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test ($\chi 2$) was used. Quantitative data was expressed as mean and standard deviation (Mean ± SD). Correlation analysis was performed using the Spearman's test and a p-value of less than 0.05 was considered statistically significant.

Results

(Table 1) shows that 46.2% of studied teachers had an age ranging from 35-44 years, 86.3% were females, 83.4% were married and 50.1% had teaching experience ≤20 years. The majority (81.3%) had no child with epilepsy in their classroom and 42% had never been informed by parents of the form of epilepsy their child had. Most teachers (67.8%) saw a seizure either in classroom, home, public place or phone/TV/movies. About 75% (75.4%) of teachers reported that classmates try to help a child with epilepsy.

Table 1. Distribution of studied teachers according to their demographics and their experience with a child with epilepsy (No.: 459)

Variable	No. (%)
Age (years)	
<35	51 (11.1)
35-44	212 (46.2)
45-54	175 (38.1)
≥55	21 (4.6)
Gender	
Female	396 (86.3)
Male	63 (13.7)
Marital status	
Widow	8 (1.7)
Single	43 (9.4)
Married	383 (83.4)
Divorced	25 (5.4)
Years of teaching experience	
≤20	230 (50.1)
>20	229 (49.9)
Have you ever had children with epilepsy in your classroom?	
Three students	2 (0.4)
Two students	12 (2.6)
One student	72 (15.7)
None	373 (81.3)
Have you been informed by parents of the form of epilepsy their child has?	
Never	193 (42)
Yes, sometimes	145 (31.6)
Yes, always	121 (26.4)
Have you ever seen a seizure	
No	148 (32.2)
Yes, Classroom	92 (20)
Yes, Home	86 (18.7)
Yes, Public place	73 (15.9)
Yes, Phone/TV/movies	60 (13.1)
Based on your experience, how do classmates behave toward a child with epilepsy?	
Tend to marginalize	14 (3.1)
Don't know	99 (21.6)
Try to help	346 (75.4)

The most common sources of information about epilepsy were friends/acquaintances (63.6%) and social media (35%) (Figure 1).

Figure 1. Percentage distribution of studied teachers according to sources of information about epilepsy (No.: 457)

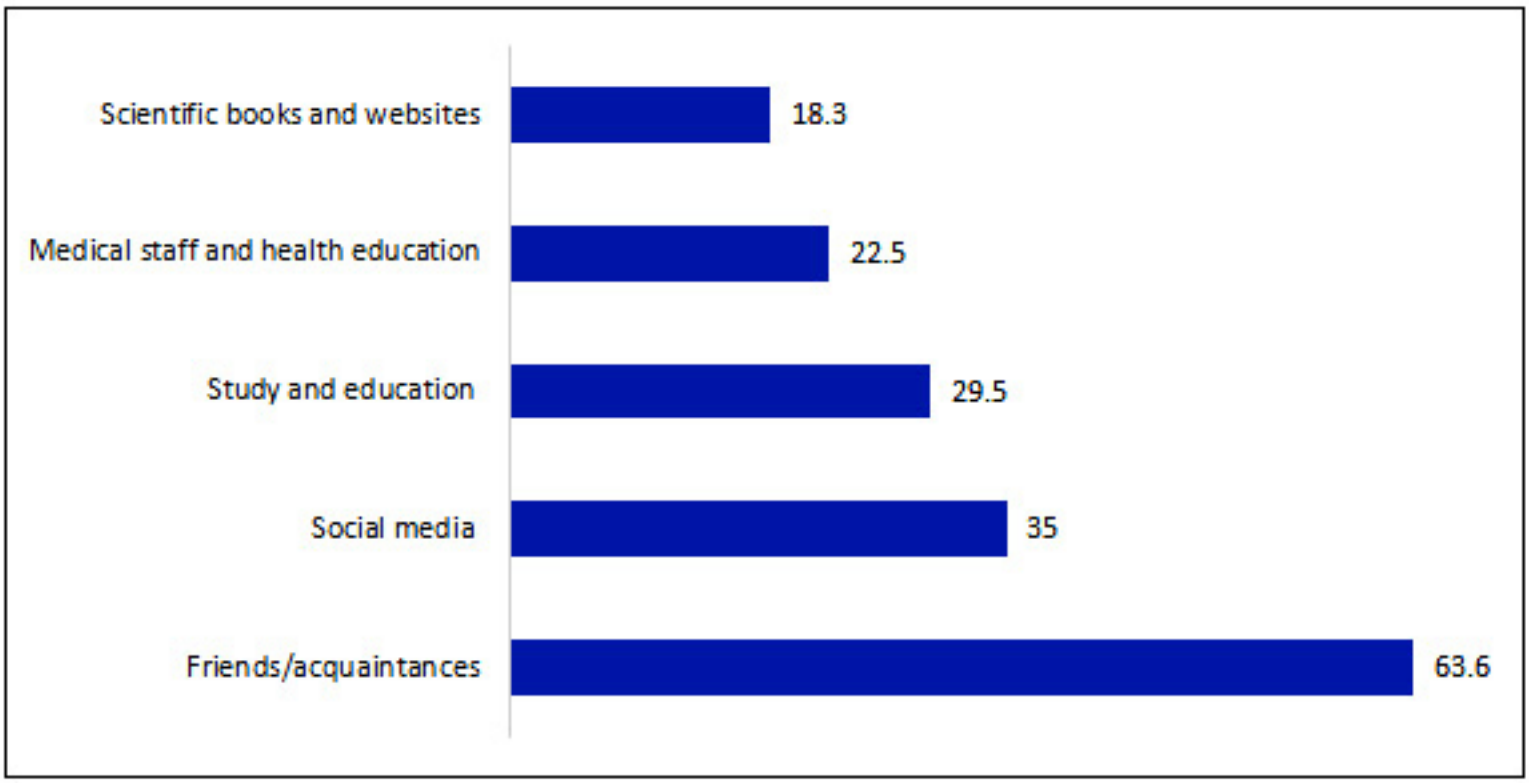


Table 2 shows that 99.6% of teachers had heard about epilepsy. Of them, 45.3%, 34.4%, 12.9% 11.5% and 6.3% reported that hereditary disease, head injury, brain tumor, birth defect and viral infection are causes of epilepsy, respectively. About 58% (58.6%) correctly knew that all ages could be the age of onset of epilepsy. Of them, 39.4% disagreed that epilepsy is a psychiatric disease and 55.1% and 68% correctly knew that epilepsy is treatable with specific drugs and neurosurgery respectively. The majority (73.4%) knew that epilepsy is a curable illness, and 41.2% knew that recreational and sports activity of the child with epilepsy must be normal. Only 18.5% reported that all sports are safe for a child with epilepsy.

Table 2. Teachers' responses to knowledge items related to epilepsy (No.: 459)

Variable	No. (%)
Previously heard about epilepsy	
No	2 (0.4)
Yes	457 (99.6)
What do you think causes epilepsy?	
Hereditary disease*	208 (45.3)
Psychological disease	71 (15.5)
Head injury*	158 (34.4)
Jinn	55 (12)
Viral infection*	29 (6.3)
Brain tumor*	59 (12.9)
Birth defect*	53 (11.5)
Don't know	118 (25.7)
What is the age of onset of epilepsy?	
Childhood	110 (24)
Adult	18 (3.9)
All ages*	269 (58.6)
Don't know	62 (13.5)
Do you think epilepsy is a form of psychiatric disease?	
No*	181 (39.4)
Don't know	102 (22.2)
Yes	176 (38.3)
Do you think epilepsy is treatable with?	
Specific drugs*	253 (55.1)
Ruqia and Quran	93 (20.3)
Cupping	1 (0.2)
Neurosurgery*	31 (68)
Don't know	81 (17.6)
Do you think epilepsy is a curable illness?	
No	43 (9.4)
Don't know	79 (17.2)
Yes*	337 (73.4)
In your experience, recreational and sports activity of the child with epilepsy must be	
Normal**	189 (41.2)
Don't know	67 (14.6)
Limited	203 (44.2)
Which of the following sports do you think should absolutely not be recommended for a child with epilepsy?	
Athletics	16 (3.5)
Skiing	8 (1.7)
Tennis	4 (0.9)
Swimming	105 (22.9)
Boxing	115 (25.1)
All sports activities	90 (19.6)
Cycling	14 (3.1)
Football	22 (4.8)
Nothing, they are all safe*	85 (18.5)

(Table 3) show that 28.7%, 48% and 23.8% disagreed that epilepsy affects marriage, having children or regular employment. Of them, 5.5% and 30.8% disagreed that epilepsy affects driving or sports and leisure activities respectively. About 38% (38.2%) disagreed that epilepsy impairs learning and 49% disagreed that children with epilepsy have mental and/or behavior alterations. Only 27.9% disagreed that anti-epileptic drugs affect learning and behavior and 33% disagreed that children with epilepsy have relationship problems with other children. The majority (83.6%) agreed that children with epilepsy require support in school.

Table 3. Teachers' responses to attitude items related to epilepsy (No.: 459)

Variable	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Epilepsy affects marriage	72 (15.7)	146 (31.8)	109 (23.7)	108 (23.5)	24 (5.2)
Epilepsy affects having children	42 (9.2)	84 (18.3)	113 (24.6)	178 (38.8)	42 (9.2)
Epilepsy affects regular employment	66 (14.4)	190 (41.4)	94 (20.5)	95 (20.7)	14 (3.1)
Epilepsy affects driving	208 (45.3)	170 (37)	56 (12.2)	20 (4.4)	5 (1.1)
Epilepsy affects sports and leisure activities	58 (12.6)	155 (33.8)	105 (22.9)	121 (26.4)	20 (4.4)
Epilepsy impairs learning in children	50 (10.9)	103 (22.4)	131 (28.5)	149 (32.5)	26 (5.7)
Children with epilepsy require support in school	193 (42)	191 (41.6)	57 (12.4)	16 (3.5)	2 (0.4)
Children with epilepsy have mental and/or behavior alterations	56 (12.2)	127 (27.7)	136 (29.6)	117 (25.5)	23 (5)
Anti-epileptic drugs affect learning and behavior	52 (11.3)	115 (25.1)	164 (35.7)	112 (24.4)	16 (3.5)
Children with epilepsy have relationship problems with other children:	46 (10)	119 (25.9)	145 (31.6)	126 (27.5)	23 (5)

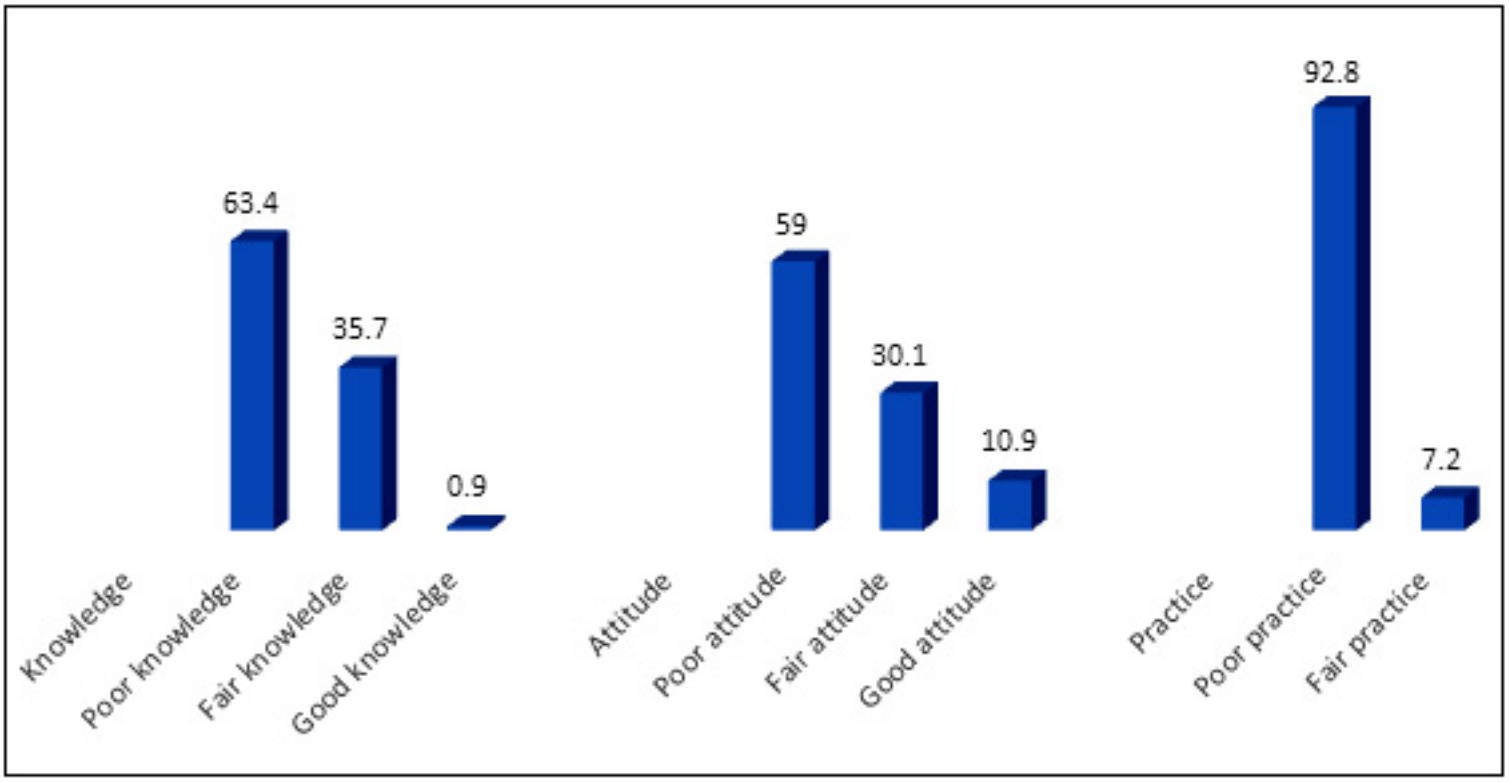
Table 4 shows that only 7% reported that they can manage a child experiencing an epileptic attack in an excellent way. Of them, 35.1% reported that in the case of a seizure in class they will call an ambulance and 9.6% reported they would have the person lie down on the ground and wait until the end of the attack. Only 22% of teachers reported having difficulties in administering anti-epileptic drugs during school hours. About 40% (40.5%) reported that compared with their healthy classmates, children with epilepsy should be treated the same with respect to attitudes and demands.

