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Assessing health literacy among hypertensive patients attending primary healthcare clinics at King Abdulaziz Medical City, Riyadh, Saudi Arabia

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Editorial

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A number of papers discussed diabetes issues. Dr Sabit did a narrative systematic review to assess the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries and the factors associated with it. They followed the Preferred Reporting Items for Systematic Review guidelines. Studies published from January 2000 to December 2020. The review aims A total of 12 studies were retrieved from search databases from 8 different countries in the Middle East. The prevalence of depression in type 2 diabetes mellitus in the Middle East is found to be fairly high ranging from 17% to 74.4%. The authors concluded that the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries is high with a wide-ranging difference. The factors associated with the development of depression in type 2 diabetes need to be addressed and taken care of. Lack of meta-analysis is the major limitation of this study that could be considered for future reviews. Whereas Arruhaily, et al., did a case control study was conducted at Diabetic centre and PHC centres. The cases were Early-onset T2DM (30–45 years of age). A self-administered questionnaire consisted of three parts included socio-demographic information, eating behaviors and questions focusing on DM. The aim of this study is to detect the magnitude of bad nutritional habits and assess the strength of association between T2DM and late-night dinner and skipping breakfast in Medina, Saudi Arabia. A total 47 cases with diabetes mellites type 2 and 188 controls were included. Cases were more prone to be obese with median BMI 30.5. Overall, 74.5% of cases were reported to be physically inactive. The authors concluded that their data confirmed that skipping breakfast and late-night dinner were prevalent, and many risk factors associated with diabetes millets have been identified. Therefore, we recommend introducing health education programs to address misconceptions towards prevention and better control of diabetes mellitus. Dr. Abuallut assessed the knowledge, attitudes, and patient compliance behavior regarding DR among diabetic patients from Jazan Region of Saudi Arabia and identify factors related to patient awareness and compliance. He did across-sectional study was done on 385 diabetic patients from six primary healthcare centers in Jazan region. A self-administered questionnaire was used to solicit responses regarding knowledge, attitudes, and compliance with regular ophthalmic eye examinations. About half of the participants (50.6%) were females, and 51.4% were within the age group 45-64 years. Less than half of the participants (40.8%) had low monthly income, and 45.5% were illiterate or had primary education. About 33.6% of the participants had the disease for more than 10 years, and 90.1% were controlled. There was a high awareness level of diabetes-related eye complications (96.4%) and the need for regular eye exams (93.5%). About 54.0% had never seen an ophthalmologist. The author conclude that there is a need to increase patient awareness about the complications of diabetes and the need for policy guidance for primary healthcare providers to follow best practices when treating diabetic patients to guard against and/or control its compilations.

A number of paper in this issue discussed the covid situation in the Region . El-Gamal, et al., did a cross-sectional study of 518 subjects, who gave their responses through an online google form. The objective was to assess the acceptance of COVID-19 vaccines in Saudi Arabians and to uncover the barriers associated with vaccination. The vaccine acceptance rate was 68.7%; it was significantly more common among people in Makkah city, among those with high income, and those with relatives who had the COVID-19 infection. The authors concluded that about one-third of the population did not accept the vaccine, particularly, those with low income. Increasing the knowledge of the people about the clinical aspects, and health impact of the virus of COVID-19 on the community are important intervention tools to increase the acceptance rate of COVID-19 vaccination among the population. Alsharei & Elbashir reviewed the neurological manifestations of Covid-19. They reviewed the covid outbreak and discussed the various aspect of neurological manifestations.

Alalwan et al., did a cross sectional observational quantitative study was carried out at Primary health care centres during the period from January to august 2021 in Cluster-1 Riyadh, Saudi Arabia.. The Aim of study to find out the resources of physicians' knowledge regarding upper respiratory tract infection management, to identify the clinical factors that might affect antibiotics prescription by primary health care physician. In this study, we were able to collect 197 responses of our questionnaire with mean age of 31.6 years old (SD= 6.27). More than half of the participants were males (54.8 %) and 72.6 % of them were residents. Furthermore, 91.9 % of the participants reported following of criteria or guideline for prescribing of antibiotics in treatment of UTRI. Among those physicians, 88.4 % of them reported depending on centor criteria. Furthermore, 70.6 % of the physicians reported a frequency of patients request of antibiotic of 1-4 times during the past months and 44.7 % of them would not accept to the patients request while 28.9 % would refuse and educate the patients and 21.3 % would agree according to guidelines.

Al-Arifi, et al., did a cross-sectional study that aims to identify the effect of various factors on health literacy among hypertensive patients attending the primary health care clinic at KAMC-R. Data was collected using a self-administered questionnaire shortly before the patient encounters their treating physician. In this study 395 responses were obtained. Of which, 55.7 % were female patients. The data were collected from 3 different centers (Health Care Specialty Center (HCSC) 39% , Iskan clinics 31% and

Um-Alhamam center 30%). Of the participants, 34.2 % reported that they never needed help with reading drug leaflet and medical instruction, while 33.4 % reported always need of help, 11.9 % sometimes need help, 10.4 % usually need help and 10.1 % rarely need help. The authors concluded that high percentage of hypertensive patients had low health literacy. Those who were females, less educated, old, and patients with sedentary lifestyle are more likely to have low level of health literacy. We recommend that physicians should confirm that their patients have full understanding of the nature of the disease, the correct timing and dosage of medications with frequent reassessment.

Abu Sabah et al., did a descriptive cross-sectional survey of the local Asir community using a questionnaire. The study focused on evaluating the general population's awareness people towards the immediate responses that are required, following ophthalmic chemical injury incidents within the Asir province. Overall population awareness regarding chemical eye injury within the Asir region, KSA. Among this cohort, 288 (48%) had good awareness level regarding chemical eye injury and its management, while 312 (52%) had poor awareness. The authors concluded that these results should be evaluated by the ministry of health and the appropriate actions should be made, such as health awareness campaigns regarding ocular chemical injuries and immediate corrective actions, in order to improve knowledge and to create a healthier society.

Khan et al., reported on Boerhaave Syndrome in a 16-year-old girl in a primary care centre. They stressed that Boerhaave syndrome is the spontaneous rupture of the oesophagus due to raised intra-oesophageal pressure and is a potentially fatal condition. The patient often presents with retrosternal chest pain and upper abdominal pain associated with significant history of retching and vomiting. The condition has a mortality rate of up to 40% hence early diagnosis and timely intervention is crucial. This emergency is rarely seen in children and young adolescents. We report a case of Boerhaave syndrome in a 16-year-old girl who presented to a primary care setting with vomiting, abdominal pain, and subcutaneous emphysema. The diagnosis of oesophageal rupture was made clinically. Thus, immediate referral to secondary care was vital in providing urgent management. This discussion highlights that this emergency can present in younger age adolescents, therefore high index of suspicion is imperative for good prognosis.

Almashaqbeh et al., did a retrospective investigation included 115 patients with COVID-19, with a median age of 49.1-66.3 years old, at King Hussein Medical Center, Amman, Jordan. Computed tomography (CT) scores of pulmonary insult were determined. Baseline CT findings showed ground-glass opacity, consolidation, crazy-paving pattern and reticular shadow. The aim of the study is to assess the predictors of the COVID-19 disease course and pulmonary insult.The independent factors for the COVID-19 disease course were baseline CT score ($P < 0.05$) and C-reactive protein (CRP) ($P< 0.05$). The factors for pulmonary insult were age, neutrophil, lymphocyte and CRP levels and CT score ($P < 0.05$). The cut-off value for CRP was 19.0 and the cut-off value for CT score was 9.0. The authors concluded that Age, baseline CT score, CRP, neutrophil and lymphocyte percentages may predict the CT score of pulmonary insult. A CRP value of more than 19 and baseline CT score of more than 9 were independent factors of severe COVID-19 disease.

Alqahtani, et al., did a cross-sectional study for all positive (XDRAB) reported cases in the ICU of Al-Qatif Central Hospital, Eastern region during August and September 2019. Investigation of cases was based on the patient's files, charts, lab records, interviewing the infection prevention and control team of the hospital, and the directorate. Microbiological and environmental samples were collected and tested for XDRAB.This investigation aimed to describe the extensively drug-resistant Acinetobacter baumannii (XDRAB) outbreak, which occurred in the intensive care unit (ICU) of Al-Qatif central hospital, Saudi Arabia. A total of nine patients tested positive. Eight of the cases were male, and only three of them were Non-Saudi. The age ranged from 21 to 82 years, the mean age is 48.6 ± 21.14 years, and the mean length of ICU stay was eight ± 5.75 days. The environmental samples and the swaps from the health care workers (HCW) hand results were negative for XDRAB. The authors concluded that the ICU of Al-Qatif hospital experienced an XDRAB outbreak in August, and it continued till September 2019. There was a previous outbreak with the same organism early in the same year, which required a strong adherence to the control and prevention measures and further analytical studies to find out the reasons behind the recurrent XDRAB outbreak.

Alqahtani, et al., sought to assess the commitment of the HCWs toward vaccination as well as the reasons for vaccine refusal. They did a cross-sectional study was performed during Hajj season 2019 among HCWs in Al Mashaer, Makkah, Saudi Arabia. Anonymous, self-administered questionnaires were distributed to collect the information on demographic characteristics, vaccine uptake, and their attitudes and concerns towards receiving the vaccine. A total of 760 completed questionnaires were received, with a response rate of 95%. Males represented (58%), and the average age (Mean±SD) was 36.7±7.65 years. More than half of participants (56%) were working in the primary health centers (PHCs), while (44%) were working in the hospitals. (93%) of the participants have received the vaccine before in their life. For this current Hajj season, (76%) of them received the vaccine. Following the authority's recommendation (74%) was the main reason for vaccination, 24% were not vaccinated before attending this Hajj, and 25% did not intend to take the vaccine in the future. Concerns about the vaccine side effects (46%) and misconception regarding its efficacy (44%) were the main barriers for vaccination refusal. The authors concluded that despite the good uptake of the vaccine, there are still misconceptions about the efficacy of the vaccine and concerns about its side effects. Awareness programs are required to address those concerns, especially for younger staff, pharmacists, and other cadres. Higher vaccine uptake among healthcare workers will impact the vaccination of the general population.

Knowledge, Attitude and practice toward prescribing Antibiotics for Upper Respiratory Tract Infections among primary health care physicians in Cluster-1, Riyadh, Saudi Arabia

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Abstract

Background: Respiratory tract infections are among the most frequently encountered clinical conditions and upper respiratory tract infections (URTIs) are one of the most common reasons for consultations in primary health care centres. Antibiotics are often prescribed unnecessarily for URTIs around the globe. Identifying factors associated with the ubiquitous inappropriate prescribing of antibiotics for URTIs will help develop effective interventions and decrease antimicrobial resistance. The Aim of the study was to find out the resources of physicians' knowledge regarding upper respiratory tract infection management, and to identify the clinical factors that might affect antibiotics prescription by primary health care physicians.

Methodology: This is cross sectional observational quantitative study was carried out at Primary health care centres during the period from January to August 2021 in Cluster-1 Riyadh, Saudi Arabia. An online self-administered questionnaire was conducted on 197 physicians by using convenient sampling technique. The data was analysed using SPSS software version 23. The study was done on all physicians who have worked in primary health care in cluster 1 for one year or more, male and female, Saudi and non-Saudi, and including consultants, specialists, residents and general practitioners.

Results: In this study, we were able to collect 197 responses of our questionnaire with mean age of 31.6 years old (SD= 6.27). More than half of the participants were males (54.8 %) and 72.6 % of them were residents. Furthermore, 91.9 % of the participants reported following of criteria or guidelines for prescribing of antibiotics in treatment of UTRI. Among those physicians, 88.4 % of them reported depending on centor criteria. Furthermore, 70.6 % of the physicians reported a frequency of patient requests for antibiotic 1-4 times during the past months and 44.7 % of them would not accept the patients request while 28.9 % would refuse and educate the patients and 21.3 % would agree according to guidelines.

Conclusion: We found good to moderate level of knowledge among the physicians toward the use of antibiotics in treatment of URTI however, some improvement in the patient's knowledge should be considered.

Keywords: antibiotics, URTI, primary healthcare, Saudi Arabia

Introduction

Upper respiratory tract infection "URTI" is one of the most common and frequent encountered clinical conditions that causes patients to visit primary health care [1]. Upper respiratory tract infections (URTIs) can be defined as self-limited irritation and swelling of the upper airways associated with cough with no proof of pneumonia, lacking a separate condition to account for the patient symptoms, or with no history of COPD/emphysema/chronic bronchitis [2]. Upper respiratory tract infections involve nose, sinuses, pharynx, larynx, and the large airways [2]. Viruses have been shown to be the main etiological agents for respiratory tract infections. However, current evidence-based guidelines do not support antibiotic use in the majority of URTI cases, as URTIs are frequently caused by viral etiology, and are often self-limiting [3].

A recent systemic review done in 2018 reported that the most common clinician reported reason to visit is URTI [4].

Also, a study done in northern Saudi Arabia found that one third of prescriptions analyzed are for respiratory tract infections (ARIs) [5]. On the other hand, one of the studies showed that tonsillopharyngitis which is part of URTI is the reason for over 70% of unnecessary antibiotic prescriptions by primary care physicians [1]. In addition to that CDC guidelines revealed that 79% of antibiotic prescriptions were unnecessary [6]. In contrast many studies showed that inappropriate antibiotics use for URTIs may lead to develop antibiotics resistance [7]. Antimicrobial resistance part of major issue that facing medical failed [8].