The mean knowledge, attitude and practice scores were 5.03 ± 1.61, 4.05 ± 2.32 and 1.14 ± 0.88 respectively. The prevalence of poor, fair and good knowledge levels among teachers was 63.4%, 35.7% and 0.9% respectively. Regarding attitude, 59%, 30.1% and 10.9% had poor, fair and good attitude respectively. the majority (92.8%) had poor practice, while 7.2% had fair practice regarding child epilepsy.

Table 4. Teachers' responses to practice items related to epilepsy (No.: 459)

Variable	No. (%)
Do you know how to manage a child experiencing an epileptic attack?	
Don't know	225 (49)
Yes, poorly	70 (15.3)
Yes, moderately	132 (28.8)
Yes, excellent*	32 (7)
In the case of a seizure in class (with loss of consciousness, drop, and spasms of the whole body) what would you do?	
Call an ambulance*	161 (35.1)
Have the person lie down on the ground and wait until the end of the attack*	44 (9.6)
Place something in the child's mouth	169 (36.8)
Block the spasms of the limbs	17 (3.7)
Administer medications	1 (0.2)
Would not know what to do	67 (14.6)
In your school are there difficulties in administering anti-epileptic drugs during school hours?	
No*	101 (22)
Don't know	231 (50.3)
Yes	127 (27.7)
Compared with their healthy classmates, how should children with epilepsy be treated with respect to attitudes and demands?	
Differently	226 (49.2)
Don't know	47 (10.2)
The same*	186 (40.5)

Figure 2. Percentage distribution of studied teachers according to knowledge, attitude and practice levels (No.: 459)



Tables 5 and 6 show that a non-significant relationship was found between teachers' knowledge or attitude level towards epilepsy and their demographics, and their experience with a child with epilepsy (p=>0.05).

Table 5. Relationship between teachers' knowledge level regarding epilepsy and their demographics and their experience with a child with epilepsy (No.: 459)

Variable	Knowledge level			χ^2	p-value
	Poor No. (%)	Fair No. (%)	Good No. (%)		
Age (years)					
<35	32 (11)	18 (11)	1 (25)	2.37	0.882
35-44	139 (47.8)	72 (43.9)	1 (25)		
45-54	106 (36.4)	67 (40.9)	2 (50)		
≥55	14 (4.8)	7 (4.3)	0 (0.0)		
Gender					
Female	251 (86.3)	142 (86.6)	3 (75)	0.44	0.801
Male	40 (13.7)	22 (13.4)	1 (25)		
Marital status					
Single	54 (18.6)	22 (13.4)	0 (0.0)	2.8	0.246
Married	237 (81.4)	142 (86.6)	4 (100)		
Years of teaching experience					
≤20	145 (49.8)	84 (51.2)	1 (25)	1.09	0.577
>20	146 (50.2)	80 (48.8)	3 (75)		
Have you ever had children with epilepsy in your classroom?					
Three students	1 (50)	1 (0.6)	0 (0.0)	0.71	0.994
Two students	8 (2.7)	4 (2.4)	0 (0.0)		
One student	44 (15.1)	27 (16.5)	1 (25)		
None	238 (81.8)	132 (80.5)	3 (75)		
Have you been informed by parents of the form of epilepsy their child has?					
Never	131 (45)	61 (37.2)	1 (25)	4.57	0.333
Yes, sometimes	91 (31.3)	53 (32.3)	1 (25)		
Yes, always	69 (23.7)	50 (30.5)	2 (50)		
Have you ever seen a seizure					
Yes (in classroom, home, public place or phone/TV/movies)	190 (65.3)	118 (72)	3 (75)	1.22	0.329
No	101 (34.7)	46 (28)	1 (25)		
Based on your experience, how do classmates behave toward a child with epilepsy?					
Tend to marginalize	8 (2.7)	6 (3.7)	0 (0.0)	13.02	0.121
Don't know	76 (26.1)	21 (12.8)	2 (50)		
Try to help	207 (71.1)	137 (83.5)	2 (50)		

Table 6. Relationship between teachers' attitude level towards epilepsy and their demographics and their experience with a child with epilepsy (No.: 459)

Variable	Attitude level			χ2	p-value
	Poor No. (%)	Fair No. (%)	Good No. (%)		
Age (years)					
<35	130 (48)	62 (44.9)	20 (40)		
35-44	99 (36.5)	55 (39.9)	21 (42)	3.24	0.778
45-54	10 (3.7)	7 (5.1)	4 (8)		
≥55	32 (11.8)	14 (10.1)	5 (10)		
Gender					
Female	236 (87.1)	115 (83.3)	45 (90)	1.74	0.418
Male	35 (12.9)	23 (16.7)	5 (10)		
Marital status					
Single	48 (17.7)	20 (14.5)	8 (16)	0.69	0.705
Married	223 (82.3)	118 (85.5)	42 (84)		
Years of teaching experience					
≤20	139 (51.3)	69 (50)	22 (44)	0.69	0.638
>20	132 (48.7)	69 (50)	28 (56)		
Have you ever had children with epilepsy in your classroom?					
Three students	1 (0.4)	1 (0.7)	0 (0.0)	1.93	0.925
Two students	7 (2.6)	4 (2.9)	1 (2)		
One student	41 (15.1)	25 (18.1)	6 (12)		
None	222 (81.9)	108 (78.3)	43 (86)		
Have you been informed by parents of the form of epilepsy their child has?					
Never	114 (42.1)	58 (42)	21 (42)	3.92	0.417
Yes, sometimes	89 (32.8)	37 (26.8)	19 (38)		
Yes, always	68 (25.1)	43 (31.2)	10 (20)		
Have you ever seen a seizure					
Yes (in classroom, home, public place or phone/TV/movies)	188 (69.4)	95 (68.8)	28 (56)	3.56	0.169
No	83 (30.6)	43 (31.2)	22 (44)		
Based on your experience, how do classmates behave toward a child with epilepsy?	7 (2.6)	6 (4.3)	1 (2)	6.94	0.139
Tend to marginalize	69 (25.5)	21 (15.2)	9 (18)		
Don't know	195 (72)	111 (80.4)	40 (80)		
Try to help					

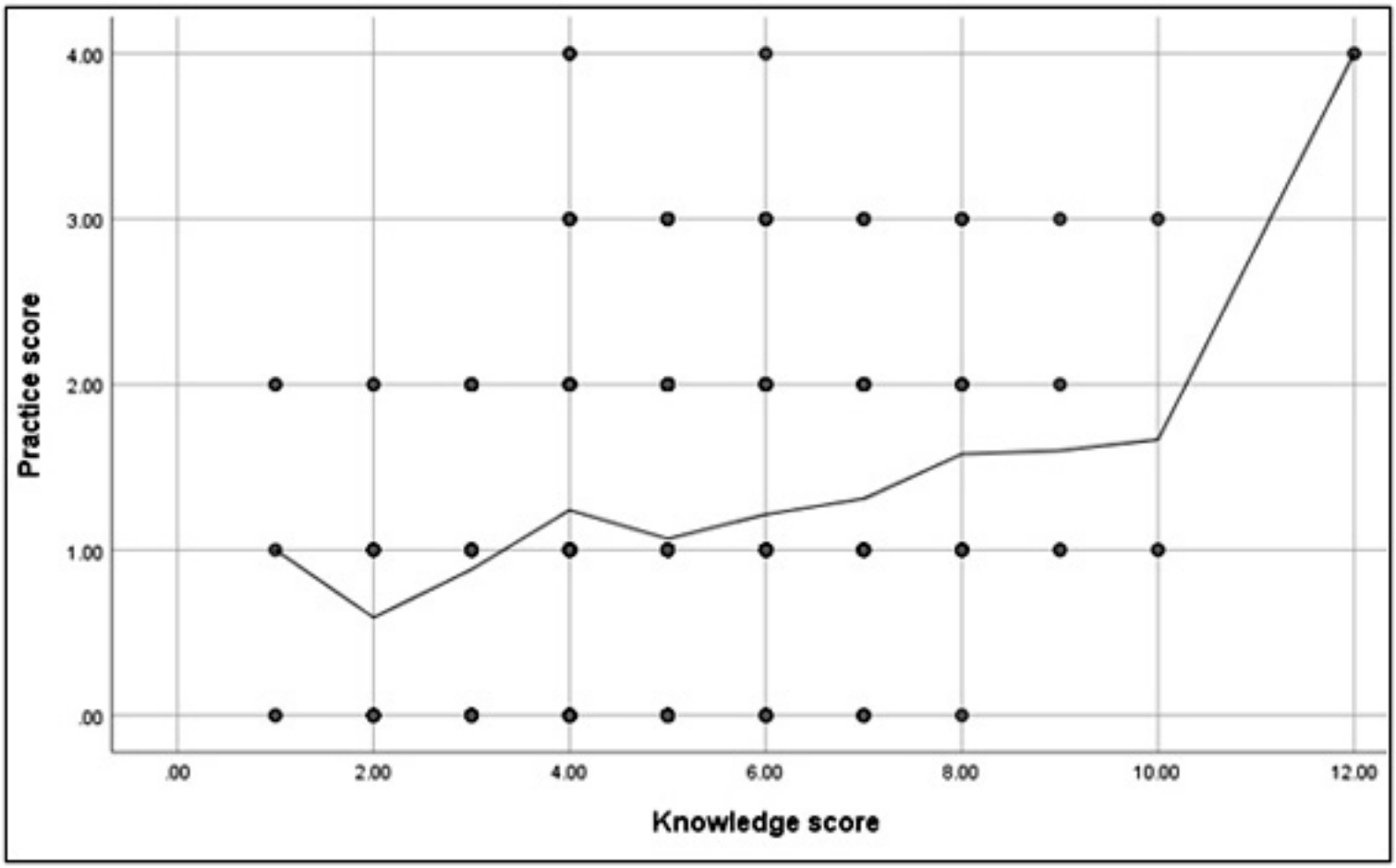
Regarding practice, Table 7 shows that teachers who had a fair practice significantly had an age ranging from 35-44 years, were married or had no child with epilepsy in their classroom (p=<0.05).

Table 7. Relationship between teachers' practice level regarding epilepsy and their demographics and their experience with a child with epilepsy (No.: 459)

Variable	Practice level		χ2	p-value
	Poor No. (%)	Fair No. (%)		
Age (years)				
<35	43 (10.1)	8 (24.2)		
35-44	200 (46.9)	12 (36.4)	8.41	**0.038**
45-54	165 (38.7)	10 (30.3)		
≥55	18 (4.2)	3 (9.1)		
Gender				
Female	369 (86.6)	27 (81.8)	0.59	0.44
Male	57 (13.4)	6 (18.2)		
Marital status				
Single	66 (15.5)	10 (30.3)	4.86	**0.027**
Married	360 (84.5)	23 (69.7)		
Years of teaching experience				
≤20	212 (49.8)	18 (54.5)	0.28	0.597
>20	214 (50.2)	15 (45.5)		
Have you ever had children with epilepsy in your classroom?				
Three students	0 (0.0)	2 (6.1)		
Two students	9 (2.1)	3 (9.1)	33.57	**<0.001**
One student	65 (15.3)	7 (21.2)		
None	352 (82.6)	21 (63.6)		
Have you been informed by parents of the form of epilepsy their child has?				
Never	183 (43)	10 (30.3)	2.55	0.279
Yes, sometimes	134 (31.5)	11 (33.3)		
Yes, always	109 (25.6)	12 (36.4)		
Have you ever seen a seizure				
Yes (in classroom, home, public place or phone/TV/movies)	187 (67.4)	24 (72.7)	0.4	0.526
No	139 (32.6)	9 (27.3)		
Based on your experience, how do classmates behave toward a child with epilepsy?	13 (3.1)	1 (3)	1.89	0.388
Tend to marginalize	95 (22.3)	4 (12.1)		
Don't know	318 (74.6)	28 (84.8)		
Try to help				

A significant positive correlation was found between knowledge and practice scores (r = 0.18, p-value = < 0.001) (Figure 3).

Figure 3. Spearman's correlation analysis between knowledge and practice scores



N.B.: (r = 0.18, p-value = < 0.001)

Discussion

This study was done to determine primary school teachers' knowledge, attitude, and practice toward children with epilepsy in Ha'il region, Saudi Arabia. Almost all teachers (99.6%) had heard about epilepsy from many sources. Approximately more than half of the respondents (63.6%) reported friends/ acquaintances as their source of information and (35%) from social media. These findings are similar to a study conducted in Arar, Saudi Arabia, that reported (99%) of teachers knew of a disease called epilepsy. According to source of information, relatives and friends of teachers represent the main source of their information (49.1%). Whereas social media was found to be only (4.9%) (10). Another study done in Taif, Saudi Arabia, found (95%) of teachers had heard about epilepsy and (43%) of them know epilepsy from social media (11). Moreover, (45.4%) answered social media, when a study was done in Addis Ababa, Ethiopia (12).