The factors that affect prescribing antibiotics are health factors, patient factors and cultural norms, also higher socioeconomic status, older age, and longer duration of consultation correlate with prescribing antibiotics [3]. Physicians should first identify patients' expectations about antibiotics treatment before trying to give information about the self-limitedness of respiratory tract symptoms and ineffectiveness of antibiotics in order to improve shared decision making and rationalize antibiotics prescribing [6]. Looking to the impact of antibiotic resistance on public health and how it is going to be a great concern facing medical health especially in primary health care and family medicine , is why we thought to study the effect of Knowledge, Attitude and practice (KAP) toward prescribing antibiotics for URTI among Primary health care physicians in Cluster-1 in Riyadh, Saudi Arabia, especially as there are not enough studies that have been done in our region that assesses KAP towards antibiotics. This will help us to provide better healthcare for patients, and the information we will acquire on the way to achieve these goals will also help to address the causes that affect prescribing antibiotics among physicians.

In our study, we tried to assess the knowledge, attitude and practices towards antibiotic use in upper respiratory tract infections and the clinical factors that might affect antibiotics prescription by primary healthcare physician including centor criteria among patients seeking primary health care in Cluster-1 Riyadh, Saudi Arabia.

Methodology

Study design:
A cross sectional observational quantitative study was carried out at Primary health care centres during the period from January to August 2021 in Cluster-1 Riyadh, Saudi Arabia.

Sample size:
Sample size was calculated using sample size calculator of Raosoft ®. The tool uses the following equations for calculating sample size:

$$n = N*X / (X + N - 1),$$

and X is calculated using $X = Z_{\alpha/2}{}^2 \neg*p*(1-p) / MOE^2$

where n is sample size, N is population size, $Z_{\alpha/2}$ is the critical value of the Normal distribution at α/2, MOE is the margin of error and p is the sample proportion.

Our population size was 400 primary health care physicians in Cluster-1, in Riyadh which included consultants, specialist and residents. Confidence level of 95 %, margin of error is 5 %, $Z_{\alpha/2}$ will be 1.96 and property would be 5 %. According to these inputs, sample size was 197.

Subjects:
The study was conducted among primary health care physicians in Cluster-1, in Riyadh. Inclusion criteria included all physicians who work in primary health care in Cluster-1 for one year and more, male and female, Saudi and non-Saudi, including consultants, specialists, residents and general practitioners. The only exclusion criteria were the uncompleted questionnaire and those who refused to participate in the study.

Sampling technique:
The study was conducted among 197 physicians who were chosen after applying a convenient sampling technique.

Data collection method:
An online self-administered questionnaire was conducted on 197 physicians. The questionnaire consisted of 15 questions including information about demographic factors such as age, gender and experience. Moreover, the questionnaire included some questions about how physicians prescribe the antibiotic and if they are affected by patients' desire.

Data management and statistical considerations:
Data collection was done using online questionnaire, where Microsoft Excel was used for data entry and statistical analysis was conducted using SPSS software, IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA). Then frequency and percentage were used to describe categorical variable and mean and standard deviation were used for assessing continuous variables. For assessing correlation between variables, chi-squared test was used to describe the difference between clinical phenotypes in categorical variables while ANOVA test was used for continuous variables. A P-value of <0.05 was considered statistically significant.

Ethical consideration:
The study was conducted after gaining approval from King Saud Medical City Research Center's Institutional Review Board. All participants agreed to use an online consent form. They were informed about the purpose of the research, why they were chosen, all potential risks and benefits and that they could refuse to participate, or could withdraw from the study at any point in time. An Arabic/English informed consent form, which was attached to the proposal, was obtained from participants, who were involved in this study voluntarily after being given adequate information on the objectives and benefits of the project. At all times, privacy, and total avoidance of deception of the participants was maintained, and their data were confidential.

Results

In this study, we were able to collect 197 responses to our questionnaire with mean age of 31.6 years old (SD= 6.27). More than half of the participants were males (54.8 %) and 72.6 % of them were residents. Furthermore, 41.1 % of the participants reported having 3-5 years of practice and 50.3 % of them reported seeing 5-10 patients per day where 47.2 % reported seeing 26-50 % of the patients with URTI and 41.6 % seeing 0-25 % of total patients with URTI (Table 1).

Moreover, 47.7 % of the participants reported that most patients diagnosed with URTI were aged between 15-45 years old while 23.9 % were between 6-14 years old. Furthermore, 91.9 % of the participants reported following of criteria or guideline for prescribing of antibiotics in treatment of UTRI. Among those physicians, 88.4 % of them reported depending on Centor criteria (Table 2).

In Figure 1 and Figure 2, we showed the most common symptoms and signs that may affect physicians' decision to prescribe antibiotics for URTI. The most common symptoms include fever of 38.5 C (77.7 %) followed by deteriorating general condition (72.6 %), patients looking unwell (66 %) and resistant fever over 3 days (60.9 %). The most common signs included exudates in throat (100.0 %) followed by cervical lymphadenopathy (69.5 %), crepitation at lung auscultation (46.7 %) and inflamed eardrum (45.7 %).

Moreover, we found that 70.6 % of the participants would inform the patients to re-consult within two days if they not getting better or not prescribed antibiotics while 19.8 % of the physicians would be affected by patients asking for antibiotics . Furthermore, 70.6 % of the physicians reported a frequency of patients requesting antibiotics 1-4 times during the past months and 44.7 % of them would not accept the patients' requests while 28.9 % would refuse and educate the patients and 21.3 % would agree according to guidelines. Moreover, we found that 58.4 % of the participants reported that they faced complaints by the patients because of refusing to prescribe antibiotics for them. Almost two third of the sample suggested applying programs that aim to increase the awareness of population about the importance of avoiding antibiotics and restricting their prescription through national campaigns and health education while 29.5 % suggested ensuring following of physicians guidelines. Moreover, amoxicillin was the most common prescribed antibiotics (71.4 %) (Table 3).

Moreover, we found that there is a significant difference between male and female physicians and following of guidelines in prescribing of antibiotics (P=0.002) where males seem to follow the guidelines more than females however, there was no difference in following guidelines between different qualifications or experience. Moreover, we found that male physicians tend to refuse the prescription of antibiotics when it was asked by patients more than females, significantly (P=0.038) (Table 4).

Table 1: Demographic factors of the participants (N=197)

		Count	Column N %
Gender	Male	108	54.8%
	Female	89	45.2%
Qualification	Resident	143	72.6%
	Specialist	22	11.2%
	Consultant	28	14.2%
	General practitioner	4	2.0%
Years in practice	<1 year	4	2.0%
	1-2	51	25.9%
	3-5	81	41.1%
	> 5 years	61	31.0%
Total patients seen in general by physicians per day :	5-10 patients	99	50.3%
	11-20 patients	59	29.9%
	>20 patients	39	19.8%
Patients seen with URTI	0-25 %	82	41.6%
	26-50 %	93	47.2%
	51-75 %	16	8.1%
	76-100 %	6	3.0%

Table 2: Physicians' attitude and practices toward URTI

		Count	Column N %
Majority of patients' age with URTI	< 1 years old	10	5.1%
	1–5-year-old	45	22.8%
	6-14 years old	47	23.9%
	15-45 years old	94	47.7%
	46-65 years old	1	0.5%
Do you follow any Criteria/guidelines for prescribing Antibiotics?	Yes	181	91.9%
	No	16	8.1%
If Yes, Mention the criteria/guideline	Centor criteria	153	88.4%
	The Modified Centor score	3	1.7%
	Other	17	9.8%

Figure 1: Symptoms that may affect physicians decision to prescribe antibiotics for URTI

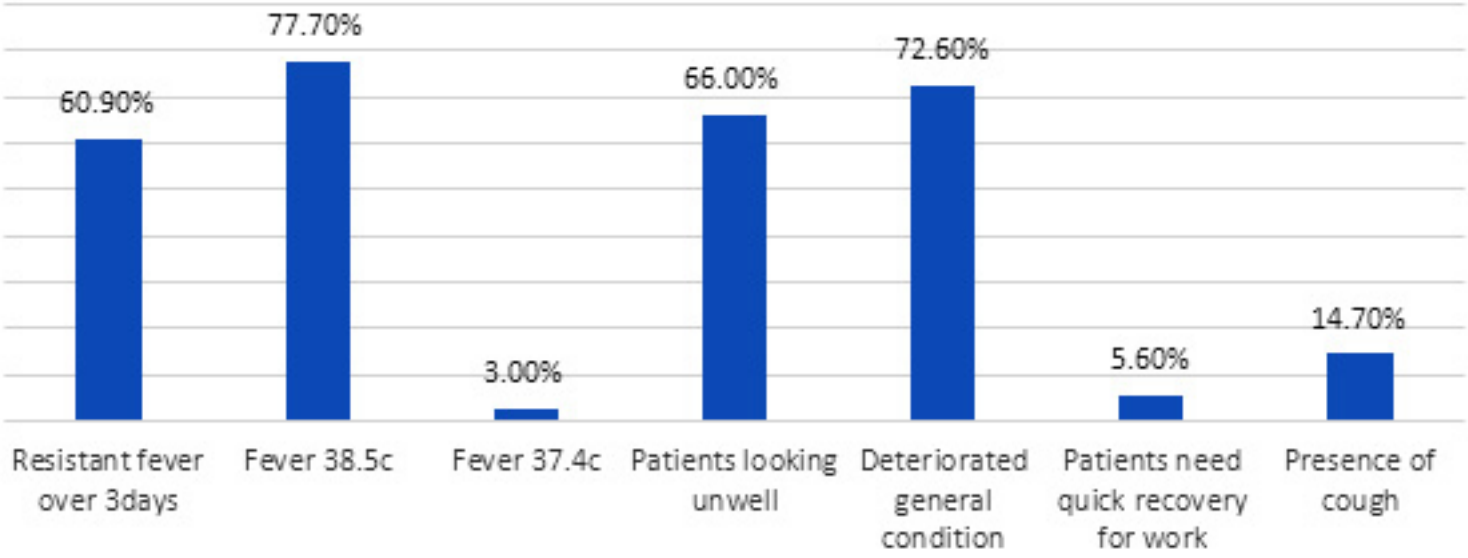

Figure 2: Signs that may affect physicians' decision to prescribe antibiotics for URTI

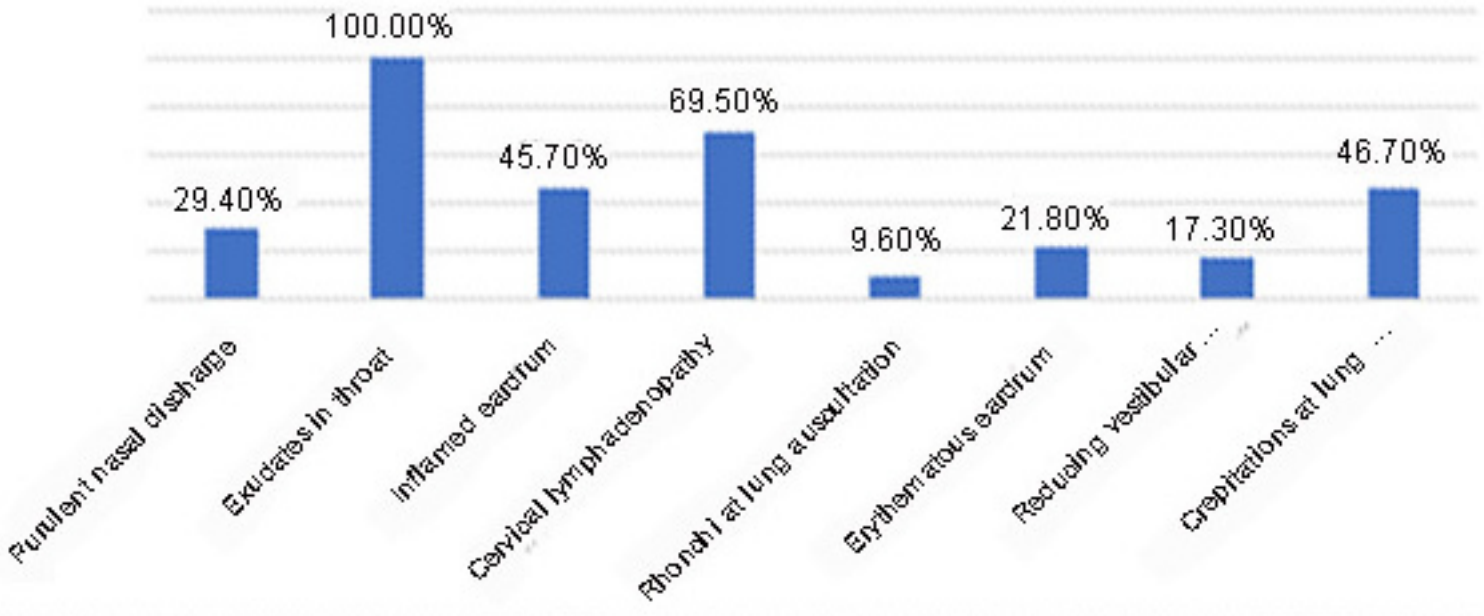

Table 3: Physicians' attitude and practices toward prescribing of antibiotics in URTI