In the present survey, more than half of participants (63.4%) reported poor knowledge levels of epilepsy. Regarding causes of epilepsy, (45.3%) believed hereditary disease is a cause of epilepsy, some of them (34.4%) believed it was due to a head injury, whereas (12.9%), (11.5%) and (6.3%) reported brain tumor, birth defect and viral infection respectively. Similarly, recent studies conducted in different regions in Saudi Arabia, demonstrated significant changes and improvement in understanding of epilepsy causes (13,14). In addition, in this survey, only (12%) believed that 'Jinn' can cause epilepsy. This is converse to a study carried out in 2012, in Saudi Arabia, which suggested (40%) of teachers thought that epilepsy is caused by jinn (15).

When teachers investigated if epilepsy is a form of psychiatric disease, (39%) of teachers disagreed. Likewise, a study carried out in Niamey, Niger, revealed around (42.1%) considered epilepsy as a brain illness instead of (15.9%) as a form of psychiatric illness (16). Conversely to studies done in Tabuk and Taif, (56.4%) (59%) proposed epilepsy to be a psychiatric disease, respectively (11,17). However, (73.4%) knew that epilepsy is a curable illness. Accordingly, (55.1%) and (68%) knew it is treatable with specific drugs and neurosurgery, respectively. Additionally, when compared to a study in 2012, (67.5%) answered Ruqia, while (10.4%) answered cupping (15). These beliefs have been dramatically changed in the present study which showed approximately (20.3%) with Ruqia and (0.2%) with cupping.

With respect to attitude, it was found that more than half of the participants have a poor attitude towards epilepsy. The majority of our participants agreed that epilepsy affects marriage 47.5

employment 55.8%, and sports and leisure activities 46.4%. In accordance with another study conducted in Italy, 33%, 40%, and 33% of the teachers believed that epilepsy is a limitation for marriage, employment, and sports respectively (18). This negative attitude is the result of inadequate knowledge and can be a factor leading to problems related to these aspects and increase the burden of this disease on affected individuals (19).

Driving is dangerous for epileptic patients for two reasons: 1) Anti-epileptic drug (AED) side effects and/or the underlying pathology causing the individual's seizures may impair general driving ability, resulting in interictal cognitive or sensorimotor deficits; and 2) there is an intermittent risk of loss of consciousness or motor control due to a seizure while driving (20).

Nearly all of our participants 82.3% admitted that epilepsy is an obstacle to driving. Similar results have been found in Alshahrani, et al. study 48.38% (21). However, contradictory results were found in a study conducted in Taif city where only 18% of them considered epilepsy as a limitation to driving (11). This represents a positive attitude by our participants. In accordance with the rules and requirements of other countries, it would be safer for patients and the community if the seizures were under control (in seizure free remission) for about 12 months prior to obtaining a driving license (22).

Regarding education and cognitive function, 38.2% of the teachers agreed that epilepsy doesn't impair learning in children, which is supported by other Saudi studies where participants believed that epileptic children are capable of academic achievement (13). Another Saudi study found that 51.4% of the participants did not anticipate a lower level of learning from children with epilepsy (23).

Apart from this, 39.9% of our participants said that children with epilepsy have mental and/or behavior alterations, while 36.4% believed that Anti-epileptic drugs affect learning and behavior. This is consistent with a study done in Italy where 41.4% reported mental and/or behavior alterations because of anti-epileptic drugs (18).

Executive dysfunction is a common cognitive side effect of AEDs, and a Korean study concluded that any AED can cause cognitive impairment if used for a long enough period of time (24). Accordingly, an AED treatment can have a positive or negative impact on cognition (25). Because increased seizure frequency, duration, and severity are associated with impaired cognition, AED use can reduce cognitive dysfunction by controlling seizures. However, while the cognitive effects of AEDs are typically moderate when used as monotherapy at blood concentrations within the standard therapeutic ranges, significant impacts such as decreased quality of life or neuropsychological deficits can occur (24,25). On the other hand, 83.6% of our population agreed children with epilepsy require support in school. A similar result was shown in a study done in Italy where 55.8% believed that children with epilepsy require personal support at school (18).

Of the participants, 35.9% agreed that children with epilepsy have relationship problems with other children. Moreover, a study conducted in Khartoum thought that epileptic patients were not socially separated by their colleagues 71.7% (26). A similar question was asked by Alamri S, et al. if society discriminates against people with epilepsy. The majority of respondents (77%) said no (12). We concluded that all teachers who had an epileptic child in their class to be supportive and to learn about their conditions from the children's families, to know how to administer the medication if needed, and to educate other classmates about the disease to prevent discrimination or social stigma (27). The correct method of providing first aid to a child facing seizure remains not fully understood by teachers. This highlights the importance of training programs and awareness, particularly in epilepsy first aid (28).

In this survey we suggested the vast majority of teachers are not well qualified to provide first aid to a child facing seizure in school. Therefore, our results illustrated poor practice of teachers in about 92.8 percent. When teachers were asked "in case of a seizure in class, what would you do?", the majority (36.8%) wrongly said they would place something in the child's mouth. The remaining respondents (35.1%) correctly would call an ambulance and less than expected (9.6%), correctly would lie the person down on the ground and wait until the end of the attack. These results were also observed in a study applied in Makkah on female teachers, which highlighted that about (55%) answered to put an object in mouth (28). Another study reported in Jeddah, proposed around (36.2%) of teachers would open the mouth and place something in it (29). These wrong beliefs and practice haven't corrected until this time, even with public awareness by Saudi Ministry of Health. Accordingly, we suggest first aid training programs for teachers, since they are the first care provider at school.

Limitations

A limitation of the present study was the use of a self-reporting questionnaire that could have a recall bias.

Conclusion

According to this study, 99.6% of teachers had heard of epilepsy and 39.4% thought it was a psychiatric disorder. In terms of attitude, 28.7%, 48%, and 23.8% of teachers, respectively, disputed that epilepsy interferes with marriage, having children, or working full-time. Furthermore, 5.5%, 30.8%, and 38.2% disputed that epilepsy has an impact on driving, sports, leisure activities, and learning. Only 7% said they can effectively manage a youngster who is having an epileptic seizure. Poor, fair, and good knowledge levels were found in 63.4%, 35.7%, and 0.9% of teachers, respectively. In terms of attitude, 59%, 30.1%, and 10.9%, respectively, had a poor, fair, and good attitude. Concerning juvenile epilepsy, the majority (92.8%) had poor practice, whereas 7.2% had fair practice. Teachers with a fair practice had an age range of 35-44 years, were married, or had no child with epilepsy in their classroom. There was also a substantial positive

association between knowledge and practice scores. There are gaps in teachers' knowledge and practice when it comes to children with epilepsy. This involves health education programs and training sessions to teach people how to enhance their awareness, attitude, and practice.

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Prevalence of Perceived Fatigue and its Impact on Quality of Life Among Saudi General Population

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Abstract

Background: Fatigue is a prevalent condition and the incidence of fatigue has been reported as a symptom of different health conditions among the population of Saudi Arabia. It is important to determine the impact of perceived fatigue in the general population as well as the factors that can explain its prevalence.

Aim: The aim of the study was to gauge the prevalence of perceived fatigue among the people of Saudi Arabia, its effect on their quality of life and the socio-demographic factors that could explain the prevalence and self-reported experience of fatigue among the people.

Methods: A descriptive cross-sectional study was conducted among the Saudi general population. A questionnaire was developed with various self-reported measures for estimating the prevalence of fatigue among the population. One-way ANOVA was used to examine the association between socio-demographic characteristics and fatigue experience.

Results: General fatigue is found to be more common among the people of Saudi Arabia than physical and mental fatigue which does not really interfere with their daily life activities and can be reduced with rest. Socio-demographic factors; particularly gender, anaemia and being widowed are found to be associated with the prevalence of perceived fatigue.

Conclusion: The experience of fatigue can differ for people depending on their socio-demographic factors.

Keywords: Perceived Fatigue, Fatigue Assessment Scale (FAS), Prevalence of Perceived Fatigue, Impact of Fatigue on Quality of Life, General Population, Saudi Arabia.

Introduction

Fatigue is a term used to define physical and mental exhaustion. However, the term has a broad and multidimensional concept such that it may vary in its duration and intensity to certain degrees (Engberg et al., 2017). The incidence of fatigue long gained the attention of research since its occurrence in 7.5 per cent of 1000 patients attending general practices. Not only this, but the symptom of fatigue often leads to physical morbidity and psychological distress (Cullen, Kearney and Bury, 2002). Fatigue symptoms cause persistent and prolonged exhaustion and are usually associated with cognitive impairment, physical distress, and sleep disturbances. In the extant literature, varying terms have been used to explain various aspects of fatigue such as physical fatigue, cognitive fatigue, performance fatigue etc. each demonstrating different dimensions of fatigue (Kluger, Krupp and Enoka, 2013). In this context, perceived fatigue can be understood as a subjective and self-reported experience of fatigue where the individual would report fatigue using self-report measures. These include experiencing subjective exhaustion, increased exertion, or perceived discrepancies between exertion and actual results or performance (Riegler et al., 2022). On the other hand, fatigability is a concept, characterized by the more objective experience of a lack of physical and mental strength or decline in performance; measured in relation to some control/reference value (Eldadah, 2010).

Studies of perceived fatigue in older adults show an age-associated incidence of fatigue (LaSorda et al., 2020). However, the research has also reported that both young and older adults may become susceptible to increased fatigability with their changing capacities of neuromuscular mechanisms (Paris et al., 2022). This is so because the comparison of fatigability between young adults and older people remains quite complex for the reason of differences in their neuromuscular functionality (Bigland-Ritchie et al., 1995). One aspect of comparison is studied as the performance of a dynamic task which is unrelatable to muscular capacity such that responses may vary to the task (Paris et al., 2020). In addition to the general population, people with psychiatric disorders are also prone to fatigue symptoms. In fact, it is found that the prevalence of fatigue among such people is 25 to 36 per cent (Zou et al., 2020). In addition, Hunter, (2018) studied the mechanism behind fatigability during activities which is associated with perceptions of fatigue and afferent input during the performance of tasks. It was stated that this fatigability increases the load on the neuromuscular mechanism and reduces the speed of voluntary contraction of muscles (Smith et al., 2007). This perceived fatigue can be developed regardless of the performance of submaximal tasks and if the task continues longer, the failure of performance may result from fatigability causing decreased maximal strength to perform the tasks (Hunter, Duchateau and Enoka, 2004). Hence, the assessment of fatigability can be a strategic approach to studying risks and symptoms.

Literature has studied the risk of fatigue in different health conditions. For example, Severijns et al., (2017) systematically studied the assessment of fatigability in patients with multiple sclerosis. There were found a variety of protocols to assess fatigability such as measuring the isometric and concentric contractions in healthcare settings. Kim et al., (2018) also highlighted that fatigability can be assessed through different measures of performance, and self-reported deterioration, however, there is still a lack of practice for assessing these measures to determine fatigability (Kim et al., 2018). Fatigue is found to be correlated with various negative health outcomes such as poor general health (Galland-Decker, Marques-Vidal and Vollenweider, 2019) and sleeping disorders (Veauthier, 2014) etc. As health appears to be a major dimension of "quality of life", the negative health outcomes of fatigue highlight an adverse effect of the condition on the quality of life of the people. To conceptualize, quality of life can be understood as the overall general well-being of people in terms of objective factors and subjective assessments of emotional, physical and social well-being as well as levels of personal development and goal-oriented activity (Kluger, Krupp and Enoka, 2013).

Moreover, studies in Saudi Arabia showed the prevalence of fatigue as a symptom in different health conditions such as multiple sclerosis, Sjögren's syndrome, and systemic lupus erythematosus (Al-Sobayel et al., 2016: AlEnzi et al., 2020). However, the problem is the lack of assessment of the risk of fatigue in patients and their health outcomes. On the other hand, literature has studied the fatigue assessment scale (FAS) as an imperative instrument to measure fatigue as a unidimensional concept with exclude other risk factors lead to perceived fatigability . It has defined the uni-dimensionality of fatigue which assesses the perceived risk of tiredness among the population for their level of experiencing poor outcomes (Michielsen et al., 2004). Not only this, but the prevalence of these perceptions may define the influence of quality of living. Based on uncertainty present in the literature in the context of the Saudi population and their susceptibility to perceived fatigue and poor quality of life, the present study aims to determine the impact of perceived fatigue in the general population of Saudi Arabia to determine how this perceived fatigue would impact their daily activities and quality of life.

From the aforementioned research purpose, we pursued our research objectives in this study, which aimed:

- To estimate the prevalence of perceived fatigue among the people of Saudi Arabia.
- To gauge the subjective and self-reported experience of fatigue among the people.
- To determine the effect of perceived fatigue on the quality of life of the people in Saudi Arabia.
- To determine the socio-demographic factors and risk factors that could explain the prevalence and self-reported experience of fatigue among the people of Saudi Arabia.

Literature Review

1 Perceived Fatigue and Fatigue Experience

The concept of fatigue has been used in various contexts while referring to various conditions, causes, and in different situations or conceptions. (Landmark-Hoyvik et al., 2010). In general, it can be understood as a normal response of an individual's body or mind to physical activity and stress, but it can also be a sign of many disorders. In a general sense, people appear to be well familiar with this condition from their personal experience, regardless of age, gender, or health status (Davis and Walsh, 2010). Its subjective dimension is called perceived fatigue which entails an individual's perceptions of his subjective experience of fatigue (Landmark-Hoyvik et al., 2010). Furthermore, fatigue can be both pathological and physiological implying that it can be experienced by both diseased people and healthy individuals. In the case of generally healthy people (who don't have any comorbidity), fatigue can be a physiological response to prolonged strenuous activity. It can be a temporary condition that would decrease with rest over time. In such cases, the experience of fatigue does not interfere with the daily life activity of the people (Kluger, Krupp and Enoka, 2013).

On the other hand, the experience of fatigue among people with diseases varies. For people who have comorbidity or any disease, fatigue can be an overwhelming experience, related to lack of energy, lethargy, lack of endurance and loss of strength that interferes with their daily life activities (Davis and Walsh, 2010). Common underlying reasons for physiological fatigue entail tiredness after any exhausting physical activity, physical or mental disorders, jet lag etc. In contrast to this, pathological fatigue may result from some physical or mental diseases (Finsterer and Mahjoub, 2014). Nonetheless, regardless of any type of fatigue experienced by any individual, the experience of fatigue can have a negative effect on the social, physical, emotional and occupational functioning of the people which may cause significant impairment in the quality of life (Bower, 2012). Furthermore, Fatigue can be regarded as a signal to prevent any additional exertion on the body for the muscles to avoid any kind of injury or prolonged muscular condition (Al-Mulla, Sepulveda and Colley, 2011).

2 Quantification of Fatigue

The construct of perceived fatigue (individual perceptions of fatigue) can be measured with the incorporation of self-reported scales. The scale for measuring perceived fatigue in a quantitative manner needs to include self-reported measures (Finsterer and Mahjoub, 2014). In general, the incorporated scale can be unidimensional (evaluate a single characteristic) or multidimensional (evaluate multiple characteristics) (Falup-Pecurariu, 2013). The dimensions to be assessed in the perceived fatigue scale may include instantaneous (state) cognition, chronic cognition (trait cognition), effects of fatigue on functioning or performance, assessment of related factors such as physical or mental exhaustion, the severity of the fatigue experience and the dimensions of fatigue such as mental or physical fatigue. The various scales differ in their ability to exhibit sensitivity endpoints of moderate or severe fatigue (e.g., Fatigue Susceptibility Scale) as well as sensitivity to change over time for clinical intervention (e.g., Modified Fatigue Impact Scale), (Kluger, Krupp and Enoka, 2013). A scale containing self-reported measures is used for the present study to gauge the subjective experience of fatigue self-reported by the people.

3 Relation with Socio-demographic Factors

This research demonstrates the dependency of perceived fatigue on various socio-demographic factors such as age, gender, comorbidities, individual habits etc. Age and gender have been widely discussed as major socio-demographic factors explaining the prevalence of fatigue. It is found that certain aspects of perceived fatigue can be dependent on age (6). In contrast, age does not impair the capability of recruiting motor units or the central nervous system, but motor neuron firing rates vary significantly with age (Davis and Walsh, 2010). Older adults may have decreased muscle strength due to sarcopenia (Lanza, Larsen and Kent-Braun, 2007). Regarding gender differences, there are contrasting opinions. It is found that men, in general, report greater peripheral neuromuscular changes than females, manifested in a higher reduction in quadriceps peak strength; particularly during exercising. In contrast, women report decreases in quadriceps motor evoked potential (MEP) amplitude (Stern et al., 2012). Furthermore, it is also found that people with substance use disorders (SUDs) suffer from a variety of health problems that ultimately redound in their experience of fatigue (Votaw et al., 2019; Morris et al., 2018). Substance use or any dysfunction of organs (such as kidney disease), mental disorders, as well as diabetes, anaemia and other chronic conditions are associated with the experience of fatigue (Vold et al., 2020). In addition, females with a low level of education and patients with opioid use disorders receiving opioid agonist therapy are also found to be generally at risk of increased fatigability (Galland-Decker, Marques-Vidal and Vollenweider, 2019; Maglione et al., 2018).

Methods

A descriptive cross-sectional study was conducted among the Saudi general population. The questionnaire targeted all Saudi Arabia regions for participants aged above 18 years old between 2021 – 2022. Participants were recruited by sharing the questionnaire through social media. Consent was taken from all participants who agreed to complete the questionnaire.

The online questionnaire was made using Google form. The questionnaire was customized according to our aims. Questions wer taken from many research studies motioned in the references and some were compiled by the researchers to achieve the objectives of the research, then all questions were reviewed by an independent expert to assess the validity and applicability and their opinion was taken when creating the questionnaire.

After that, a pilot study was done on 15 persons who were excluded from the result. The aim from the pilot study was to assess the reliability of the questionnaire, however the reliability coefficient (Cronbach's Alpha) of the questionnaire was 0.97.

1 Participants

This cross-sectional observational study was conducted to assess the prevalence of fatigue and its subsequent impact on the quality of life of the Saudi general population. For this purpose, a close-ended survey questionnaire was designed comprising two sections; where the first section focused on socio-demographic information with risk factors/disease which may lead to fatigue, and the second section was the most important, where the national scale of fatigue (Fatigue Assessment Scale [FAS]) was used. The sample size for this study was 673 participants who were Saudi citizens and who provided a completely filledin survey, which was conducted online. All the participants were aged 18 and above to ensure informed decision-making.

2 Data Analysis

The collected data from the online survey were analyzed using Statistical Package for Social Sciences (SPSS) v20. The collected responses were entered into MS Excel for coding and systematically organizing the data. Descriptive statistics were used for assessing the socio-demographic characteristics and FAS questions, while ANOVA was used for determining the statistical relationship existing between the research variables. Additionally, logistic regression was used to recognize the data anomalies.

3 Research Ethics

To comply with the ethical considerations, formal ethical approval from the Scientific Research & Ethical Committee of Faculty of Medicine, Al Baha University was taken for conducting the research. After permission was granted, a consent form was designed comprising brief research objectives and implications to educate the participants about the significance of the study. The informed consent section also included the clause relating to the voluntary participation of the respondents and their free will to leave the research at any time without having to face any negative consequences. The data security and safety clause was also added, which ensured that the collected data would not be used for any other research purpose and neither would be shared with other researchers for future reference. Lastly, the confidentiality of the participants was also ensured by data coding, and no personal data was to be shared publicly.

Results

1 Demographic characteristics of the participants

The frequency descriptive of the participants is shown in Table 1. Most participants were male (51.3%) and 48.7% were female. Moreover, 30.5% of the respondents belonged to the age group from 26 to 35 years while only 2.7% are older than 55 years. More than half of the respondents are married and 42.8% of the participants are single. Similarly, 67% of the participants have a university education. Furthermore, most participants are nonsmokers only 18.7% are a smoker. Similarly, 95.5% have no diabetes and 82.6 per cent have no anemia.

Table 1: Socio-demographical characteristics of the participants

	Frequency	Per cent
- Gender		
female	328	48.7
male	345	51.3
- Age		
from 18 to 25 years	172	25.6
from 26 to 35 years	205	30.5
from 36 to 45 years	145	21.5
from 46 to 55 years	95	14.1
less than 18 years[i]	38	5.6
more than 55 years[i]	18	2.7
- Marital status		
Divorced	8	1.2
Married	363	53.9
Single	288	42.8
Widow/widower	14	2.1
- Educational level		
High School or less	183	27.2
Master's degree and above	37	5.5
Not educated	2	0.3
University	451	67.0
- Smoker		
No, but I am an ex-smoker	43	6.4
No, I am not a smoker	504	74.9
Yes, I am currently a smoker	126	18.7
- Diabetes		
No	643	95.5
Yes	30	4.5
- Anemia		
No	556	82.6
Yes	117	17.4

The regional demographical data of the participants is shown in the Figure 1 / Table 2. It shows that most of the participants (38%) are from Makkah, while 19.5% of the participants are from Riyadh.

Figure 1: Participants regional characteristics (The percentage of Participants demographical data)

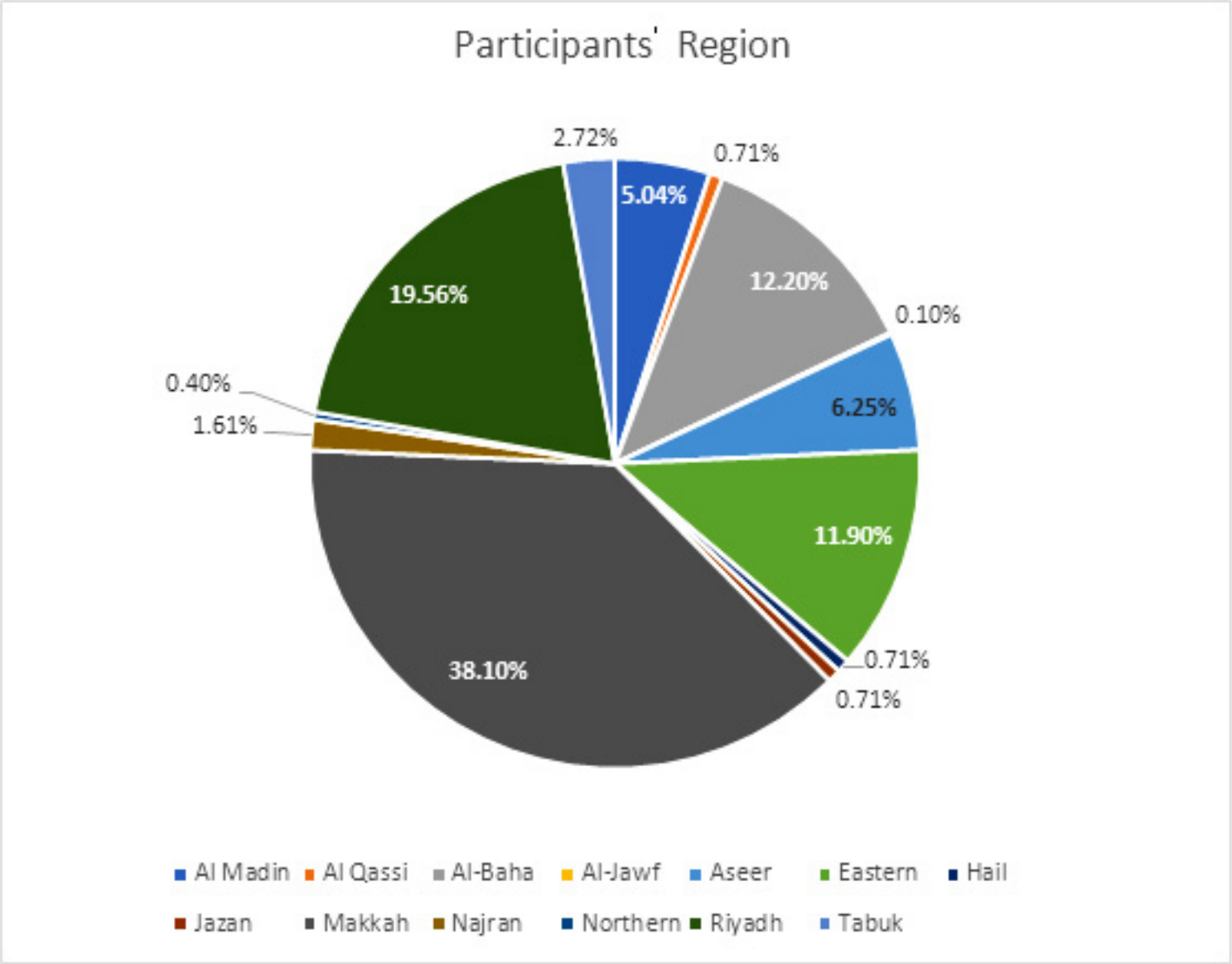


Table 2: Participants demographical data

Regions	Count of 5. Region:
Al Madinah	34
Al Qassim	5
Al-Baha	82
Al-Jawf	1
Aseer	42
Eastern Province	80
Hail	5
Jazan	5
Makkah	256
Najran	11
Northern Borders Province	3
Riyadh	131
Tabuk	18
Grand Total	673

The descriptive statistics below in Table 3 show the descriptive statistics of the length, weight, and BMI of the respondents. The overall results indicate greater variation in the weight and length as well as BMI values.

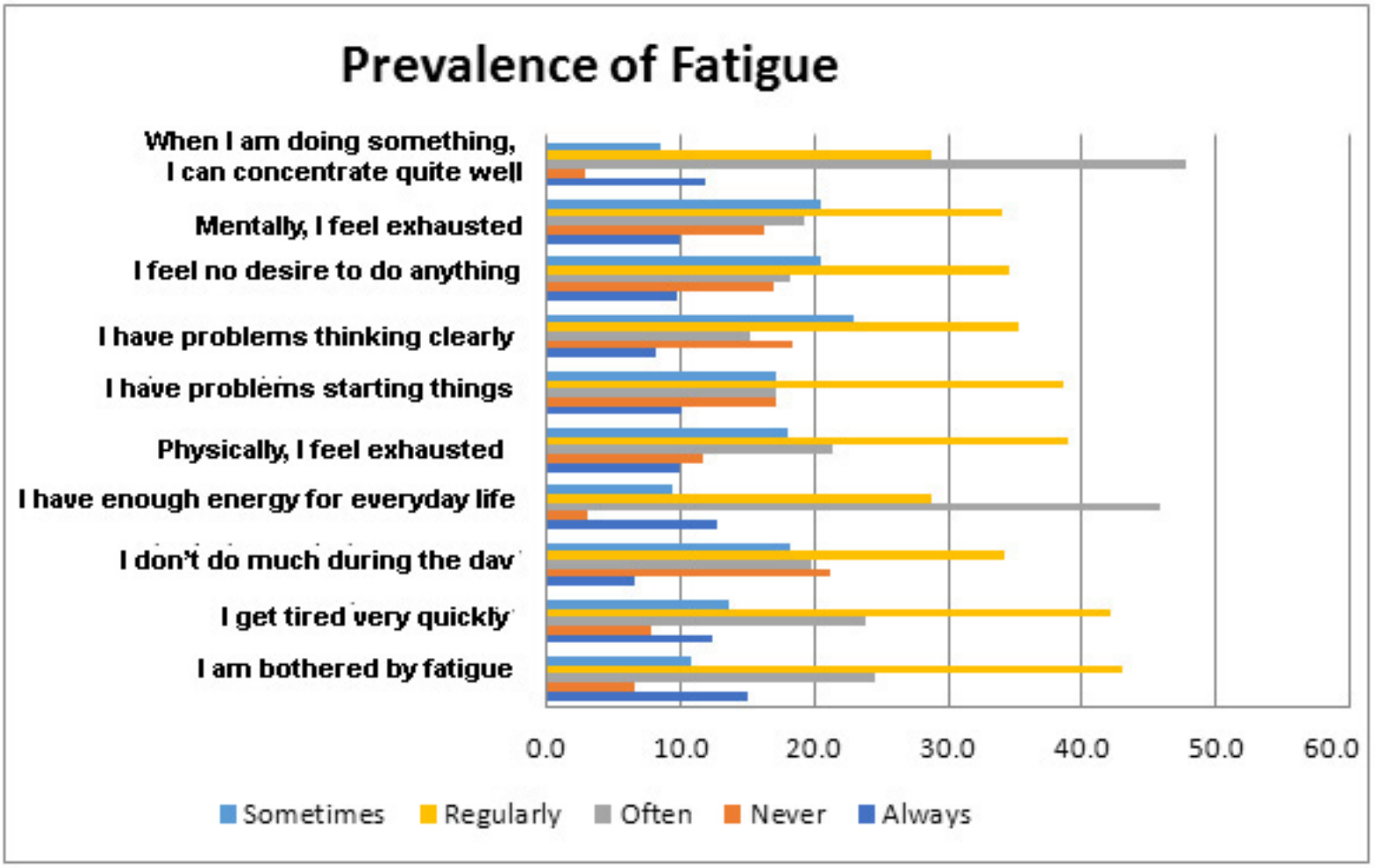
Table 3: Descriptive Statistic Results - length, weight, and BMI.