		Count	Column N %
Factors affecting decision to prescribe antibiotics	Patient expects antibiotics according to you.	19	9.6%
	Patient was informed to re-consult within two days if not gettingbetter or not prescribed antibiotics.	139	70.6%
	Patient asks for antibiotics.	39	19.8%
Frequency of patient request of antibiotics for URTIs during past month. Time of request in the past month	No request	28	14.2%
	1-4 times	139	70.6%
	5-9 times	20	10.2%
	10 or more times	10	5.1%
Response of physicians to patient's request and advice for prescribing Antibiotics	Accept according to guidelines	42	21.3%
	Not accept	88	44.7%
	Refuse and educate the patients	57	28.9%
	Agree	10	5.1%
Did you face any complaint by the patients because of refusing to prescribe antibiotics?	Yes	115	58.4%
	No	82	41.6%
Your suggestion on the most single important program for reducing inappropriate oral antibiotics use for URTIs.	Follow guidelines of prescribing of antibiotics	44	29.5%
	Increasing the awareness of population throughout campaign, health education and Social media	105	70.5%
15- From your point of view are there any antibiotics you prefer to use for URTI?	Amoxicillin	110	71.4%
	Azithromycin	25	16.2%
	Penicillin	19	12.3%

		Gender		Qualification				Total patients seen in general by physicians per day:		
		Male	Female	Resident	Specialist	Consultant	General practitioner	5-10	11-20	>20
Do you follow any Criteria/guidelines for prescribing Antibiotics?	Yes	55.8%	44.2%	72.4%	11.0%	14.4%	2.2%	50.3%	29.8%	19.9%
	No	43.8%	56.3%	75.0%	12.5%	12.5%	0.0%	50.0%	31.3%	18.8%
	P-value	0.002*		0.934				0.990		
Response of physicians to patient's request and advice for prescribing Antibiotics	Accept according to guidelines	50.0%	50.0%	88.1%	7.1%	4.8%	0.0%	42.9%	35.7%	21.4%
	Not accept	65.9%	34.1%	72.7%	9.1%	14.8%	3.4%	47.7%	31.8%	20.5%
	Refuse and educate the patients	43.9%	56.1%	61.4%	19.3%	17.5%	1.8%	59.6%	22.8%	17.5%
	Agree	40.0%	60.0%	70.0%	0.0%	30.0%	0.0%	50.0%	30.0%	20.0%
	P-value	0.038*		0.103				0.766		

Table 4: The relation between demographic factors of the participants and their attitude toward use of antibiotics

Discussion

Consumption of antibiotics worldwide has increased dramatically over the past decade. In many countries, antimicrobials are legally available without a prescription, or the rules are not uniformly enforced. Studies show that in countries with low regulation, there is a high level of abuse [9]. According to one study, 77% of Greek pharmacists prescribe antibiotics without a prescription. Antibiotics were often given to patients with flu-like symptoms [10]. Evidence from various countries shows that self-medication is common and often inappropriate [11]; Antibiotics are usually bought without appropriate symptoms, in insufficient doses, or if not taken [12]. In these cases, antibiotics are of no use. Therefore, the evidence limits its recommended use in some cases where the aetiology may be bacterial [13,14].

Improper use of antimicrobials can occur due to complex interactions such as pharmacist knowledge and experience, diagnostic uncertainty, patient-drug interaction, and inadequate patient education from clinicians [15,16]. Additional factors influencing the ranking are patients' knowledge, beliefs and attitudes, antimicrobial use, self-medication, patient expectations, and patient experience with antimicrobial drugs. Appropriate use of antimicrobials for patients [17,18]. The most successful interventions in reducing inappropriate antimicrobial prescribing combine education for clinicians, patients, and the public [19]. The aim of this study was to assess the knowledge, attitude and practices towards antibiotic use in upper respiratory tract infections and the clinical factors that might affect antibiotics prescription by primary healthcare physicians including Centor criteria among patients seeking primary health care in Cluster-1 Riyadh, Saudi Arabia.

In this study, we found good level of knowledge among physicians considering prescribing of the antibiotics in cases of URTI depending on several factors and findings in this study. First, 91.9 % of the participants reported that they follow guidelines in prescribing antibiotics especially Centor scoring guidelines. This percentage is considered proper compared with previous studies that investigated the compliance of physicians to guidelines including the study of Karbach U et.al. [20], Alhuzaimi A et al., [21] and Ward M et.al. [22].

Secondly, we found that about half of the participants would refuse the patients' request of antibiotics and almost a third of them would further educate patients about how and when to use antibiotics. In a previous study, it was found that almost a third of patients with URTI would ask their physicians for antibiotics [23] and other studies [2,24] which are similar to our results in which physicians reported that 70 % of patients asked them to prescribe antibiotics. Moreover, in this study, we found that almost two-thirds of the physicians reported having complaints by patients when they refused to prescribe antibiotics.

In this study, most of the physicians suggested applying programs that aim to increase the awareness of population about the importance of avoiding antibiotics and restrict their prescription through national campaigns and health education. According to many previous studies, education and increasing the awareness of population about medical aspects would help in improving the health aspects of the population [25–27].

This study had some limitations including depending on self-reported questionnaire which may lead to some personal bias because some physicians may want to appear better which may be the reason that almost all of the participants reported following of guidelines. Moreover, some questions depended on previous history which may lead to recall bias.

In conclusion, we found a good to moderate level of knowledge among the physicians toward the use of antibiotics in treatment of URTI however, some improvement in the patient's knowledge should be considered.

References

1. M T, GA K, PA. B. Upper Respiratory Tract Infection. StatPearls [Internet]. Published 2020. Accessed March 7, 2022. https://www.ncbi.nlm.nih.gov/books/NBK532961/
2. Pan DST, Huang JH, Lee MHM, et al. Knowledge, attitudes and practices towards antibiotic use in upper respiratory tract infections among patients seeking primary health care in Singapore. BMC Fam Pract. 2016;17(1):148. doi:10.1186/s12875-016-0547-3
3. Finley CR, Chan DS, Garrison S, et al. What are the most common conditions in primary care? Les problèmes de santé les plus fréquents dans les soins primaires Une revue systématique. Can Fam Physician | Le Médecin Fam Can }. 2018;64:832-840. www.cfp.ca.
4. el-Gilany AH. Acute respiratory infections in primary health care centres in northern Saudi Arabia. East Mediterr Health J. 6(5-6):955-960. http://www.ncbi.nlm.nih.gov/pubmed/12197354
5. Aisha M, Geofrey NS, Florida M, et al. Physician prescription practice of antibiotics for upper respiratory tract infection at Kilimanjaro Christian Medical Centre Moshi, Tanzania. African J Pharm Pharmacol. 2018;12(27):408-415. doi:10.5897/AJPP2018.4956
6. Bagger K, Nielsen ABS, Siersma V, Bjerrum L. Inappropriate antibiotic prescribing and demand for antibiotics in patients with upper respiratory tract infections is hardly different in female versus male patients as seen in primary care. Eur J Gen Pract. 2015;21(2):118-123. doi:10.3109/13814788.2014.1001361
7. Nash DR, Harman J, Wald ER, Kelleher KJ. Antibiotic Prescribing by Primary Care Physicians for Children With Upper Respiratory Tract Infections. Arch Pediatr Adolesc Med. 2002;156(11):1114. doi:10.1001/archpedi.156.11.1114
8. Dallas A, Magin P, Morgan S, et al. Antibiotic prescribing for respiratory infections: a cross-sectional analysis of the ReCEnT study exploring the habits of early-career doctors in primary care. Fam Pract. 2015;32(1):49-55. doi:10.1093/fampra/cmu069

9. Castel JM, Laporte J-R, Reggi V, et al. Multicenter study on self-medication and self-prescription in six Latin American countries*. Clin Pharmacol Ther. 1997;61(4):488-493. doi:10.1016/S0009-9236(97)90199-5
10. Contopoulos Ioannidis DG, Koliofoti ID, Koutroumpa IC, Giannakakis IA, Ioannidis JPA. Pathways for Inappropriate Dispensing of Antibiotics for Rhinosinusitis: A Randomized Trial. Clin Infect Dis. 2001;33(1):76-82. doi:10.1086/320888
11. McKee MD, Mills L, Mainous AG. Antibiotic use for the treatment of upper respiratory infections in a diverse community. J Fam Pract. 1999;48(12):993-996. doi:10628580
12. Hersh AL, Shapiro DJ, Pavia AT, Shah SS. Antibiotic Prescribing in Ambulatory Pediatrics in the United States. Pediatrics. 2011;128(6):1053-1061. doi:10.1542/peds.2011-1337
13. Lee GC, Reveles KR, Attridge RT, et al. Outpatient antibiotic prescribing in the United States: 2000 to 2010. BMC Med. 2014;12(1):96. doi:10.1186/1741-7015-12-96
14. Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. Ther Adv Drug Saf. 2014;5(6):229-241. doi:10.1177/2042098614554919
15. Md Rezal RS, Hassali MA, Alrasheedy AA, Saleem F, Md Yusof FA, Godman B. Physicians' knowledge, perceptions and behaviour towards antibiotic prescribing: a systematic review of the literature. Expert Rev Anti Infect Ther. 2015;13(5):665-680. doi:10.1586/14787210.2015.1025057
16. Franco BE, Altagracia Martínez M, Sánchez Rodríguez MA, Wertheimer AI. The determinants of the antibiotic resistance process. Infect Drug Resist. 2009;2:1-11. http://www.ncbi.nlm.nih.gov/pubmed/21694883
17. Holloway KA, Ivanovska V, Wagner AK, Vialle-Valentin C, Ross-Degnan D. Prescribing for acute childhood infections in developing and transitional countries, 1990–2009. Paediatr Int Child Health. 2015;35(1):5-13. doi:10.1179/2046905514Y.0000000115
18. You JHS, Yau B, Choi KC, Chau CTS, Huang QR, Lee SS. Public Knowledge, Attitudes and Behavior on Antibiotic Use: A Telephone Survey in Hong Kong. Infection. 2008;36(2):153-157. doi:10.1007/s15010-007-7214-5
19. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. Cochrane Database Syst Rev. Published online October 19, 2005. doi:10.1002/14651858.CD003539.pub2
20. Karbach U, Schubert I, Hagemeister J, Ernstmann N, Pfaff H, Höpp H-W. Physicians' knowledge of and compliance with guidelines: an exploratory study in cardiovascular diseases. Dtsch Arztebl Int. 2011;108(5):61-69. doi:10.3238/arztebl.2011.0061
21. Alhuzaimi AN, Bahkley AM, Aljadeed AM, Alghaiheb AA. Physicians' knowledge and practice attitudes toward infective endocarditis antibiotic prophylaxis guidelines in Saudi Arabia. J Saudi Hear Assoc. 2019;31(2):88-93. doi:10.1016/j.jsha.2018.11.005
22. Ward MM, Vaughn TE, Uden-Holman T, Doebbeling BN, Clarke WR, Woolson RF. Physician knowledge, attitudes and practices regarding a widely implemented guideline. J Eval Clin Pract. 2002;8(2):155-162. doi:10.1046/j.1365-2753.2002.00337.x
23. O'Connor R, O'Doherty J, O'Regan A, O'Neill A, McMahon C, Dunne CP. Medical management of acute upper respiratory infections in an urban primary care out-of-hours facility: cross-sectional study of patient presentations and expectations. BMJ Open. 2019;9(2):e025396. doi:10.1136/bmjopen-2018-025396
24. Fletcher-Lartey S, Yee M, Gaarslev C, Khan R. Why do general practitioners prescribe antibiotics for upper respiratory tract infections to meet patient expectations: a mixed methods study. BMJ Open. 2016;6(10):e012244. doi:10.1136/bmjopen-2016-012244
25. Scott JG, Cohen D, DiCicco-Bloom B, Orzano AJ, Jaen CR, Crabtree BF. Antibiotic use in acute respiratory infections and the ways patients pressure physicians for a prescription. J Fam Pract. 2001;50(10):853-858. doi:11674887
26. Linder JA, Singer DE. Desire for antibiotics and antibiotic prescribing for adults with upper respiratory tract infections. J Gen Intern Med. 2003;18(10):795-801. doi:10.1046/j.1525-1497.2003.21101.x
27. Alothman A, Algwizani A, Alsulaiman M, Alalwan A, Binsalih S, Bosaeed M. Knowledge and Attitude of Physicians toward Prescribing Antibiotics and the Risk of Resistance in Two Reference Hospitals. Infect Dis Res Treat. 2016;9:IDRT.S40047. doi:10.4137/IDRT.S40047

Assessing health literacy among hypertensive patients attending primary healthcare clinics at King Abdulaziz Medical City, Riyadh, Saudi Arabia

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Abstract

Background: Inadequate health literacy is associated with worse health outcomes and carries high financial burden on both patients and healthcare system. There is insufficient data about health literacy among the hypertensive patients in Saudi Arabia. The aim of this study is to measure health literacy among hypertensive patients attending the primary health care clinics at King Abdulaziz Medical City, Riyadh (KAMC-R).

Methodology: This study is a cross-sectional study that aims to identify the effect of various factors on health literacy among hypertensive patients attending the primary health care clinic at KAMC-R. Data was collected using a self-administered questionnaire shortly before the patient encountered their treating physician. The questionnaire is comprised of two parts. The first part deals with the patient's characteristics and demographic data. The second part of the questionnaire assesses health literacy utilizing the Arabic version of the Single Item Literacy Screener (SILS).

Results: In this study 395 responses were obtained, of which, 55.7 % were female patients. The data were collected from 3 different centers (Health Care Specialty Center (HCSC) 39% , Iskan clinics 31% and Um-Alhamam center 30%). Of the participants, 34.2 % reported that they never needed help with reading drug leaflet and medical instructions, while 33.4 % reported always needing help, 11.9 % sometimes need help, 10.4 % usually need help and 10.1 % rarely need help. The study showed that males had higher level of good health literacy with about 64.1 %, compared with 45.1 % of females (P=0.00). The health literacy among hypertensive patients is affected proportionally by education level, monthly income, and level of exercise and affected inversely by age.