	N	Minimum	Maximum	Mean	Std. Deviation
Length	673	133	191	163.06	13.581
Weight	673	38	170	71.10	19.743
BMI	673	15.95	43.78	28.05	18.166

2 Prevalence of Perceived Fatigue and its Impact on Quality of Life among the Saudi General Population

The prevalence of Perceived Fatigue by the ten questions from Fatigue Assessment Scale of the questionnaire and the percentages of their responses are shown in Figure 2. From the figure, most of the participants believe that they usually can concentrate well. Moreover, most participants have enough energy for everyday work. In contrast, general fatigue such as being bothered by fatigue, and getting tired quickly seem to be more common compared to mental fatigue such as having no desire to do anything and having a problem thinking, etc.

Figure 2: Prevalence of Perceived Fatigue among Saudi General Population



3 Association between Demographic characteristics and fatigue subgroups

Fatigue among the Saudi General Population is divided into three subgroups General fatigue, mental fatigue, and physical fatigue. To examine the association between demographic characteristics and sub-group fatigue, one-way ANOVA was utilized. The results of the one-way ANOVA are shown in Table 4. Regarding gender, the p-value is significant for all three subgroups (less than 0.05). Moreover, the mean value of fatigue of all three subgroups is higher in females compared to males, so, it can be concluded that females are more likely to suffer from general, physical as well as mental fatigue compared to males. For the second demographic which is age, the p-value is found to be insignificant, indicating that age has no significant impact on general, physical as well as mental fatigue. However, the mean value of fatigue is higher for participants of the age group from 18 to 25 years.

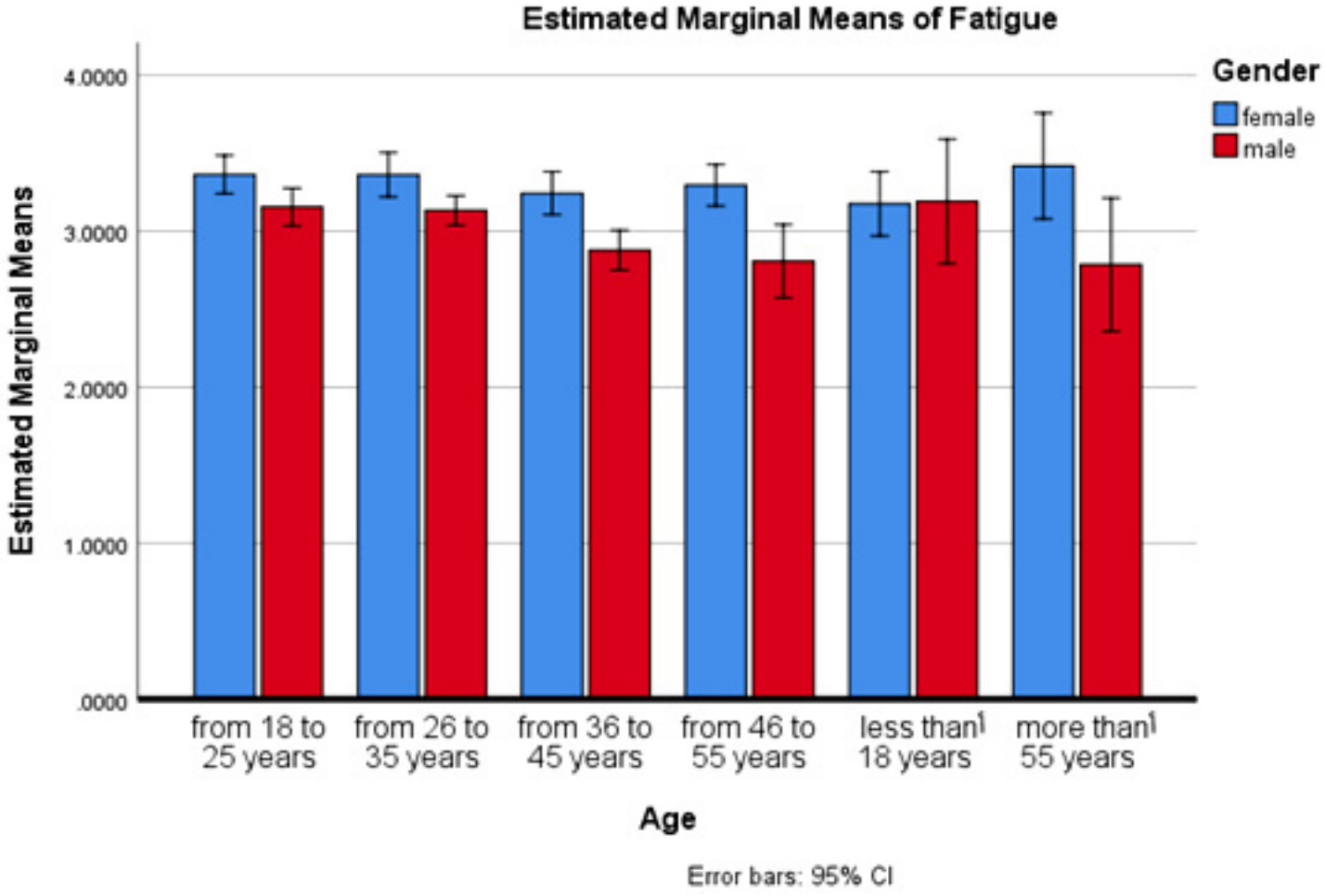
Similarly, no significant impact of marital status of the participants is found in the three subcategories of fatigue. However mean value of General fatigue is found higher for widows. Similarly mean value of physical fatigue and mental fatigue is also found to be higher widows, indicating that widows are more likely to suffer from fatigue.

Table 4: One-way ANOVA result of multidimensional fatigue among the Saudi General Population in association with demographic characteristics (Mean ± SE)

Variable	Subgroup	General fatigue	Physical fatigue	Mental fatigue
Gender	Female	3.39±0.744	3.29±0.658	3.23±0.736
	Male	3.09±0.806	3.13±0.720	2.93±0.779
	P-value	0	0.002	0
Age	from 18 to 25 years	3.17 ±0.719	3.27 ±0.69	3.18±0.719
	from 26 to 35 years	3.12 ±0.778	3.24 ±0.746	3.13±0.778
	from 36 to 45 years	2.91 ±0.795	3.1 ±0.642	2.92±0.795
	from 46 to 55 years	3.06 ±0.739	3.18 ±0.633	3.06±0.739
	Less than 18 years	3.08 ±0.872	3.19 ±0.7	3.08±0.872
	More than 55 years	2.91 ±0.833	3.35 ±0.828	2.91±0.833
	P-value	0.054	0.323	0.054
Marital Status	Single	3.24 ±0.841	3.23 ±0.696	3.13 ±0.744
	Married	3.22 ±0.753	3.18 ±0.7	3.02 ±0.797
	widow	3.76 ±0.646	3.57 ±0.513	3.28 ±0.726
	Divorced	3.29 ±0.517	3.08 ±0.556	3.03 ±0.489
	P-value	0.1	0.198	0.325
Education	Not educated	4.5 ±0.707	4 ±0.471	3.87 ±0.176
	High School or less	3.29 ±0.842	3.16 ±0.718	3.06 ±0.766
	University	3.22 ±0.771	3.21 ±0.694	3.09 ±0.771
	Master's degree and above	3.15 ±0.709	3.35 ±0.555	2.89 ±0.802
	P-value	0.082	0.181	0.228
Smoking Status	No, I am not a smoker	3.24 ±0.8	3.22 ±0.689	3.08 ±0.784
	I am an ex-smoker	3.24 ±0.749	3.11 ±0.741	3.04 ±0.841
	Yes, I am currently a smoker	3.23 ±0.77	3.19 ±0.703	3.04 ±0.7
	P-value	0.955	0.565	0.833
Diabetes	No	3.24 ±0.788	3.21 ±0.699	3.08 ±0.768
	Yes	3.27 ±0.853	3.15 ±0.611	2.95 ±0.858
	P-value	0.815	0.647	0.39
Anemia	No	3.18 ±0.787	3.19 ±0.681	3.02 ±0.758
	Yes	3.53 ±0.741	3.31 ±0.752	3.31 ±0.795
	P-value	0	0.084	0

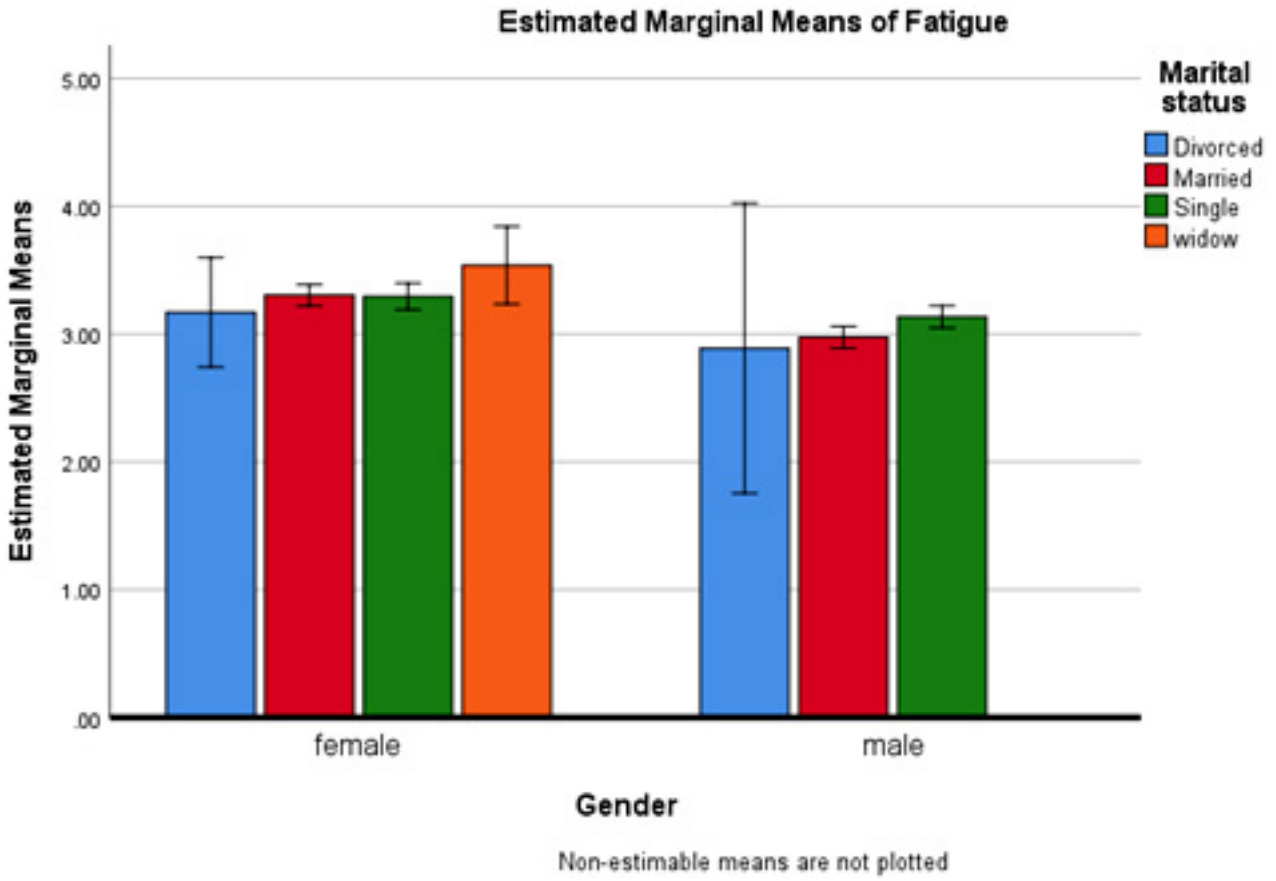
Moreover, no significant impact of education on general, physical as well as mental fatigue is found. Additionally mean value for the not educated participant is higher for general, physical as well as mental fatigue. Similarly, no impact of smoking habit is found on general, physical as well as mental fatigue And no association of diabetes was found with any of the three fatigue subgroups. However, the mean value of general fatigue is higher for the participants with diabetes, while mental and physical fatigue is higher for the participants who are not diagnosed with diabetes. In contrast to the result of diabetes, anemia has a significant impact on general and mental fatigue. Anemic participants are more likely to suffer from general fatigue, as well as mental fatigue. The overall results of the ANOVA table show that female gender and anemic are the only significant factors for fatigue among the Saudi general population.
The further assessment of the fatigue score among the Saudi general population was done by a univariate General Linear Model (GLM). The results of the GLM are documented by figures. Figure 3 indicates the mental fatigue group by gender of the participants. It indicates that women had higher mean overall fatigue scores than men. Moreover, a female who is more than 55 years has higher fatigue compared to other age groups. However, men who are less than 18 years are more likely to suffer from mental fatigue