Conclusion: The study showed that a high percentage of hypertensive patients had low health literacy. Those who were females, less educated, old, and patients with sedentary lifestyle are more likely to have a low level of health literacy. We recommend that physicians should confirm that their patients have full understanding of the nature of the disease, and the correct timing and dosage of medications with frequent reassessment.

Keywords: Health literacy, hypertensive patients, primary healthcare, Riyadh, Saudi Arabia

Introduction

Healthcare is defined as the promotion or maintenance of people's health by treating or preventing physical or psychological impairment [1]. Providing proper healthcare requires a patient who is actively involved in the management plan and has the ability to look for, obtain and understand health-related information. However, inadequate health literacy remains a major obstacle that many physicians face when dealing with their patients. Health literacy is a concept which focuses on literacy in the healthcare field which includes numeracy, aural and spoken literacy, and written literacy [2]. The American Centers of Disease Control and prevention (CDC) has defined health literacy as "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions" [3]. Inadequate health literacy is associated with worse health outcomes and leads to a high financial burden on both patients and the healthcare system. [4].

The 2014 global status report of non-communicable diseases published by the World Health Organization (WHO) showed that the prevalence of raised blood pressure in Saudi Arabia was approximately 26.6% among adults aged 18 and older [5]. Since patients with hypertension need long-term care, health literacy can play an important role in the quality of the provided care. Having a high level of health literacy is a key factor to better blood pressure control and is associated with better quality of life in patients with hypertension. Inadequate or marginal health literacy increases the 10-year risk of ischemic cardiovascular disease and incidence of artery stiffness in hypertensive patients [5].

Despite several studies showing that limited and inadequate health literacy is highly prevalent among certain populations of patients, there is still a need for studies to address this issue in Saudi Arabia [6]. There is a lack of data in regard to health literacy measurement among the hypertensive population in Saudi Arabia. Hence, research evaluating health literacy on a national level is needed and necessary for future implementation of educational interventions that target better outcomes and less financial burden on the healthcare system. The aim of this study is to measure health literacy among hypertensive patients attending the primary health care clinics at King Abdulaziz Medical City-Riyadh (KAMC-R).

Methodology

This study is a cross-sectional study that intends to identify the effect of various factors on health literacy among hypertensive patients attending the primary health care clinic at KAMC-R which is a tertiary care center that began operating in May 1983. It has a capacity of 962 beds and approximately 3 million outpatient visits a year. The medical city comprises 4 healthcare centers distributed in Riyadh. Two residents visited the clinic and interviewed the patients after their encounter with their treating physician. The data collection was conducted over a two-month period. Roughly, in the last year, there were 410 thousand visits to the primary health care clinics at Um-Alhamam, Iskan, and Health care specialized center (HCSC) centers combined. As hypertension prevalence in general populations is 26.6%, this means that there are300 hypertensive patients visiting the targeted PCH per day. The sample size was calculated based on a 5% margin of error, 95% confidence interval, and a 50% estimated response rate. By using the Raosoft sample size calculator, the required sample size was 369. The sample was adjusted to 385 to compensate for incomplete survey forms. Inclusion criteria included all hypertensive patients aged 18 and above attending the targeted primary health care clinics on the day of the survey while exclusion criteria included patients with severe vision or hearing problems, patients with severe physical or mental illness and health care workers.

The sampling technique used in this study is convenient sampling technique. On each of the 3 targeted PHC centers, the samples were collected on 2 random days each week. We obtained data of 20 participants on each sampling session. The sampling continued for 10 weeks.

Data were collected using a self-administered questionnaire shortly before the patient encounters with their treating physician. The questionnaire is comprised of two parts. The first part deals with the patient's characteristic (age, gender, marital status, duration of diagnosis of hypertension, any other chronic diseases, family monthly income, employment status level of education, and family history of hypertension). In the data collection form, some variables are categorized, gender: male or female, marital status: married or not married or widow/widower or divorced, level of education: illiterate, elementary, intermediate, high school, diploma, or bachelor and above, family history of hypertension : yes or no. The second part of the questionnaire assesses health literacy utilizing the Arabic version of the Single Item Literacy Screener (SILS) which was translated and validated in Iraq [7].

The SILS was developed by Morris and colleagues, and consists of a single item question intended to identify adults in need of help with printed health material [8]. It was validated against the Test of Functional Health Literacy in Adults (TOFHLA) and the Rapid Estimate of Adult Literacy in Medicine (REALM) with an AUROC of 0.79 (95% CI = 0.74 to 0.83) [8]. The SILS asks, "How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?" Possible responses are 1-Never, 2-Rarely, 3-Sometimes, 4-Often, and 5-Always [8]. Each number corresponding to a response is a score in the SILS. Patients with a score of 2 or less were considered to have a good health literacy level, while a score of more than 2 indicated some difficulty with reading printed health related material and the patient was considered to have limited health literacy [8].

Table 1: Demographic factors of the participants (N=395)

Gender	Male	175	44.3%
	Female	220	55.7%
Center	Um-Alhamam	121	30%
	Iskan	121	31%
	HCSC	153	39%
Age	20-30	3	0.8%
	31-40	20	5.1%
	41-50	64	16.2%
	51-60	118	29.9%
	61-70	123	31.1%
	70 and above	67	17.0%
Social status	Single	21	5.3%
	Married	263	66.6%
	Divorced	34	8.6%
	Widow/Widower	77	19.5%
Income	Preferred not to tell	145	36.7%
	<3000	28	7.1%
	3000-10000	107	27.1%
	>10000	115	29.1%
Employment status	Student	3	0.8%
	Currently employed	114	28.9%
	Unemployed	170	43.0%
	Retired	108	27.3%
Education level	Illiterate	55	13.9%
	Primary	70	17.7%
	Intermediate	62	15.7%
	Secondary	115	29.1%
	Higher education	93	23.5%

Table 2: Medical characteristics of patients

Height	140-150	51	12.9%
	151-160	147	37.2%
	161-170	127	32.2%
	171-180	62	15.7%
	180 or taller	8	2.0%
Exercising	No	125	31.6%
	Rarely	87	22.0%
	Occasionally	78	19.7%
	Almost daily	71	18.0%
	Daily	34	8.6%
HTN drugs	1	222	56.2%
	2	131	33.2%
	3	34	8.6%
	4	8	2.0%
Clinic or ER visits for uncontrolled HTN	None	254	64.3%
	1	64	16.2%
	2	36	9.1%
	3	16	4.1%
	More than 3	25	6.3%
Compliance	0-25 %	17	4.3%
	26-50 %	27	6.8%
	51-75 %	78	19.7%
	Above 75 %	273	69.1%
Onset of diagnosis	I do not know	114	28.9%
	1 year	1	0.3%
	0-5 years	67	17.0%
	6-10 years	106	26.8%
	11-15	60	15.2%
	16-20	16	4.1%
	20 and above	31	7.8%
Family history of HTN	No	174	44.1%
	Yes	221	55.9%

The validated Arabic SILS was obtained by contacting Dr. Al-Ruthia who conducted a study on the relationship between health literacy and body mass index among Arab women with polycystic ovary syndrome using the validated Arabic SILS at a university hospital [9]. The data was entered and analyzed using SPSS v23. The descriptive statistics were presented as mean ± SD for the numerical variables (e.g. age, BMI) and as frequency (%) for the categorical variables (e.g. gender, level of education, family history of hypertension).

The main outcome variable is health literacy which was categorized into two categories (good health literacy/ limited health literacy) based on the scores of the SILS questionnaire. The Chi Square test was used to compare health literacy by demographical variables (e.g. gender, age, level of education). A p-value < 0.05 was considered to show a statistically significant association.

Results

In this study 395 responses were obtained. of which, 55.7 % were female patients. The data were collected from 3 different centers (Health Care Specialty Center (HCSC) 39%, Iskan clinics 31% and Um-Alhamam center 30%). Most of the participant were older than 40 (93.4%) (Table 1). Of the patients, only 8.6 % reported daily practicing of exercise. Almost half of the patients use only one medication and almost two thirds reported compliance above 75%. Moreover, 64.3 % of the patients reported no previous clinic or ER visits for uncontrolled HTN while 16.2 % reported one visit (Table 2).

In this study, 34.2 % of the patients reported that they never need help with reading drug leaflet and medical instruction, while 33.4 % reported they always need help, 11.9 % sometimes need help, 10.4 % usually need help and 10.1 % rarely need help (Figure 1).

This study found that males had a good level of health literacy (64.1%) where only 45.1% of females had good health literacy (P=0.00). Unsurprisingly, older patients had more difficulty with reading printed health related material (P=0.00) where 83.6 % of patients of age group of 70 or above always had limited health literacy. Significantly, we found that patients with lower monthly income or who were unemployed, and patients with lower education reported higher frequency of needing help in reading leaflets and other medical instructions The health literacy among hypertensive patients is affected proportionally by education level, monthly income, and level of exercise and affected inversely by age (P=0.00). No relation was found between ER visits and number of HTN and health literacy. (Tables 3, 4).

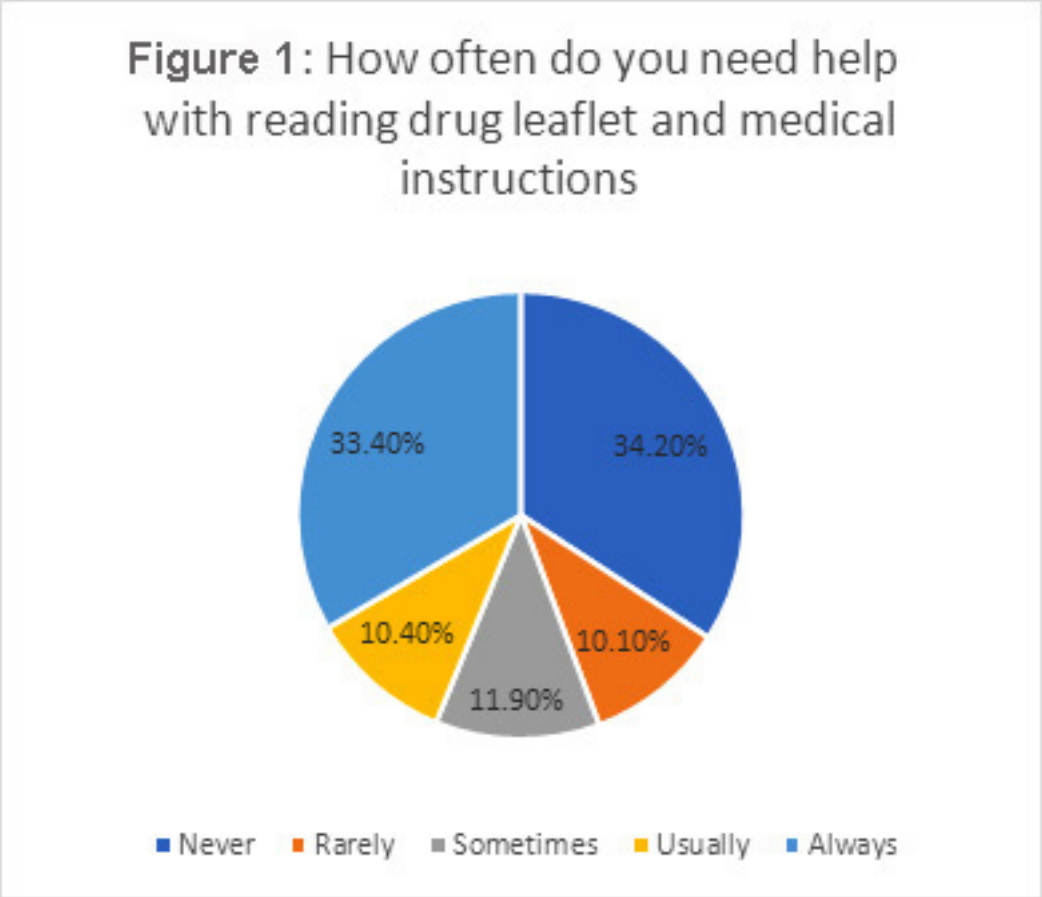

Table 3: The relation between need for help in reading drug leaflet and medical instructions and demographic factors of the participants

		Good health literacy		Limited health literacy		P-value
		N	N %	N	N %	
Gender	Male	96	54.9%	79	45.1%	0.00*
	Female	79	35.9%	141	64.1%	
Age	20-30	3	100.0%	0	0.0%	0.00*
	31-40	19	95.0%	1	5.0%	
	41-50	45	70.3%	19	29.7%	
	51-60	56	47.5%	62	52.5%	
	61-70	41	33.3%	82	66.7%	
	70 and above	11	16.4%	56	83.6%	
Social status	Single	16	76.2%	5	23.8%	0.00*
	Married	130	49.4%	133	50.6%	
	Divorced	21	61.8%	13	38.2%	
	Widow/Widower	8	10.4%	69	89.6%	
Income	<3000	6	21.4%	22	78.6%	0.00*
	3000-10000	32	29.9%	75	70.1%	
	>10000	71	61.7%	44	38.3%	
Employment status	Student	1	33.3%	2	66.7%	0.00*
	Currently employed	98	86.0%	16	14.0%	
	Unemployed	32	18.8%	138	81.2%	
	Retired	44	40.7%	64	59.3%	
Education level	Illiterate	2	3.6%	53	96.4%	0.00*
	Primary	5	7.1%	65	92.9%	
	Intermediate	10	16.1%	52	83.9%	
	Secondary	69	60.0%	46	40.0%	
	Higher education	89	95.7%	4	4.3%	

Table 4: The relation between need for help in reading drug leaflet and medical instructions and medical characteristic of patients

		Good health literacy		Limited health literacy		
		N	N %	N	N %	
Exercising	No	30	24.0%	95	76.0%	0.00*
	Rarely	36	41.4%	51	58.6%	
	Occasionally	44	56.4%	34	43.6%	
	Almost daily	39	54.9%	32	45.1%	
	Daily	26	76.5%	8	23.5%	
HTN drugs	1	110	49.5%	112	50.5%	0.05
	2	51	38.9%	80	61.1%	
	3	13	38.2%	21	61.8%	
	4	1	12.5%	7	87.5%	
Clinic or ER visits for uncontrolled HTN	None	115	45.3%	139	54.7%	0.881
	1	30	46.9%	34	53.1%	
	2	14	38.9%	22	61.1%	
	3	6	37.5%	10	62.5%	
	More than 3	10	40.0%	15	60.0%	
Onset of diagnosis	1 year	1	100.0%	0	0.0%	0.00*
	0-5 years	48	71.6%	19	28.4%	
	6-10 years	63	59.4%	43	40.6%	
	11-15	23	38.3%	37	61.7%	
	16-20	5	31.3%	11	68.8%	
	20 and above	5	16.1%	26	83.9%	
Family history of HTN	No	54	31.0%	120	69.0%	0.00*
	Yes	121	54.8%	100	45.2%	

Discussion

Poor hypertension management has many multifaceted causes including obesity [10], medical adherence [11], and poor dietary and other lifestyle habits management [12]. According to previous systematic reviews, individuals' health literacy is one of the contributing factors in controlling hypertension [13]. Health literate patients seem to have better control of their hypertension [14–20] knowledge of hypertension [21,22] and sodium restriction [19,22]. Therefore, it is important to assess and improve the patient's health literacy. In this study, we aimed to measure health literacy among hypertensive patients attending the primary health care clinics at KAMC-R.

Today, patients are able to access a huge range of medical information using smartphones, regardless of their skills, where many patients may be able to gain health information and make it available to others through social media [23]. However, this could make patients feel overwhelmed when they have to make well-informed decisions about their medical regimen. They may also be at higher risk of making judgments that could be harmful to their health in extreme circumstances [24]. Most instruments used to assess health literacy depend on assessing of functional health literacy skills as one's ability to locate, read and understand health information [25]. Assessing health literacy is different from the well-known KAP studies in which authors aim to assess the patients' knowledge, attitudes and practice toward specific medical conditions. However, KAP studies are not able to assess the extent of health literacy which covers the aspect of one's ability to access, understand, appraise and apply health-related information in healthcare, disease prevention, and health promotion, which has been proven to be a critical health determinant and may have been overlooked until recent years.

In this study, we found that 55.7 % of hypertensive patients had limited health literacy where 33.4 % of them reported that they always need help in reading medical instructions. In a study conducted by McNaughton C et.al, the authors found that 45 % of hypertensive patients had low health literacy [20] while Shi et al. used the Chinese Health Literacy Scale for Hypertension where authors found that more than half of their study subjects (55.3%) had low health literacy [26]. Good health literacy was found significantly higher in males, younger age, higher income population, employed and higher educated population. In another study, authors reported that better health literacy was reported in patients younger than 40 years old, among men, higher level of education and employee patients [14]. Sun et al, reported that education has a positive and direct

effect on prior knowledge and health literacy [27]. One research study showed that men had limited health literacy [28,29]. However, the authors explained that as result of the men who participated in their study had low education.

Other factors affecting patients' health literacy included exercising, duration of hypertension and family history of hypertension. Many studies showed that there is association between bad lifestyle, low level of health literacy and low control of hypertension [25,30–33]. Low level of health literacy means that patients didn't comprehend the needed information regarding the importance and how to control the disease, as exercising. Having family history of hypertension is associated with better health literacy which is expected as patients had previous basic information.

This study had some limitations including depending of self-reported questionnaire which could lead to some personal bias in reporting some information. Moreover, the study was conducted in primary care centers where the majority of hypertensive patients were of an essential type which mostly affects old patients whereas patients with secondary hypertension, who are usually younger, follow up in specialized clinics.

In conclusion, this study found a high percentage of hypertensive patients had low health literacy, which correlated with female gender, low education level, older age, family history of hypertension and practicing exercise. We recommend that physicians should confirm that their patients have full understanding of the nature of the disease, and the correct timing and dosage of medications with frequent reassessment.

References

1. Saravanan MS, Sai Manoj Kumar R. A survey on knowledge discovery of Healthcare Dataset using Graph based approach. Res J Pharm Biol Chem Sci. 2016;7(8):8-13.
2. Nielsen-Bohlman L, Panzer A, Kindig D. Health Literacy: A Prescription to End Confusion.; 2004. doi:10.17226/10883
3. Room P, Index A, Us C. Centers for Disease Control and Prevention. Learn about health literacy. Published online 2009:1-5. doi:CDC 24/7
4. Berkman N, Sheridan S, Donahue K, Halpern D, K C. Low health literacy and health outcomes: An updated systematic review. Ann Intern Med. 2011;155(2):97-107.
5. WHO. WHO | Global status report on noncommunicable diseases 2014. WHO. Published online 2015.
6. Hernandez LM. Health Literacy: Improving Health, Health Systems, and Health Policy around the World: Workshop Summary. National Academies Press; 2013.
7. Al-Jumaili AA, Al-Rekabi MD, Sorofman B. Evaluation of instruments to assess health literacy in Arabic language among Iraqis. Res Soc Adm Pharm. 2015;11(6):803-813. doi:https://doi.org/10.1016/j.sapharm.2015.02.002
8. Morris NS, MacLean CD, Chew LD, Littenberg B. The Single Item Literacy Screener: Evaluation of a brief instrument to identify limited reading ability. BMC Fam Pract. 2006;7(1):21. doi:10.1186/1471-2296-7-21
9. Al-Ruthia YS, Balkhi B, AlGhadeer S, et al. Relationship between health literacy and body mass index among Arab women with polycystic ovary syndrome. Saudi Pharm J. 2017;25(7):1015-1018. doi:https://doi.org/10.1016/j.jsps.2017.04.003
10. Jiang S-Z, Lu W, Zong X-F, Ruan H-Y, Liu Y. Obesity and hypertension. Exp Ther Med. 2016;12(4):2395-2399. doi:10.3892/etm.2016.3667
11. Poulter NR, Borghi C, Parati G, et al. Medication adherence in hypertension. J Hypertens. 2020;38(4):579-587. doi:10.1097/HJH.0000000000002294
12. Beilin LJ. Lifestyle and Hypertension—An Overview. Clin Exp Hypertens. 1999;21(5-6):749-762. doi:10.3109/10641969909061005
13. Mohd Isa D, Shahar S, He FJ, Majid HA. Associations of Health Literacy with Blood Pressure and Dietary Salt Intake among Adults: A Systematic Review. Nutrients. 2021;13(12):4534. doi:10.3390/nu13124534
14. Gaffari-fam S, Babazadeh T, Oliaei S, Behboodi L, Daemi A. Adherence to a Health Literacy and Healthy Lifestyle with Improved Blood Pressure Control in Iran. Patient Prefer Adherence. 2020;Volume 14:499-506. doi:10.2147/PPA.S244820
15. Costa VRS, Costa PDR, Nakano EY, Apolinário D, Santana ANC. Functional health literacy in hypertensive elders at primary health care. Rev Bras Enferm. 2019;72(suppl 2):266-273. doi:10.1590/0034-7167-2018-0897
16. Borges FM, Silva ARV da, Lima LH de O, Almeida PC de, Vieira NFC, Machado ALG. Health literacy of adults with and without arterial hypertension. Rev Bras Enferm. 2019;72(3):646-653. doi:10.1590/0034-7167-2018-0366
17. Selcuk KT, Mercan Y, Aydin T. Uncontrolled Blood Pressure in Patients with Hypertension and Associated Factors: The Role of Low Health Literacy. Erciyes Tıp Dergisi/Erciyes Med J. 2018;40(4):222-227. doi:10.5152/etd.2018.18102
18. Hu K, Wu S, Sun K, et al. GW28-e0218 Health Literacy and Its Association with Medication Adherence and Blood Pressure Control among Patients with Hypertension. J Am Coll Cardiol. 2017;70(16):C85. doi:10.1016/j.jacc.2017.07.299
19. Hall E, Lee S-Y, Clark PC, Perilla J. Social Ecology of Adherence to Hypertension Treatment in Latino Migrant and Seasonal Farmworkers. J Transcult Nurs. 2016;27(1):33-41. doi:10.1177/1043659614524788
20. McNaughton CD, Jacobson TA, Kripalani S. Low literacy is associated with uncontrolled blood pressure in primary care patients with hypertension and heart disease. Patient Educ Couns. 2014;96(2):165-170. doi:10.1016/j.pec.2014.05.007
21. Yilmazel G, Çetinkaya F. Relation between Health Literacy Levels, Hypertension Awareness and Control among Primary-secondary School Teachers in Turkey. AIMS Public Heal. 2017;4(4):314-325. doi:10.3934/publichealth.2017.4.314

22. Ko Y, Balasubramanian TD, Wong L, et al. Health literacy and its association with disease knowledge and control in patients with hypertension in Singapore. Int J Cardiol. 2013;168(4):e116-e117. doi:10.1016/j.ijcard.2013.08.041
23. Temple NJ, Fraser J. Food labels: A critical assessment. Nutrition. 2014;30(3):257-260. doi:10.1016/j.nut.2013.06.012
24. Cline RJW. Consumer health information seeking on the Internet: the state of the art. Health Educ Res. 2001;16(6):671-692. doi:10.1093/her/16.6.671
25. Aldoory L. The Status of Health Literacy Research in Health Communication and Opportunities for Future Scholarship. Health Commun. 2017;32(2):211-218. doi:10.1080/10410236.2015.1114065
26. Shi D, Li J, Wang Y, et al. Association between health literacy and hypertension management in a Chinese community: a retrospective cohort study. Intern Emerg Med. 2017;12(6):765-776. doi:10.1007/s11739-017-1651-7
27. Sun X, Shi Y, Zeng Q, et al. Determinants of health literacy and health behavior regarding infectious respiratory diseases: a pathway model. BMC Public Health. 2013;13(1):261. doi:10.1186/1471-2458-13-261
28. Mafutha NG, Mogotlane S, De Swardt HC. Development of a Hypertension Health Literacy Assessment Tool for use in primary healthcare clinics in South Africa, Gauteng. African J Prim Heal Care Fam Med. 2017;9(1). doi:10.4102/phcfm.v9i1.1305
29. Gibbs A, Sikweyiya Y, Jewkes R. 'Men value their dignity': securing respect and identity construction in urban informal settlements in South Africa. Glob Health Action. 2014;7(1):23676. doi:10.3402/gha.v7.23676
30. Wielgosz A, Robinson C, Mao Y, et al. The Impact of Using Different Methods to Assess Completeness of 24-Hour Urine Collection on Estimating Dietary Sodium. J Clin Hypertens. 2016;18(6):581-584. doi:10.1111/jch.12716
31. Land M-A, Webster J, Christoforou A, et al. Salt intake assessed by 24 h urinary sodium excretion in a random and opportunistic sample in Australia. BMJ Open. 2014;4(1):e003720. doi:10.1136/bmjopen-2013-003720
32. Willett W. Nutritional Epidemiology. Oxford University Press; 2012. doi:10.1093/acprof:oso/9780199754038.001.0001
33. He FJ, MacGregor GA. Effect of modest salt reduction on blood pressure: a meta-analysis of randomized trials. Implications for public health. J Hum Hypertens. 2002;16(11):761-770. doi:10.1038/sj.jhh.1001459

Awareness and Compliance Behavior of Diabetic Patients for Eye care to Prevent Diabetic Retinopathy: The Status of Jazan Region, Saudi Arabia

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Abstract

Background: Diabetic retinopathy (DR) as a complication of diabetes mellitus (DM) and other diabetic complications are of great worldwide concern. In order to control both DM and DR, patients must be informed and comply with prevention and treatment recommendations.

Objectives: The study aimed to assess the knowledge, attitudes, and patient compliance behavior regarding DR among diabetic patients from Jazan Region of Saudi Arabia and identify factors related to patient awareness and compliance.

Patients and Methods: This cross-sectional study was done on 385 diabetic patients from six primary healthcare centers in Jazan region. A self-administered questionnaire was used to solicit responses regarding knowledge, attitudes, and compliance with regular ophthalmic eye examinations. The questionnaire also comprised questions related to the sociodemographic data and other questions related to the diabetic status. The collected responses were presented as frequencies and percentages, and the associations between the variables were accomplished using Chi-squared test. P-value < 0.05 was considered significant.

Results: About half of the participants (50.6%) were females, and 51.4% were within the age group 45-64 years. Less than half of the participants (40.8%) had low monthly income, and 45.5% were illiterate or had primary education. About 33.6% of the participants had the disease for more than 10 years, and 90.1% were controlled. There was a high awareness level of diabetes-related eye complications (96.4%) and the need for regular eye exams (93.5%). About 54.0% had never seen an ophthalmologist. Participants in the low to medium economic levels and those with primary education had a significant positive attitude. No significant associations were found between the diabetic variables and most of the knowledge and attitude questions (P> 0.05).

Conclusion: There is a need to increase patient awareness about the complications of diabetes and the need for policy guidance for primary healthcare providers to follow best practices when treating diabetic patients to guard against and/or control its complications.

Keywords: Diabetes, Knowledge, Attitudes, Ophthalmic eye examination, Compliance, Behavior, Diabetic retinopathy, Jazan.