Figure 3: Marginal mean of the overall by gender and age group



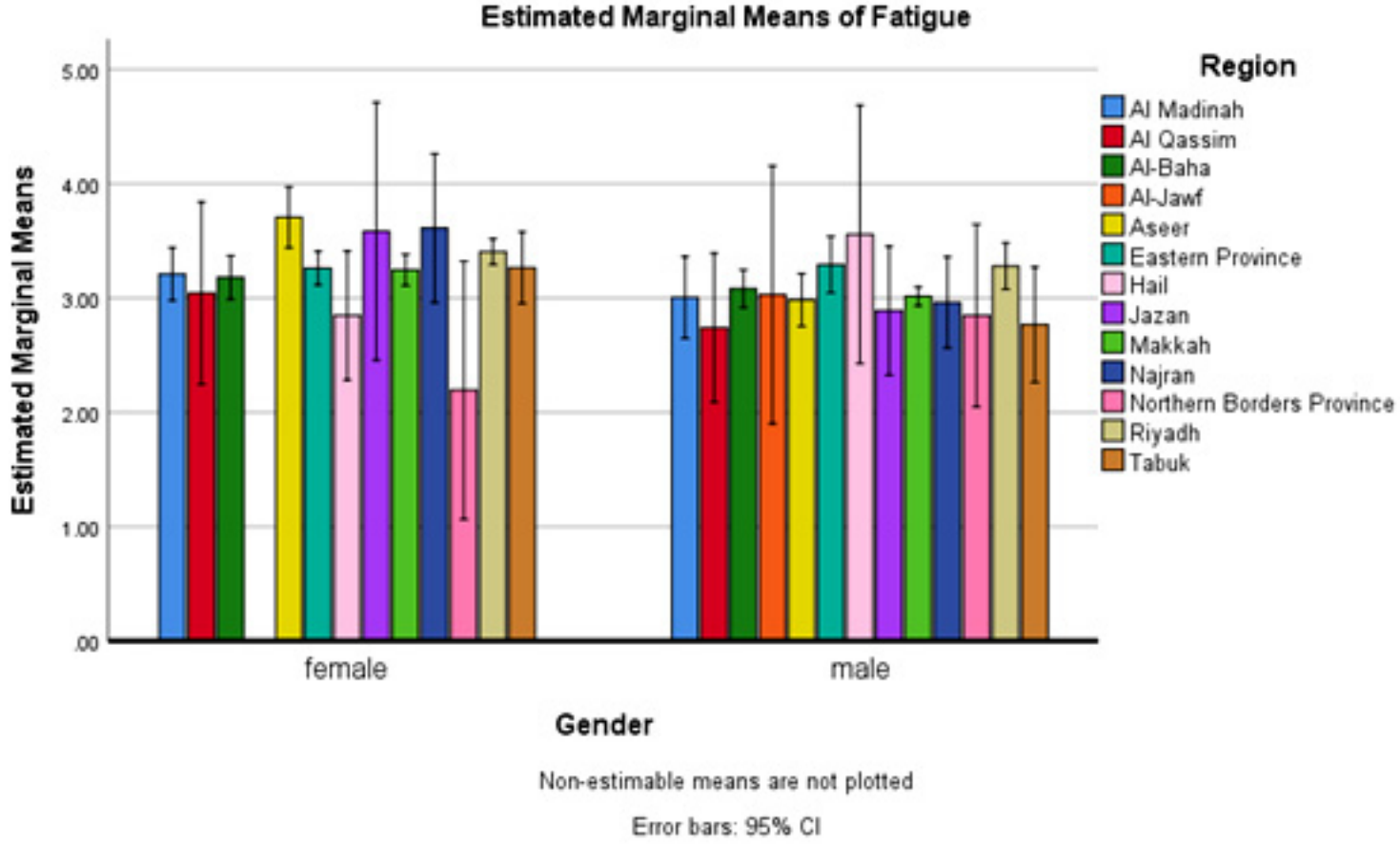
Similarly, Figure 4 shows that widowed females are more likely to suffer from fatigue, than single, married and divorced. However, single men are more likely to suffer from fatigue.

Figure 4: Marginal mean of the overall fatigue by gender and marital status



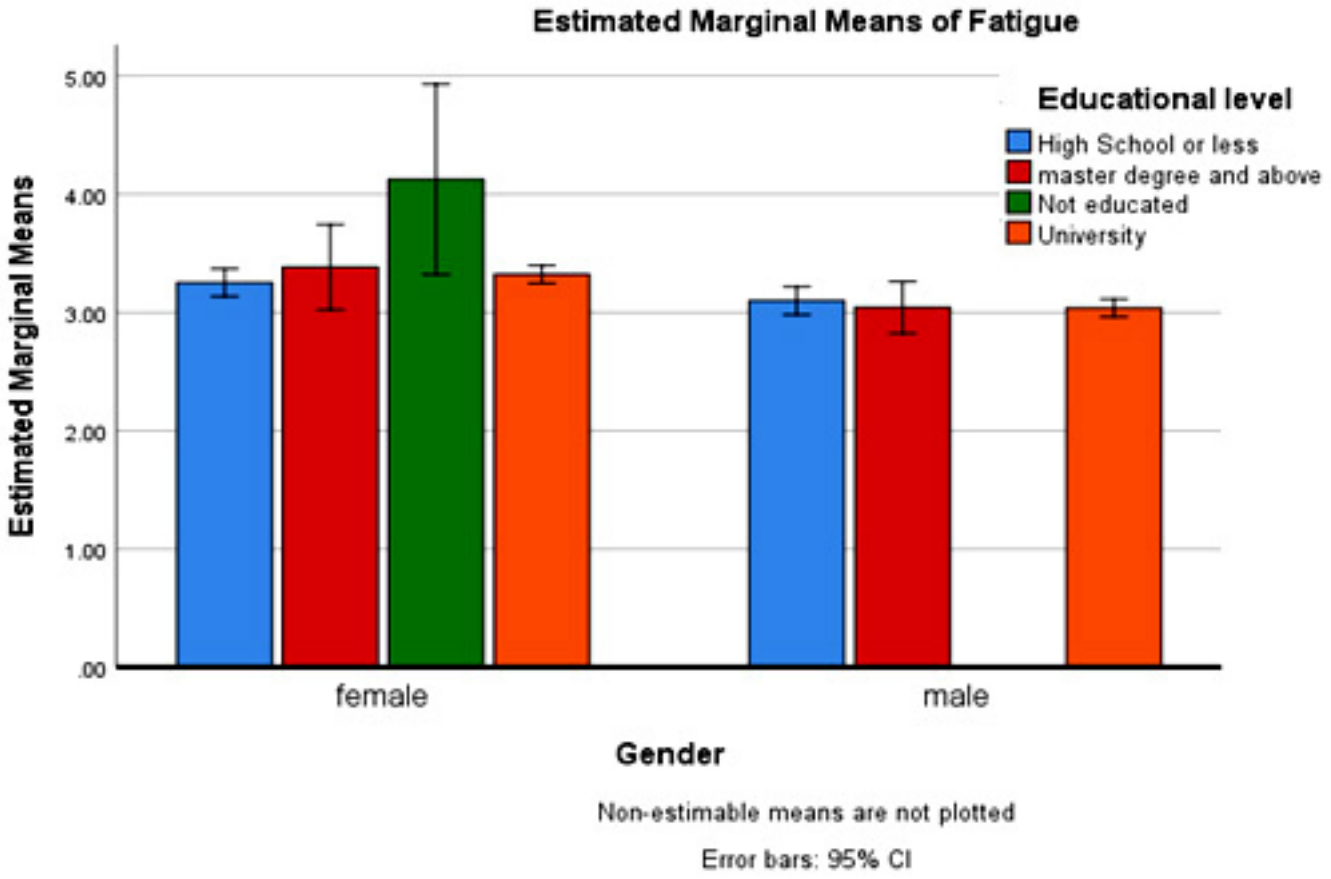
A higher value of fatigue is found for the Aseer Region for females, then Jazan, and then for Najran. However, the minimum value of overall fatigue is found for the Hail. Meanwhile, for the male, the maximum value of fatigue is found for Hail, then for Riyadh and Eastern provinces.

Figure 5: Marginal mean of the overall fatigue by gender and regions



For the education level, the highest value of mean fatigue is found for the females with no education and consequently for the females with a university education and master's degree. However, for males mean fatigue is the same for all education levels.

Figure 6: Marginal mean of the overall fatigue by gender and education level



Discussion

To restate, the aim of the current cross-sectional study was to determine the prevalence of perceived fatigue among the people in Saudi Arabia, and its effect on the quality of life of the people and its association with different socio-demographic factors. In terms of the prevalence of fatigue, it was found from the survey that the people appear to have good energy levels and the ability to concentrate well demonstrating satisfactory mental and physical strength. Previous studies have shown a correlation between the improvement of energy and physical functioning and reduction in fatigue which ultimately contributes to overall well-being and quality of life of people (Mock et al., 2004; Hazes et al., 2010; Gielissen et al., 2012). This demonstrates that the population, in general, do not report high levels of fatigue due to their sufficient energy levels and ability to concentrate well. Nonetheless, it was also found from the survey that the experience of general fatigue such as getting tired appears to be more common as compared to the experience of mental fatigue demonstrating no impact on the cognitive ability of the people such as thinking, problem-solving etc. This directs attention towards the prevalence of physiological fatigue that may result from prolonged strenuous activity that can be relieved with rest and avoidance of physical activity for some time. Also, this kind of fatigue does not have a severe impact on the daily life activity of the people (Kluger, Krupp and Enoka, 2013) so the population in general, do not report severe impacts of perceived fatigue.

Furthermore, the study attempted to determine the impacts of socio-demographic factors on the perceived experience of fatigue among the study population. The results of the survey validated the gender dependency of perceived fatigue as the result indicated that females are more likely to experience general, physical and mental fatigue as compared to males. This is found to be in line with the findings of the previous studies that have proposed an association between gender and perceived fatigue. It is found that in the case of video conferencing and meetings, women tend to experience greater fatigue compared to men (Fauville et al., 2021). In a similar vein, Vold et al., (2020) proposed that women tend to be more fatigued as compared to men while the association between substance use and fatigue was stronger for females as compared to males. In this regard, it is worth noting that the gender difference in household responsibilities as well as financial stability can explain the differences between the experience of fatigue between females and males with females being more disadvantaged than males. Thus, due to such differences, females suffer from perceived fatigue greater than males.

When it comes to age, the current study found no association between the age of the individuals and perceived fatigue. Thus, age cannot explain the prevalence of general, physical and mental fatigue among the population. This finding of the study is found to be contrasting with many previous studies that have worked on the association between age and experience of fatigue. LaSorda et al., (2020) proposed that older people are more subject to fatigue than younger people. However, the findings of the current study appear to be in line with the findings of Paris et al., (2022) that have proposed that regardless of age, people can become susceptible to increased fatigability due to their changing capacities of neuromuscular mechanisms. Generally, it concludes that age has no impact on the perceived fatigue of the people in Saudi Arabia. In terms of marital status, no difference was found between the people who were unmarried and married demonstrating that people may experience fatigue regardless of their marital status. However, being a widow was associated with experiencing higher levels of stress. This is again found to be in line with the findings of many previous studies and has contrasted with many others. For instance, the findings are in line with the findings of Karakurt and Ünsal (2013) that have asserted that widowed people tend to report greater levels of fatigue compared to people who are either married or unmarried. In this context, both physical fatigue and mental fatigue were found to be greater for widowed people.

The findings of the current study did not find any substantial effect of education on the experience of any type of fatigue. Similarly, no association between smoking habit as well as diabetes was found in any of the fatigue subcategories. However, a strong association was found between anemia and perceived fatigue. In particular, people suffering from anemia are found to be more likely to report general and mental fatigue as compared to people not having anemia. In this regard, it is worth noting that in the relevant extant literature, anemia was found to be significantly associated with fatigue; in fact, fatigue has been found to be a major symptom of anemia. This is because, the abnormalities in energy metabolism notable by the anemic individual causes them to experience greater levels of fatigue (Sobrero et al., 2001). Also, as anemia is a common condition among cancer patients, the association between anemia and fatigue is exacerbated by rising metabolic needs of the patients due to the growing tumor. Thus, the fluctuations in the hemoglobin levels have significant impacts on mental and physical fatigue ultimately having a negative effect on both the quality of life and well-being of the people (Tardy et al., 2020; Lanser et al., 2020; Ebede Jang and Escalante, 2017; Sobrero et al., 2001). So, fatigue and anemia are found to be strongly associated. Therefore, gender and anemia are found to be the major factors that can explain the prevalence of perceived fatigue among the Saudi general population from the socio-demographic characteristic and other risk factors.