Introduction

Type 2 Diabetes (DM2) is a chronic disease of worldwide concern that is characterized by the body's inability to metabolize glucose due to either insufficient insulin production by the pancreas or to cell inability to respond to the available insulin (insulin resistance) (1). DM2 is increasing globally due to several factors such as obesity, sedentary lifestyles, and urbanization. The present population of diabetics is expected to swell from 463 million to 700 million, including both diagnosed and undiagnosed (2,3). Poorly managed DM2 has many adverse macro-/micro-vascular health consequences such as cardiovascular, renal, and eye diseases and neuropathy. One of the most common causes of blindness among adults aged 20-74 years is diabetic retinopathy (DR), resulting from long-term DM2. It occurs within two decades of diagnosis among both insulin-dependent and -independent diabetes (4).

A systematic review of 35 international studies showed a global DR frequency of 35.4%(5). Saudi Arabia is ranked 2nd highest in the prevalence of DM2 in the Middle East and 7th highest globally. Saudi population studies have shown DR rates ranging from 27.8% to 36% from region to region (6-9). Such a high rate of DR is due to several reasons, for example, poor control of DM2 and guarding against its complications. Many patients do not have regular eye examinations. They may not seek eye exams because they do not understand the silent nature of the progression of DR or that it can result in irreversible blindness. Studies from Saudi Arabia have also shown a strong correlation between advanced age, duration of DM2, and insulin dependence (2,11,19). Deficiencies regarding patient education on DR seriousness and the need to control their DM2 to prevent it are evidenced in these studies. The true extent of DR may be hard to measure as patients who do not get regular eye exams will not be part of the data set (12).

International studies revealed variations in awareness of the risk of diabetic eye diseases such as DR and compliance with regular eye examinations worldwide. Studies in Australia, Hong Kong, and Switzerland report that most diabetic patients are aware of the significance of regular eye exams but compliance ranges from 69 to 75.7%(5,12,13). By contrast, studies of India, Bangladesh, and Ghana developing nations show lower awareness of ocular diseases; 17.01%, 24%, and 34.6%, respectively, correlated with a corresponding lack of compliance with regular eye exams (14-16). Studies conducted in Jordan and Syria found relatively high levels of awareness of diabetes-related eye diseases, including DR and blindness. However, patients were referred to ophthalmologists in both countries at low rates; 59.5% and 25%, respectively (17,18).

Studies in three cities of Saudi Arabia have shown compliance with ophthalmologic exams to parallel international studies (19-22). A study from King Abdulaziz University Hospital in Jeddah reported that 61% of diabetic patients were aware of DR; however, 38% of them were aware that an annual retinal examination is necessary, and a majority were not aware of the risk factors and prevention measures for DR (19). A population-based study in Jeddah showed that 82.6% of patients with DM2 who were mindful of diabetic risks for DR, only 65% went for regular ophthalmologic exams (20). A study conducted in Al-Hasa, showed a lower awareness of diabetes-related eye diseases (46.8%), with a corresponding lower rate of regular eye examinations (45.1%) among diabetic patients (21). A cross-sectional study conducted at two primary healthcare centers in Riyadh reported that 88% of patients with DM2 had knowledge about DR. Nevertheless, 45% of them passed more than two years since their last eye examination (22).

To the best of our knowledge, there have been no comprehensive studies on the awareness, attitudes, and management of DR among patients with DM2 in Jazan region of Saudi Arabia. The seriousness of DR and the need to assess levels of knowledge, attitudes, and management among patients with DM2 in Jazan is critical for addressing this condition to improve patients' health and life quality. We aimed to assess the knowledge, attitudes, and patient behavior regarding DR among diabetic patients in Jazan Region of Saudi Arabia and identify socioeconomic, educational, and treatment accessibility factors; which would guide policymakers planning to improve the quality of diabetes healthcare.

Subjects and methods

Study design and participants:

This was a cross-sectional study in Jazan Region, Kingdom of Saudi Arabia. A total of six centers, three urban and three rural primary healthcare centers (PHCs) with outpatient departments that treat chronic diseases, were randomly selected. The sample size for this study was calculated using sample size formula for cross-sectional study design; $n=z^2pq/d^2$, where n = sample size, and z = standard normal distribution at P = 50% with 95% confidence interval and d = marginal error (5%). The anticipated population proportion (p) of the sample was selected to be 50% although it brings the largest sample size. For 95% confidence level, z = 1.96, then the formula becomes: $n = (1.96^2 \times 50/100 \times 50/100) /0.05^2 = 384$ participants. Diabetic patients were randomly enrolled by sequential inclusion at PHCs weekly from Sunday to Thursday until reaching our target sample size of 385 patients. The questionnaire sheets were distributed to patients and collected on the same day. Nondiabetic patients, diabetic patients who received their care at diabetes centers that are not primary care, and diabetic patients who refused to participate were excluded. An official approval was obtained from Jazan Hospital IRB (#2002). Approval was secured also from each of the target six PHCs. Signed informed consent for participation was obtained from each outpatient.

Data collection:
The questionnaire used in this study was adapted from some previous studies (10-21). The collected data included anonymous personal characteristics (gender, age, monthly income, and education level). In addition, there were questions related to the DM, including duration of diabetes, diabetes control status, last fasting blood glucose (FBS) reading, and HbA1c (value in percentage). Furthermore, the questionnaire included questions of patients' knowledge and attitude about eye complications from diabetes, patients' knowledge of recommended treatment and prevention of DR, and patients' compliance behavior with recommended treatment and prevention of DR. The questionnaire was distributed and collected within the visit time from the primary healthcare clinics. A pre-test was conducted using 40 subjects to determine the clarity of the questionnaire and analyzed for any ambiguities within the questions and responses, which were eliminated in the final study. The final responses were categorized for better presentation and reporting of the results. The demographic variables were categorized as follows: gender (male and female), age (18 - 44 yrs, 45 - 64 yrs, and ≥ 65 yrs), monthly income (< 5k, 5k - 10k, and > 10k), and education level (illiterate or primary, secondary, and university or above). The DM variables were categorized as follows: duration of the disease (< 5 yrs, 5 - 10 yrs, and > 10 yrs), current status of the disease (uncontrolled, and controlled), fasting blood glucose (< 150 mg/dL, ≥ 150 - < 250 mg/dL, and ≥ 250 mg/dL), and Hb1Ac (< 7 %, 7 - <10 %, ≥ 10 %).

Data analysis:
Data were entered into a personal computer from the collected questionnaire sheets. The Statistical Package for the Social Sciences (SPSS version 25) was used for the analysis. Descriptive statistics were calculated for all quantitative and qualitative variables. The results were presented as frequencies and percentages with charts as appropriate. The Chi-Squared test was applied for the association between the knowledge and attitude questions and demographic variables and DM parameters. The statistical significance level was established at P< 0.05.

Results

A total of 385 questionnaires were available for analysis (response rate of 91%). About half of the participants (50.6%) were females, and 51.4% were within the age group 45-64 years. Less than half of the participants (40.8%) had monthly income < 5000 SR, and 45.5% were illiterate or had primary education. Regarding the diabetic-related variables, about a third (33.6%) of the participants had the disease for more than 10 years, and 90.1% were controlled. Only 295 participants responded to the question of fasting blood sugar (FBS); 46.4% reported FBS values ≥ 150 to < 250 mg/dL. Only 160 participants responded to the Hb1Ac question; of them, 75.6% reported 7 - <10 % values. More details are presented in Table 1.

Concerning the question of knowledge about RD, most participants (96.4%) knew that diabetes could cause eye disease. There was no significant association with gender (P= 0.053), income (P= 0.297), and education level (P= 0.088). However, a significant association was found with age (P= 0.007), where a lesser percentage of participants with age ≥ 65 years knew about RD (Table 2&3). There were also no significant associations with DM parameters (Table 4&5); duration of DM (P= 0.70), current status (P= 0.151), FBS (P= 0.726), and Hb1Ac (P= 0.722).

Regarding the knowledge of DM complications, the responses varied among the participants (Figure 1). Diabetic retinopathy was selected by most of the participants (n= 225, 58.4%) followed by blindness (n= 207, 53.8%), while glaucoma was the least selected choice (n= 75, 19.5%).

Knowledge of the participants regarding the available treatment for diabetic retinopathy is presented in Figure 2. More than half of the participants (n= 224, 58.2%) agreed that "control of diabetes" is the best available treatment for DR, while 46.2% (n= 178) of the participants chose "medications only" as the available treatment. However, few participants (n= 51, 13.2%) chose "alternative medical therapies" as the available treatment.

The majority of participants (93.5%) responded positively "Yes" that persons with diabetes should go for regular eye examinations. There were significant associations with the demographic variables (P< 0.05). More females responded with "No" than males (P= 0.001); a lesser number of participants with age ≥ 65 years responded with "Yes" (P= 0.011), and more participants with < 5000 SR income responded with "No" (P= 0.003), and more participants with illiterate or primary education responded with "No" (P< 0.001) (Tables 2 & 3).

However, there were no significant associations between this question and the DM parameters (P> 0.05) (Tables 4 & 5). Regarding the participants' attitude toward visiting an ophthalmologist if DM is under control, more than half of the participants (58.4%) reported "no need" for a visit as the DM is under control. There were no significant associations between this question and the demographic variables (P> 0.05), except with monthly income, where more participants with monthly income > 10000 SR reported "no need" (Tables 2 & 3).

The associations between this question and the DM variables were also not significant (P> 0.05) (Tables 4 & 5). Responses of the participants to the question of whether timely treatment can prevent/delay damage due to diabetes revealed that most participants (92.5%) agreed to that. No significant associations were observed between this question with gender (P= 0.122), age (P= 0.990), and education (P=0.674). However, there was a significant association with monthly income where a lesser number of participants with age ≥ 65 years responded with "Yes" (P= 0.011) (Tables 2 & 3). Moreover, there were significant associations with DM duration (P= 0.005), and DM status (P= 0.016), whereas no significant associations were found with FBS (P= 0.756), and Hb1Ac (P= 0.623) (Tables 4 & 5).

Table 1: Characteristics of the study sample		
	Frequency	Percent
Gender (N= 385)		
Male	190	49.4
Female	195	50.6
Age (N= 385)		
18 - 44 yrs	117	30.4
45 - 64 yrs	198	51.4
≥ 65 yrs	70	18.2
Monthly income (N= 385)		
< 5k	157	40.8
5k - 10k	143	37.1
> 10k	85	22.1
Educational level (N= 385)		
Illiterate or primary	175	45.5
Secondary	90	23.4
Univ. or above	120	31.2
Years since being diabetic (N= 385)		
< 5 yrs	123	31.9
5 - 10 yrs	132	34.3
> 10 yrs	130	33.8
Diabetes status (N= 385)		
Uncontrolled	38	9.9
Controlled	347	90.1
FBS (N= 295)		
< 150 mg/dL	85	28.8
≥ 150 - < 250 mg/dL	137	46.4
≥ 250 mg/dL	73	24.7
Hb1Ac (N= 160)		
< 7 %	14	8.8
7 - <10 %	121	75.6
≥ 10 %	25	15.6

Figure 1: Responses of the participants to the eye complications caused by diabetes

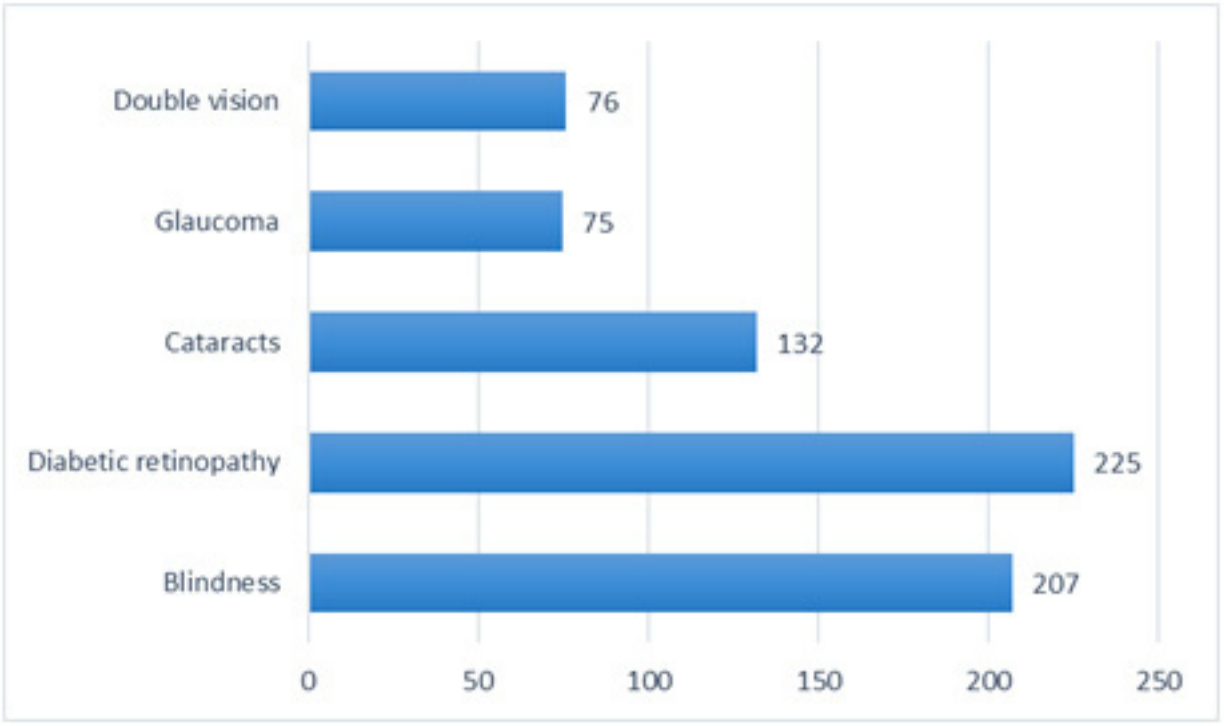


Figure 2: Knowledge of the participants towards the available treatment for diabetic retinopathy.

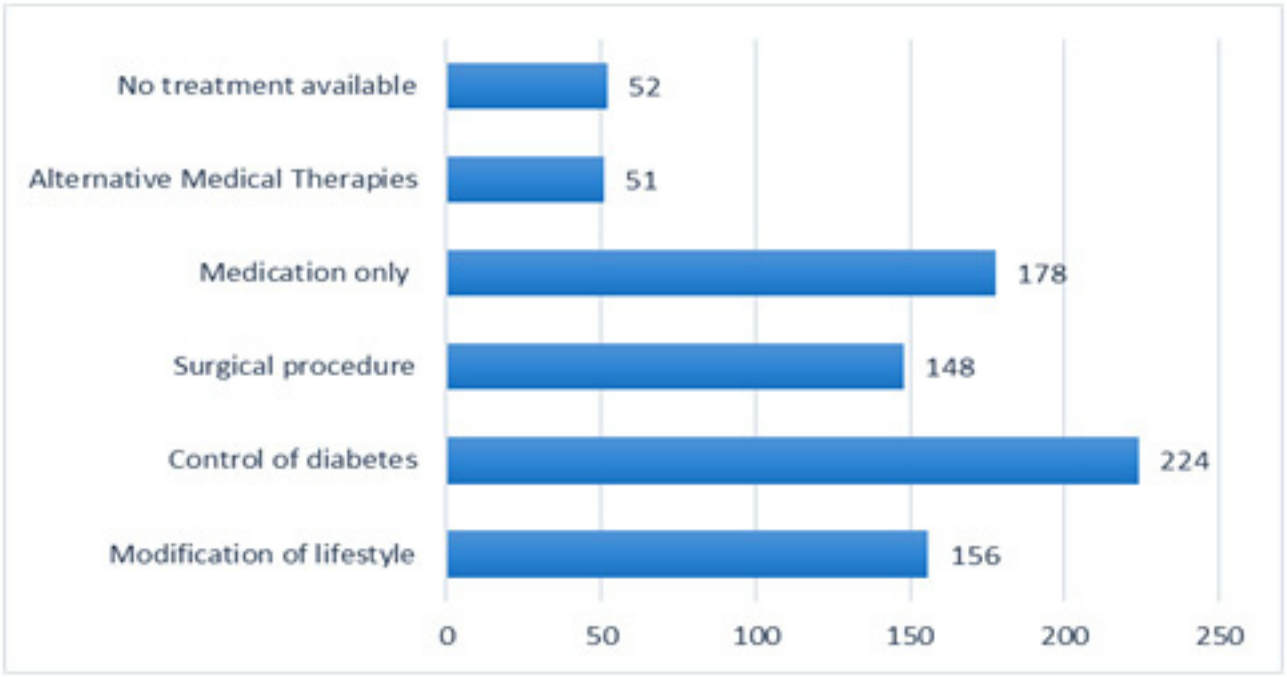


Table 2: Numbers, frequencies, and associations of the participants' responses in relation to gender and age

		Total	Gender			Age			
			Male	Female	P	18-44 yrs	45-64 yrs	≥ 65 yrs	P
Do you know that diabetes can cause eye disease?	No	14 (3.6)	3 (21.4)	11 (78.6)	0.053	3 (21.4)	4 (28.6)	7 (50.0)	0.007
	Yes	371 (96.4)	187 (50.4)	184 (49.6)		114 (30.7)	194 (52.3)	63 (17.0)	
Should persons with diabetes go for regular eye examinations?	No	25 (6.5)	4 (16.0)	21 (84.0)	0.001	4 (16.0)	11 (44.0)	10 (40.0)	0.011
	Yes	360 (93.5)	186 (51.7)	174 (48.3)		113 (31.4)	187 (51.9)	60 (16.7)	
There is no need to visit an ophthalmologist if a person has diabetes under control	No	160 (41.6)	79 (49.4)	81 (50.6)	1.000	55 (34.4)	81 (50.6)	24 (15.0)	0.224
	Yes	225 (58.4)	111 (49.3)	114 (50.7)		62 (27.6)	117 (52.0)	46 (20.4)	
Timely treatment can prevent/delay damage due to diabetes in eyes	No	29 (7.5)	10 (34.5)	19 (65.5)	0.122	9 (31.0)	15 (51.7)	5 (17.2)	0.990
	Yes	356 (92.5)	180 (50.6)	176 (49.4)		108 (30.3)	183 (51.4)	65 (18.3)	

Table 3: Numbers, frequencies, and associations of the participants' responses in relation to monthly income and education

		Income				Education			
		< 5k	5k-10k	> 10k	P	Illiterate or primary	Secondary	Univ. or above	P
Do you know that diabetes can cause eye disease?	No	8 (57.1)	5 (35.7)	1 (7.1)	0.297	10 (71.4)	3 (21.4)	1 (7.1)	0.088
	Yes	149 (40.2)	138 (37.2)	84 (22.6)		165 (44.5)	87 (23.5)	119 (32.1)	
Should persons with diabetes go for regular eye examinations?	No	18 (72.0)	6 (24.0)	1 (4.0)	0.003	21 (84.0)	2 (8.0)	2 (8.0)	0.000
	Yes	139 (38.6)	137 (38.1)	84 (23.3)		154 (42.8)	88 (24.4)	118 (32.8)	
There is no need to visit an ophthalmologist if a person has diabetes under control	No	63 (39.4)	49 (30.6)	48 (30.0)	0.004	61 (38.1)	42 (26.3)	57 (35.6)	0.051
	Yes	94 (41.8)	94 (41.8)	37 (16.4)		114 (50.7)	48 (21.3)	63 (28.0)	
Timely treatment can prevent/delay damage due to diabetes in eyes	No	8 (27.6)	17 (58.6)	4 (13.8)	0.045	14 (48.3)	8 (27.6)	7 (24.1)	0.674
	Yes	149 (41.9)	126 (35.4)	81 (22.8)		161 (45.2)	82 (23.0)	113 (31.7)	

Table 4: Numbers, frequencies, and associations of the participants' responses in relation to DM duration and status

		Duration				Status		
		< 5 yrs	5-10 yrs	> 10 yrs	P	Uncontrolled	Controlled	P
Do you know that diabetes can cause eye disease?	No	5 (35.7)	8 (57.1)	1 (7.1)	0.070	3 (21.4)	11 (78.6)	0.151
	Yes	118 (31.8)	124 (33.4)	129 (34.8)		35 (9.4)	336 (90.6)	
Should persons with diabetes go for regular eye examinations?	No	6 (24.0)	13 (52.0)	6 (24.0)	0.155	4 (16.0)	21 (84.0)	0.293
	Yes	117 (32.5)	119 (33.1)	124 (34.4)		34 (9.4)	326 (90.6)	
There is no need to visit an ophthalmologist if a person has diabetes under control	No	60 (37.5)	50 (31.3)	50 (31.3)	0.143	18 (11.3)	142 (88.8)	0.490
	Yes	63 (28.0)	82 (36.4)	80 (35.6)		20 (8.9)	205 (91.1)	
Timely treatment can prevent/delay damage due to diabetes in eyes	No	5 (17.2)	18 (62.1)	6 (20.7)	0.005	7 (24.1)	22 (75.9)	0.016
	Yes	118 (33.1)	114 (32.0)	124 (34.8)		31 (8.7)	325 (91.3)	

Table 5: Numbers, frequencies, and associations of the participants' responses in relation to FBS and Hb1Ac

		FBS					Hb1Ac				
		Total	< 150 mg/dL	≥ 150-250 mg/dL	≥ 250 mg/dL	P	Total	< 7 %	7-<10 %	≥ 10 %	P
Do you know that diabetes can cause eye disease?	No	13 (4.4)	5 (38.5)	5 (38.5)	3 (23.1)	0.726	2 (1.3)	0 (0.0)	2 (100.0)	0 (0.0)	0.722
	Yes	282 (95.6)	80 (28.4)	132 (46.8)	70 (24.8)		158 (98.7)	14 (8.9)	119 (75.3)	25 (15.8)	
Should persons with diabetes go for regular eye examinations?	No	21 (7.1)	6 (28.6)	9 (42.9)	6 (28.6)	0.906	2 (1.3)	1 (50.0)	1 (50.0)	0 (0.0)	0.109
	Yes	274 (92.9)	79 (28.8)	128 (46.7)	67 (24.5)		158 (98.7)	13 (8.2)	120 (75.9)	25 (15.8)	
There is no need to visit an ophthalmologist if a person has diabetes under control	No	116 (39.3)	38 (32.8)	47 (40.5)	31 (26.7)	0.249	53 (33.1)	7 (13.2)	37 (69.8)	9 (17.0)	0.325
	Yes	179 (60.7)	47 (26.3)	90 (50.3)	42 (23.5)		107 (66.9)	7 (6.5)	84 (78.5)	16 (15.0)	
Timely treatment can prevent/delay damage due to diabetes in eyes	No	26 (8.8)	7 (26.9)	11 (42.3)	8 (30.8)	0.756	8 (5.0)	0 (0.0)	7 (87.5)	1 (12.5)	0.623
	Yes	269 (91.2)	78 (29.0)	126 (46.8)	65 (24.2)		152 (95.0)	14 (9.2)	114 (75.0)	24 (15.8)	

For the consultation question in case of eye problems, most participants (n= 375, 97.4%) claimed that they consulted an ophthalmologist. 54 (14%) participants consulted a specialist other than an ophthalmologist, and 34 (8.8%) participants searched for an Internet solution. More details are shown in Figure 3.

When the participants were asked “how often they go for regular eye examination”, more than half of them (54.0%) answered that they never went for an examination; and that it was their first time for an ophthalmic examination. About 112 (29.1%) participants reported that they went for an examination every year, while only 10 (2.6%) participants reported that they visited an ophthalmologist every month (Figure 4).

Figure 3: Responses of the participants to the question related to consultation in the event of eye problem

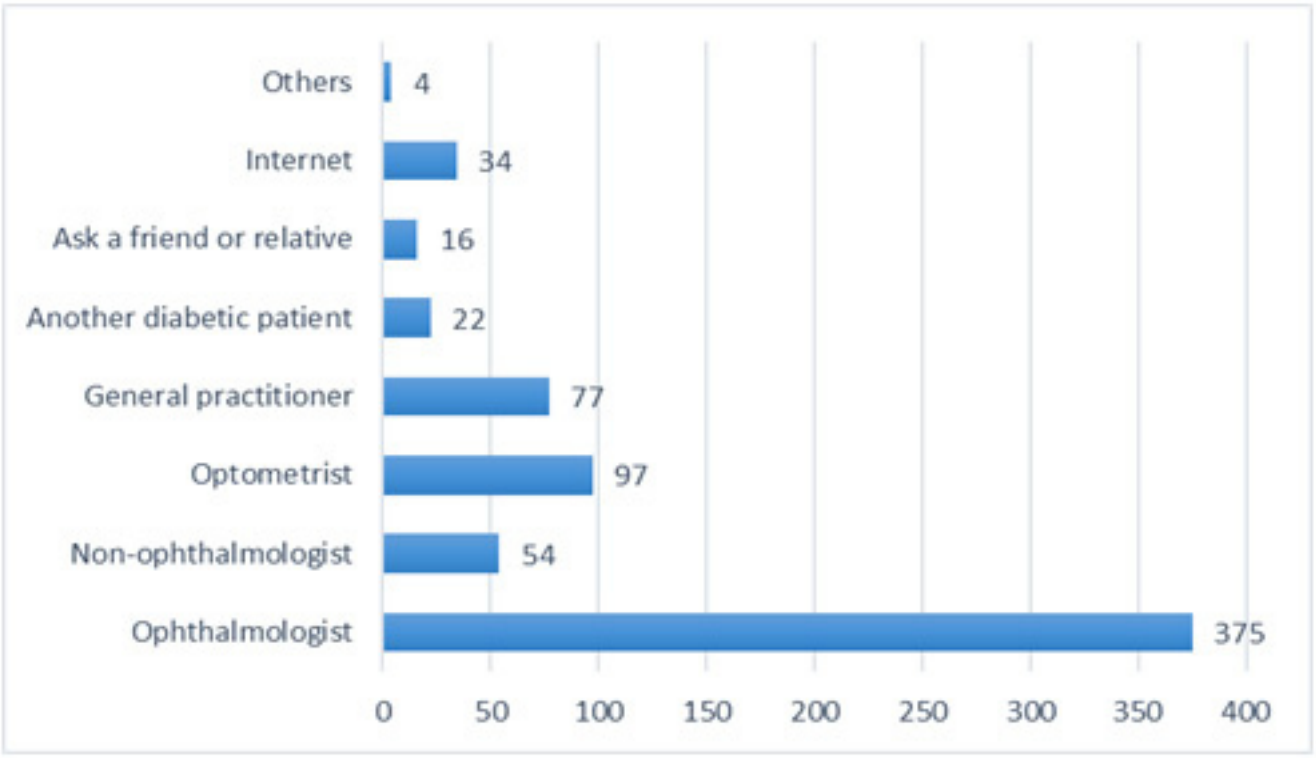
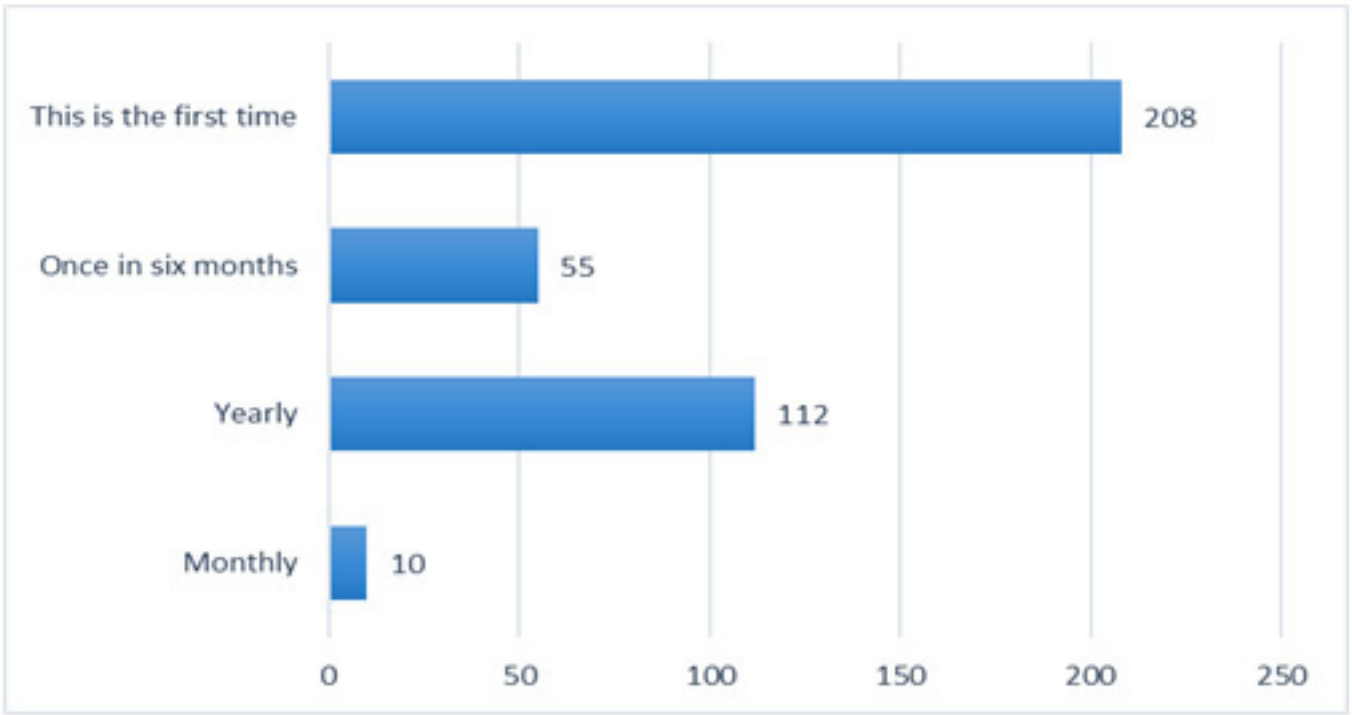