The association and the combined effect of multiple socio-demographic factors on fatigue were also investigated in the study. It was found that females who were aged over 55 years reported greater levels of fatigue compared to males or younger females. This may explain the age-associated incidence of fatigue among females (LaSorda et al., 2020). As it has already been established that household responsibilities, as well as lack of financial independence, can contribute to fatigue among females (Vold et al., 2020), it can be deduced that these two mediating factors are more relevant for older females as compared to younger females. As females age, their household responsibilities may increase while their financial independence is likely to decline over time (Li, Chen and Peng, 2022). Thus, this explains the greater levels of fatigue experienced by older females. In a similar vein, widowed women are also found to be more likely to be characterised by fatigue. This can again be associated with the lack of financial independence. Lastly, it was also found that females with no education reported a greater incidence of fatigue as compared to educated females with females having a university education and master's degree reporting the lowest incidence of fatigue. This is found to be supportive of the findings of both Galland-Decker, Marques-Vidal and Vollenweider, (2019); and Maglione et al., (2018) as they have suggested that females with lower levels of education are found to be more likely to experience fatigue demonstrating that fatigue may reduce with rising of the educational attainment.

Conclusion

The paper attempted to gauge the prevalence of perceived fatigue among the people of Saudi Arabia and attempted to determine the socio-demographic factors that could explain the prevalence and the subjective experience of fatigue that differs among the people. Generally, the paper found a significant impact of gender and anemia on the perception of fatigue. Also, despite the absence of any substantial impact of marital status (married or unmarried) on fatigue, the people who were widowed reported a greater incidence of fatigue. In general, the prevalence of general fatigue that may result from any strenuous activity is found to be commonly prevalent among the population as compared to mental or physical fatigue, demonstrating good physical and mental strength of the people and no severe impact on their quality of life. Lastly, the study also reported that females with higher ages and lower levels of education tend to report greater fatigue incidence.

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Conflicts of Interest
The authors declare no conflicts of interest regarding the publication of this paper.

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Idiopathic Granulomatous Mastitis

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Abstract

Idiopathic Granulomatous Mastitis (IGM) is an uncommon benign disorder of the breast that can mimic two frequent breast disorders, breast carcinoma and breast abscess. It is frequently under-diagnosed and poorly managed, with many health professionals unaware of the condition. Timely diagnosis with a clear understanding of the various complications is necessary. IGM usually affects women of childbearing age breastfeeding within the previous 5 years; IGM is a disorder that should be considered in the evaluation of women who present with painful breast disease. Primary health care physicians play a vital role in the identification, diagnosis, referral and long-term management of such patients. This review narrates the care of patients with IGM in Primary care.

Keywords: Mastitis, Granulomatous mastitis, Idiopathic granulomatous mastitis, Granulomatous lobular mastitis, Inflammation

Introduction

Idiopathic granulomatous mastitis (IGM) is a rare benign inflammatory breast entity characterized by holocentric granulomas. IGM has a persistent or recurrent disease course and affects parous premenopausal women with a history of lactation. It has also been associated with hyperprolactinemia and its a etiology has not been fully elucidated. Diagnosis of IGM relied on exclusion of other causes through laboratory workup as well as characteristic clinical examination and histopathologic findings of cystic neutrophilic. IGM is generally divided into two main groups of specific and non-specific. A palpable mass in the breast is the most common complaint, but nipple retraction, hyperemia in breast skin, oedema, ulceration and fistula development during the chronic period are also potential complaints. Systemic symptoms such as fever are generally not treatment, as low-dose prednisolone plus drainage was more effective with a lower recurrence rate than only surgical excision or high-dose prednisolone.

Etiology

GM is generally divided into two main groups of specific and non-specific. The term “specific GM” refers to conditions for which the etiological factors can be identified whether an isolated inflammatory event only applies to the breast, or the breast is involved in a systemic inflammatory event. Nonspecific GM is also known as idiopathic granulomatous mastitis or granulomatous lobular mastitis, which generally refers to conditions that can lead to a granulomatous reaction in the breast or conditions for which the etiological factors cannot be determined.

Causes of granulomatous inflammatory reaction

Infectious	**Mycobacterium tuberculosis** **Blastomycosis** **Cryptococcosis** **Histoplasmosis** **Actinomycosis** **Filarial infection** **Corynebacterium** **Wegener granulomatosis**
Autoimmune process	**Giant cell arteritis** **Foreign body reaction** **Plasma cell mastitis**
Duct ectasis	**Subareolar granuloma** **Periductal mastitis**
Diabetes mellitus **Sarcoidosis** **Fat necrosis** **Idiopathic**	

Presentation

Women presenting to Primary Care physicians show wide variations in their symptomatology Mastitis may present with clinical findings that mimic the two endpoints of breast diseases such as breast abscess and breast cancer. A unilateral palpable mass in the breast is the most common complaint. This condition should be suspected in any woman who presents with unilateral tender palpate mass within a couple of years after giving birth or who has history of at least one live birth and breast-feeding women. However, we have found reports of patients as young as 11 years-old, and as old as 80 years. The true prevalence of IGM is unknown. The disease has been found worldwide and, in all races, but there is a described predilection for Hispanic and Asian women.

Clinical assessment

Women with IGM should be asked about personal, menstrual, medical, and family history in detail. Physical examination should focus on any underlying disorder. The history and examination points to be considered by the Primary care physician are the diagnosis of IGM should be considered in women who develop recurrent sterile breast abscesses and appropriate diagnostic evaluation should be performed on such cases.

Investigation and Diagnosis

Diagnostic work-up of such patients should include confirmation of the diagnosis and the ruling out of other comorbid conditions. Although proper diagnostic accuracy in IGM is lacking, the following are usually used as diagnostic criteria.

The most frequent findings on mammogram and ultrasound are asymmetric diffuse increased density of fibro-glandular tissue and hypoechoic mass lesions or nodular structures, respectively. Breast MRI may be a better imaging modality, but it does not allow a differentiation between a granulomatous process and other disorders. MRI is a promising imaging modality for follow-up of the lesions over time.

Histopathological evaluation plays a crucial role in the diagnosis of IGM. Characteristic histopathology features such as lobular non-caseating granulomas with epithelioid histiocytes, multinucleated giant cells, and a predominantly neutrophilic background with attendant lymphocytes, plasma cells and eosinophils in varying numbers without necrosis and negative microbiological investigation favours diagnosis of IGM. Micro abscess formation and fat necrosis are frequently seen (2). Not all cases have typical non-caseating granulomas on histopathological exam. However, all patients have epithelioid histiocytes present within the smears.

Management

The most important steps after making the diagnosis of IGM are to inform the patient of the diagnosis in a sensitive and caring manner, provide accurate information, and offer referral to appropriate teams. IGM should ideally be managed by a multidisciplinary team comprising of a primary care physician, gynecologist, endocrinologist, rheumatologist, and a psychologist.

The treatment of IGM remains controversial. The treatment options include close follow-up, immunosuppressive drugs, and surgical excision.

Patients with uncomplicated IGM may be observed over time without treatment. Antibiotics have no role in the management of true cases of IGM. The use of corticosteroids have been reported as successful in the treatment of IGM. Steroids should be started at a dose of 1 mg/kg per day and tapered slowly according to clinical response. Responses usually occur within weeks of treatment, but patients may need to be treated for several months. About half of the cases relapse after stopping or decreasing the dose of steroids.

The use of steroid sparing agents such as methotrexate or azathioprine provide options that may facilitate tapering of steroids.

Traditionally IGM was treated by surgical excision of the mass, but some studies have suggested that the recurrence rate with surgical treatment is higher than with steroid treatment. Recurrence rates of 5% to 50% are reported after surgical excision of the mass. Wide excisions with negative margins are better than limited excision alone, as there is a higher tendency to relapse after limited excision. Furthermore, there is a high rate of fistula formation, poor wound healing, and disfigurement after surgical intervention in patients with IGM.

Conclusion

Despite the advances in our understanding of IGM, most cases remain idiopathic, and there is no clear etiology. Regardless of the etiology, (IGM) is a rare, poorly understood condition that presents as inflammatory nodules of the breast. It is often initially misdiagnosed as furunculosis or cellulitis. Despite the painful, scarring, and debilitating nature of the disease, patients often have a delay in accurate diagnosis and treatment. Even when IGM is considered as a diagnosis, it is one of exclusion, with the differential diagnosis including serious conditions such as breast cancer, sarcoidosis, and cutaneous tuberculosis. The management of women with IGM begins in Primary Care with informing the patient of the diagnosis in a sensitive and caring manner and providing accurate information about the diagnosis. A multi-disciplinary approach must be recognized as a cornerstone to effectively manage this complex entity to ensure that physical, psychological, and emotional challenges that result from IGM diagnosis are met and short-term and long-term well-being of these women is optimized.

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Conflict of interest
There are no conflicts of interest to declare by any of the authors of this study

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Depression in the Elderly: Update on Diagnosis and Management in Primary Health Care

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Abstract

Depression in the elderly is prevalent, frequently misdiagnosed, and typically untreated. Symptom patterns of geriatric patients with depressive disease are frequently uncommon or aberrant, making diagnosis difficult. Depression can masquerade as pseudodementia, sornatization, or anxiety/irritability, or it might be the underlying cause of pain syndromes and alcoholism. Depression may be a main or secondary symptom of a concurrent medical condition, such as thyroid illness and occult neoplasm, among the elderly. It is possible that common drugs, especially certain antihypertensive agents, have etiologic importance. Because there is no accurate diagnostic test, a detailed clinical evaluation is necessary. Antidepressants that are safe and effective for geriatric patients should be used to treat depressive disease in the elderly. A complete, multidisciplinary approach, including in some situations consideration of electroconvulsive therapy, is crucial. The long-term outlook for elderly depressed individuals is favorable.

Keywords:depression, elderly, diagnosis management

Introduction

Depression is a severe affective condition. It can influence your feelings, actions, and thoughts. Depression is a prevalent issue among the elderly, but clinical depression is not a normal component of aging. Late-life depression (LLD) is described as a depressive condition occurring in a patient older than 60 years, however the onset and cutoff age can vary. Clinical depression can have a substantial impact on older persons, and selecting psychotherapy and pharmaceutical treatment choices can be difficult. Depression is not a natural consequence of aging (1). Concurrent medical problems and decreased functional expectations frequently conceal the severity of disability in elderly patients (2,3). Typically, older people with depression do not present with gloomy moods, but rather with less specific symptoms such as sleeplessness, anorexia, and exhaustion. Sometimes, elderly individuals dismiss mild sadness as an appropriate response to life stress or a typical aspect of aging. This article aims to assist office-based practitioners in recognizing atypical manifestations of depression in older patients. A knowledge of these manifestations helps guide the selection of diagnostic tests and medical therapies.

Epidemiology

Depression has been discovered in 17 to 37% of older individuals seen in primary care settings, with approximately 30% of these patients classified with severe depression (1). Roughly 3 percent of community-dwelling older adults in good health suffer from serious depression, and 75 percent initially consult a primary care physician (3,4). Recurrence rates may reach 40 percent. Suicide rates among depressed patients are approximately double those of the general population. 5 Seventy-five percent of older suicide victims had seen a primary care physician during the previous month, but their symptoms were not diagnosed or addressed. In older suicide victims, depression is the most common diagnosis; in younger suicide victims, substance abuse and psychosis, alone or in combination with a mood illness, are the most common diagnoses.

A history of depression, chronic medical illness, feminine sex, being unmarried or divorced, brain disease, alcohol misuse, certain drugs, and stressful life events are risk factors for depression in the elderly. 4 Up to 15% of adult widows suffer from potentially serious depression for at least a year after the loss of their spouse. (4,5) In contrast to younger individuals with depression, elderly individuals with depression typically have a medical comorbidity (6). Major depression is more prevalent among hospitalized or institutionalized older than 70-year-old medically ill patients. Stroke (30 to 60 percent), coronary heart disease (8 to 44 percent), cancer (1 to 40 percent), Parkinson's disease (40 percent), Alzheimer's disease (20 to 40 percent), and dementia are severe or chronic diseases associated with significant rates of depression (17 to 31 percent). (4,7)

Pathogenesis

The neurobiology of depression includes a complex interaction among various biological, psychological, and social factors. There is evidence of a genetic basis for depression in persons of all ages. There also is substantial evidence that a history of depression is a risk factor for depression later in life. Elderly persons with depression have higher rates of cognitive impairment, cerebral atrophy, enlarged ventricles, leukoencephalopathy, and deep white-matter changes.

The field of neuropsychiatry is contributing to our understanding of depression in old age. Damage to frontal subcortical circuitry, particularly the striato-pallido-thalamo-cortical pathways, as a result of neurodegeneration or cerebrovascular disease has been linked to certain subtypes of late-life depression [8].

Subclinical cerebrovascular disease may also affect depression susceptibility and manifestation. Typically observed on brain imaging, cerebral atrophy, subcortical deep white matter [9], and periventricular ischemic lesions may be involved. Other radiologic manifestations of depression in later life include increased ventricular brain ratios and decreased volumes in particular brain regions [10].

Impact

As the most prevalent mental health issue among older adults, LLD has a devastating impact on patients, their families, and their communities (11). cLLD causes significant distress and is associated with a number of negative outcomes. The functional impairment caused by the disease may overwhelm caregivers and necessitate placement in an assisted living facility. LLD may also interfere with the treatment of other common geriatric medical conditions, including stroke, Parkinson's disease, and cognitive disorders (12).

Inadequate motivation hinders rehabilitation efforts and worsens outcomes. LDL is a risk factor for increased non-suicide mortality in older adults. (12,13) LLD is also associated with suicidal behavior in the elderly. Statistics Canada reports that 19.0% of Canada's 3,890 suicide victims in 2009 were over the age of 60. Older men have a higher suicide rate than older women and represent a high-risk demographic. In addition, geriatric patients may use more lethal suicide methods, as 26.0% of victims over the age of 60 died by firearm in 2009, compared to 12.0% of those aged 15 to 39. (14)

Depression exacerbates disability and diminishes quality of life. Depression in late life is associated with increased office and emergency department visits, increased drug use and cost for both prescription and over-the-counter medications, increased risk for use of alcohol or illicit drugs, increased length of inpatient stay, and overall higher costs of care (15). Late-life depression also tends to be a recurrent or persistent condition that negatively affects both medical and psychiatric morbidity and mortality (16).

Diagnosis

Depression in older adults may be difficult to identify due to the fact that older individuals may exhibit different symptoms than younger individuals. Depression can manifest differently depending on the individual and their cultural background. People from various cultures may express their emotions, moods, and mood disorders, such as depression, differently. Depression may manifest as physical symptoms in some cultures, such as aches or pains, headaches, cramps, or digestive issues. For some depressed older adults, sadness is not their primary symptom. Instead, they may be experiencing numbness or a lack of interest in activities. They may be less willing to discuss their emotions. The list below contains common symptoms. Nevertheless, because individuals experience depression differently, there may be additional symptoms not on this list. (Tables 1 & 2)

- Feelings of hopelessness, guilt, worthlessness, or helplessness
- Irritability, restlessness, or difficulty sitting still
- Decreased energy or fatigue
- Moving or speaking more slowly
- Difficulty concentrating, remembering, or making decisions
- Difficulty sleeping, waking up too early, or oversleeping
- Eating more or less than usual, typically with unplanned weight gain or loss
- Thoughts of death or suicide, or attempts at suicide

When both predisposing and precipitating risk factors are considered, it is easier to detect depression in later life. Prior clinical depression, physical and chronic disabling illnesses (e.g., cerebrovascular disease), problematic substance use (including multiple medications and alcohol), and persistent sleep problems are risk factors. Psychosocial predisposing risk factors include female gender, personality traits such as dependency, widowhood or divorce, social disadvantage, lack of social support, and caregiving responsibilities for others with serious illness. (17)

Recent bereavement, a change in residence (such as from a house to a nursing home), and adverse life events are risk factors for LLD (e.g., loss, separation, financial crisis, declining health, marital problems). Screen recently bereaved patients for LLD and make a clinical determination regarding depression based on the patient's history and cultural norms regarding the expression of grief after loss. (17)

Multiple persistent complaints of pain, headache, fatigue, insomnia, gastrointestinal distress, and weight loss are among the help-seeking behaviors suggestive of LLD. There may be frequent calls and visits to the family doctor, as well as high service utilization. (18) Hospitalized patients who have undergone coronary artery bypass graft surgery, myocardial infarction, stroke, or hip fracture, as well as those who experience delayed recovery or refuse treatment or discharge, should be evaluated for LLD. When patients present with apathy, withdrawal, isolation, failure to thrive, agitation, and delayed rehabilitation, LLD should be considered in the care facility. Somatic symptoms are strongly associated with depression in older patients with both LLD and physical illness. (19)

Generally, the DSM-5 criteria can be used to diagnose LLD. However, contextual obstacles must be taken into account. The "markedly diminished interest or pleasure" criterion may overlap or be confused with the apathy of dementia (classified as a major neurocognitive disorder in DSM-5) or another neurological illness. A physical illness or significant neurocognitive disorder can also lead to weight loss and a decreased appetite. Physical illness, chronic pain, or the use of substances such as opioids can cause sleep disturbances. A physical or neurological illness may cause psychomotor retardation, fatigue, and anergia. End-of-life concerns may be responsible for feelings of worthlessness and suicidal ideation.

Two diagnostic screening tools for LLD are available. The Geriatric Depression Scale (GDS), a validated self-assessment questionnaire, is offered in both a 30-item long-form and a 15-item short-form. The long form uses a cutoff score of 11 points to diagnose depression, while the short form uses a cutoff score of 7 points (20, 21) (table 3). The GDS is accessible online for free in numerous languages. Unfortunately, its reliability decreases as cognitive impairment worsens[22], in which case the Cornell Scale for Depression in Dementia (CSDD) is recommended (23). The CSDD relies on interviews with both the patient and a family member or caregiver, and is validated for use with patients with or without dementia.

Treatment

65 to 75 percent of elderly patients can be treated for depression (24). A biopsychosocial approach, combining pharmacotherapy and psychotherapy, is required for effective management (25). In general, therapy results in enhanced quality of life, increased functional capacity, possible improvement in medical health status, increased longevity, and decreased health care costs. There should be improvement as early as two weeks following the initiation of therapy, but full therapeutic effects may take several months. Recovery from a severe episode of depression typically takes between six and twelve months. According to studies, older depressed patients benefit most from aggressive, persistent treatment (25). Therefore, older patients should receive treatment for longer durations than younger patients typically do (24).

Successful treatment of depression in older adults depends on a number of factors, including addressing comorbid conditions, customizing pharmacologic or other interventions to the individual patient, monitoring therapy for side effects and efficacy, and ensuring close follow-up. Patients who have failed multiple antidepressant trials or have a preference for nonpharmacologic treatment should consider consulting with a mental health specialist.

Once late-life depression has been diagnosed, management options can be considered. There is good evidence to support the use of psychotherapy or pharmacotherapy alone, and the two in combination. For milder forms of

Table 1. Classic symptoms of depression in the elderly

- Depressed mood
- Diminished interests or pleasure in activities
- Weight and appetite disturbance
- Insomnia or hypersomnia
- Psychomotor change
- Fatigue/energy loss
- Guilt/low self esteem
- Concentration problems/indecision
- Anxiety
- Thoughts of death/suicide

Table 2. Atypical presentations of depression in the elderly

- **Cognitive deficit/pseudodementia**
- Pain syndromes
- Somatization
- Anxiety/irritability
- **Alcohol abuse**

Table 3. The 15-item Geriatric Depression Scale, also showing questions for the 4- and 5-item scales

Instructions: **Choose the best answer for how you have felt over the past week.**

1	**Are you basically satisfied with your life?**	**Yes/No (No)**
2	**Have you dropped many of your activities and interests?**	**Yes/No (Yes)**
3	**Do you feel your life is empty?**	**Yes/No (Yes)**
4	**Do you often get bored?**	**Yes/No (Yes)**
5	**Are you in good spirits most of the time?**	**Yes/No (No)**
6	**Are you afraid something bad is going to happen to you?**	**Yes/No (Yes)**
7	**Do you feel happy most of the time?**	**Yes/No (No)**
8	**Do you often feel helpless?**	**Yes/No (Yes)**
9	**Do you prefer to stay at home, rather than going out and doing new things?**	**Yes/No (Yes)**
10	**Do you feel you have more problems with your memory than most?**	**Yes/No (Yes)**
11	**Do you think it is wonderful to be alive now?**	**Yes/No (No)**
12	**Do you feel pretty worthless the way you are?**	**Yes/No (Yes)**
13	**Do you feel full of energy?**	**Yes/No (No)**
14	**Do you feel that your situation is hopeless?**	**Yes/No (Yes)**
15	**Do you think most people are better off (in their lives) than you are?**	**Yes/No (Yes)**

The answers shown in parentheses indicate possible depression.
Possible cut-offs: ≥5 for the 15-item version

LLD, psychotherapy may be recommended as a stand-alone treatment, with the addition of pharmacotherapy if required. For moderate severity LLD, antidepressant treatment is recommended, with the addition of psychotherapy if required. For severe LLD, antidepressant treatment and referral to mental health services are recommended.

A thorough medical history will inform treatment decisions. In managing depression in older adults, the following aspects of the patient's past are of particular importance: Assessment for suicidality, including ideation and plan; (lethality, intent, and means). Acute suicidal ideation requires urgent psychiatric referral [26].

Psychotic symptoms, hopelessness, insomnia, and malnutrition are evaluated.

Determination of whether the patient is abusing alcohol or medications with depressant side effects (benzodiazepines, CNS depressants, opiates, and other pain medications). Consider other medical conditions frequently associated with depressive symptoms, such as undiagnosed thyroid disease or diabetes. Moreover, pain syndromes can impede treatment response in depression and should be treated concurrently with the depression [27].

Determination of prior depressive episode history, age of depression onset, prior drug therapy and outcome, and prior remission duration, if achieved.

Determination of a familial history of depression and family medication response. Compared to the general population, older patients with mild depressive symptoms and first-degree relatives with a confirmed depression diagnosis are 1.5 to 3 times more likely to develop depression [28].

Psychotherapy, pharmacotherapy, electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and collaborative care approaches are current treatments for depression in older adults. (29-31) In addition, some evidence suggests that aerobic and supervised group exercise programs can reduce depressive symptoms in older adults. (32).

Psychotherapy and somatic therapy are the first-line treatments for depression (medication or electroconvulsive therapy [ECT]). A meta-analysis of 89 controlled studies involving older adults with varying degrees of depression (major depression, minor depression, and dysthymia) revealed that well-designed randomized studies were scarce, but that the overall effect size of psychotherapy or medication was moderate to large and roughly equivalent [33]. The treatment chosen will depend on the severity, type, and duration of the depressive episode, as well as contraindications, treatment accessibility, and patient preference. Psychotherapy and pharmacotherapy can be used individually or in tandem [34]. Pharmacotherapy is recommended for moderate to severe forms of depression. The combination of pharmacotherapy and psychotherapy may be most effective for chronic forms of depression [35].

Multiple studies indicate that treatment programs that offer a choice of medication and/or psychotherapy in primary care, frequently combined with patient outreach by a care manager in a collaborative care model, have significantly better outcomes than standard care [36,37].

Based on meta-analyses of randomized trials [38], antidepressants are effective for depression in later life. A patient-level data meta-analysis of seven randomized trials (n = 2283 patients) comparing antidepressants (bupropion, citalopram, duloxetine, escitalopram, fluoxetine, or paroxetine) with placebo found that response (reduction of baseline symptoms 50 percent) occurred in more patients who received active treatment than placebo (49 vs. 40 percent) [39]. Response was associated with duration of illness (current age minus age at onset of depression), such that response was greater in patients with a duration of illness >10 years compared to patients with a duration of illness 2 years.

Although antidepressants are effective for major depression in late life, their efficacy may be less robust in older patients than in younger ones. In a meta-analysis of 15 randomized trials, antidepressants were compared to placebo in 4756 patients aged 55 or older (mean age 70 years). Response was greater with antidepressants (relative risk of 1,3, 95% confidence interval [CI]: 1.2-1.5) [38]. In contrast, in the subgroup of patients with a minimum age of 65 or 75 years (mean age 74 years; six trials; 1,840 patients), the response to antidepressants and placebo was comparable. Both analyses were limited by heterogeneity across pooled trials, the absence of trials focusing on patients older than 80 years, and the exclusion of patients with more severe depression.

A meta-analysis of patient-level data from four randomized trials compared fluoxetine (10 to 30 mg per day) versus placebo in 960 geriatric patients (older than 60 years) treated for six weeks [40]. Although fluoxetine improved rating scale scores more than placebo, response and remission were comparable between the two groups. In addition, a separate analysis of adults (12 trials, 2635 patients) revealed that the improvement in rating scale scores for adults was nearly double that of elderly patients.

In a subsequent randomized trial, duloxetine was compared to placebo in 299 patients aged 65 or older [41]. Remission rates were comparable between groups (approximately 50 percent).

Physical activity may be an effective treatment for mild or major depression in older adults [42]. Major depressive disorder patients may find it difficult to engage in an exercise program and would likely benefit from concurrent pharmacotherapy or psychotherapy.

Barriers and Outcomes

Attributing depressive symptoms to "normal" aging or physical illness, masking the effects of coexisting medical conditions, self-medication (e.g., alcohol use), prescription drug use, poverty and low socioeconomic status (which restrict health care access), bereavement, social isolation and lack of family support, misdiagnosis of depression as dementia, hypochondriasis, somatization, cost issues, time constraints, and the stigma associated with mental illness. Instead of relying on the patient to report mood changes, clinical experience suggests that physicians who look for symptoms of depression rather than relying on the patient to report them have higher rates of recognition and therapeutic response.

Numerous primary care physicians grossly underestimate the extent to which elderly depressed patients will respond to antidepressant medication, psychotherapy, or ECT. The prognosis for recovery is identical for young and elderly patients, although older patients may require longer to achieve remission. The majority of patients recover (54 to 84 percent), 12 to 24 percent relapse, and 4 to 28 percent remain ill or disabled. Recuperation rates are halved in patients with psychotic depression, while relapse and disability rates are double those of patients with nonpsychotic depression. When prescribing antidepressants, close monitoring and review of side effects are crucial, as up to 40 percent of patients discontinue use within two weeks and up to 70 percent discontinue use within four weeks.

Conclusions

Clearly, the elderly patient is at risk for developing depressive symptoms, which frequently manifest atypically in this population. A number of factors complicate the diagnosis of depression or other affective illness in the elderly, including the prevalence of associated cognitive deficits and the tendency of these individuals to not complain about mood changes. When a patient denies depression, it is crucial to look for symptoms and signs consistent with the so-called "masked depressions" described in this article. In addition, when a depressive syndrome is identified, clinicians must investigate the possibility of concomitant medical illness or medication use that may have etiologic significance. According to the available data, psychotherapy, pharmacotherapy, and ECT are effective treatments for depression in older adults. Emerging evidence also supports the effectiveness of ketamine, rTMS, and collaborative care approaches. The prompt identification of depression and the early initiation of treatment will aid in enhancing outcomes and minimizing suffering among this vulnerable population.

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