Figure 4: Responses of the participants for the frequency of the visit for eye examination



Discussion

Diabetes mellitus is a primary global health concern (1). When it is poorly controlled, it is the cause of many complications, including organ damage and retinopathy (3). International studies have been conducted to measure both the knowledge of diabetes and compliance with recommended eye examinations by diabetic patients. This study was conducted in Jazan, Saudi Arabia to assess the level of knowledge and attitudes of diabetic patients in the region as well as their keenness to receive regular eye examinations for the prevention and treatment of DR. This study found that the level of knowledge about DR among people with diabetes was high (96.4%) mirroring other studies in Middle Eastern countries such as Jordan and Syria, 88% and 90%, respectively and Saudi Arabia (17,20,22). In addition, 93.6% of our participants were aware that regular retinal examinations were advisable, and 92.6% had a favourable attitude toward DR prevention measures, unlike a previous study in Jeddah in which only 38% were aware of the necessity of annual retinal examinations.

We next examined the influence of knowledge of DR on patients' behavior and compliance for required eye exams. The behavior of diabetic patients does not reflect the high percentages of knowledge and favorable attitudes with resultant regular eye examinations. 45.9% of the study participants were never seen by an ophthalmologist. It is considered malpractice if diabetic patients are not referred to ophthalmologists, as reported in Middle Eastern and Saudi literature (17,21). One common misconception voiced by 58.2% of participants is that when diabetes is well-controlled, it is unnecessary to have eyes examined by an ophthalmologist. Another misconception revealed by a Turkish study is that DR develops with noticeable initial symptoms; hence if there are no symptoms, there is no DR (11).

The goal of our study was to evaluate the knowledge, attitudes, and behavior concerning DR among diabetic patients in the Jazan region and see if there are correlations between these characteristics with socioeconomic and demographic factors. Our study indicates that DR increases up to 70% with advancing age and disease duration, which agrees with a previous study in Abha showing that 36.4% of diabetic patients with DR have a strong association with extreme age and durations of diabetes and insulin dependence (10). Our findings that most participants knew that regular eye examinations are necessary are consistent with studies conducted in Australia and Hong Kong (6,13). Among our participants, almost half (45.9%) of study participants never visited an ophthalmologist or annually consulted a specialist compared to a limited number of patients who sought consultation more frequently. This contrasts with a Swiss study that revealed that 70.5% of patients had regular annual eye examinations (12).

Gender was significantly associated with knowledge in our study. The opposite has been observed in Saudi, Nigerian, and Iranian studies (23-25). Educational status was a contributing factor to the attitude in our study; when we asked "There is no need to visit an ophthalmologist if a person has well-controlled diabetes "a significant association was found (P = 0.02). This was consistent with another study done in India, where they found a significant association between higher education and a high level of KAP (26). Socioeconomic status was also associated significantly with the attitude of our participants, while this significance was not noted in other Saudi studies done in Riyadh (23,27). A limitation of the present study is using a self-reporting questionnaire that might have a recall bias. This study provides clear evidence of the need for increased patient education about the complications of diabetes and the need for policy guidance for primary healthcare providers to follow best practices when treating diabetes, including referrals to ophthalmologists. We recommend creating a targeted campaign, including health camps, to raise awareness among the public about DR.

Conclusion

This study revealed that among diabetic outpatients, there is a high level of awareness of both diabetes-related eye complications (96.4%) and the need for regular eye exams (93.5%). However, there is an inconsistency in the attitude and behavior of this group in follow-up care with 54.0% of study participants never being seen by an ophthalmologist. One contributory factor to this disconnection is the widely held misunderstanding among diabetic patients that if diabetes is well-controlled, complications will not occur, eliminating the need for regular ophthalmic eye examinations. The additional belief held by 90% of participants is that their diabetes is well-controlled, although 82% of them had poorly controlled diabetes.

References

1. Roglic G. WHO Global report on diabetes: A summary. Int J Non-Commun Dis., 2016;1:3-8.
2. World Health Organization. Estimates for the year 2000 and projections for 2030. World Health, 2004;27(5):1047–53.
3. International Diabetes Federation. IDF Diabetes Atlas Ninth Edition 2019, 168 pp. Available from [https://www.idf.org/e-library/epidemiology-research/diabetes-atlas/159-idf-diabetes-atlas-ninth-edition-2019.html]
4. Fong DS, Aiello L, Gardner TW, King GL, Blankenship G, Cavallerano JD, et al; American Diabetes Association. Retinopathy in diabetes. Diabetes Care, 2004;27 Suppl 1: S84-7.
5. Yau JW, Rogers SL, Kawasaki R, Lamoureux EL, Kowalski JW, Bek T, et al; Meta-Analysis for Eye Disease (META-EYE) Study Group. Global prevalence and major risk factors of diabetic retinopathy. Diabetes Care, 2012;35(3):556-64.
6. Abdulaziz Al Dawish, Mohamed; Alwin Robert, Asirvatham; Braham, Rim; Abdallah Al Hayek, Ayman; Al Saeed, Abdulghani; Ahmed Ahmed, Rania; Sulaiman Al Sabaan F. Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev, 2016;12:4.
7. Al Ghamdi AH, Rabiu M, Hajar S, Yorston D, Kuper H, Polack S. Rapid assessment of avoidable blindness and diabetic retinopathy in Taif, Saudi Arabia. Br J Ophthalmol, 2012;96(9):1168–72.

8. El-Bab MF, Shawky N, Al-Sisi A, Akhtar M. Retinopathy and risk factors in diabetic patients from Al-Madinah Al-Munawarah in the Kingdom of Saudi Arabia. Clin Ophthalmol, 2012;6(1):269–76.
9. Hajar S, Hazmi A Al, Wasli M, Mousa A, Rabiu M. Prevalence and causes of blindness and diabetic retinopathy in southern Saudi Arabia. Saudi Med J, 2015;36(4):449–55.
10. Ahmed R, Khalil S, Al-Qahtani M. Diabetic retinopathy and the associated risk factors in diabetes type 2 patients in Abha, Saudi Arabia. J Fam Community Med, 2016;23(1): 23(1):18-24.
11. Çetin EN, Zencir M, Fenkçi S, Akin F, Yildirim C. Assessment of awareness of diabetic retinopathy and utilization of eye care services among Turkish diabetic patients. Prim Care Diabetes, 2013;7(4):297–302.
12. Konstantinidis L, Carron T, de Ancos E, Chinet L, Hagon-Traub I, Zuercher E, Peytremann-Bridevaux I. Awareness and practices regarding eye diseases among patients with diabetes: A cross sectional analysis of the CoDiab-VD cohort. BMC Endocr Disord, 2017;17(1):1–11.
13. Lian JX, McGhee SM, Gangwani RA, Lam CLK, Yap MKH, Wong DSH. Awareness of diabetic retinopathy and its association with attendance for systematic screening at the public primary care setting: A cross-sectional study in Hong Kong. BMJ Open, 2018;8(4):1–6.
14. Srinivasan NK, John D, Rebekah G, Kujur ES, Paul P, John SS. Diabetes and diabetic retinopathy: Knowledge, Attitude, Practice (KAP) among diabetic patients in a tertiary eye care centre. J Clin Diagnostic Res, 2017;11(7): NC01–7.
15. Ahmed KR, Jebunessa F, Hossain S, Chowdhury HA. Ocular knowledge and practice among type 2 diabetic patients in a tertiary care hospital in Bangladesh. BMC Ophthalmol, 2017;17(1):1–6.
16. Ovenseri-Ogbomo G, Abokyi S, Abokyi E, Koffuor G. Knowledge of diabetes and its associated ocular manifestations by diabetic patients: A study at Korle-Bu Teaching Hospital, Ghana. Niger Med J, 2013;54(4):217-23.
17. Bakkar MM, Haddad MF, Gammoh YS. Awareness of diabetic retinopathy among patients with type 2 diabetes mellitus in Jordan. Diabetes, Metab Syndr Obes Targets Ther, 2017;10:435–41.
18. Hamzeh A, Almhanni G, Aljaber Y, Alhasan R, Alhasan R, Alsamman MI, Alhalabi N, Haddeh Y. Awareness of diabetes and diabetic retinopathy among a group of diabetic patients in main public hospitals in Damascus, Syria during the Syrian crisis. BMC Health Serv Res, 2019;19(1):4-13.
19. Alasiri RA, Bafaraj AG. Awareness of Diabetic Retinopathy among Diabetic Patients in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Ann Int Med Dent Res, 2016;2(6):42-5.
20. Alzahrani SH, Bakarman MA, Alqahtani SM, Alqahtani MS, Butt NS, Salawati EM, Alkatheri A, Malik AA, Saad K. Awareness of diabetic retinopathy among people with diabetes in Jeddah, Saudi Arabia. Ther Adv Endocrinol Metab, 2018;9(4):103-12
21. Hisham Al-Mulla A, Khalid Al-Thafar A, Abdulrahman Al-Shaikh Hussain M, Ibrahim Ali S, Khuzaim Al-Dossary S. Knowledge, Attitude and Practice Toward Diabetic Retinopathy and Retinal Examination among Diabetic Population in Al-Hasa Region, Saudi Arabia: A Cross-sectional Study. Int J Sci Study, 2017; 64-8.
22. AlHargan MH, AlBaker KM, AlFadhel AA, AlGhamdi MA, AlMuammar SM, AlDawood HA. Awareness, knowledge, and practices related to diabetic retinopathy among diabetic patients in primary healthcare centers at Riyadh, Saudi Arabia. J Family Med Prim Care, 2019;8(2):373-7.
23. Al-Asbali T, Sakhr, Aldawari A, Alzahim IA, Alalawi H, Khandekar R, et al. Knowledge, attitude and practice regarding diabetic retinopathy screening and its management among diabetic patients at a private hospital of Riyadh, Saudi Arabia. J Family Med Prim Care. 2019 Feb;8(2):373-7.
24. Nathaniel GI, Adio O. Awareness and attitude of diabetic patients on diabetic eye complications in Port Harcourt, Migeria. Niger J Med J Natl Assoc Resid Dr Niger, 2015;24(3):252-5.
25. Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amiri P, Khosravi MH. Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: A cross-sectional study. Diabetes Metab Syndr Clin Res Rev, 2016 1;10(1):S114-9.
26. Das T, Wallang B, Semwal P, Basu S, Padhi TR, Ali MH. Changing Clinical Presentation, Current Knowledge-Attitude-Practice, and Current Vision Related Quality of Life in Self-Reported Type 2 Diabetes Patients with Retinopathy in Eastern India: The LVPEI Eye and Diabetes Study. Lansingh VC, editor. J Ophthalmol., 2016;2016:3423814.
27. Al-Yahya A, Alsulaiman A, Almizel A, Barri A, Adel F Al. Knowledge, attitude, and practices (Kap) of diabetics towards diabetes and diabetic retinopathy in Riyadh, Saudi Arabia: Cross-sectional study. Clin. Ophthalmol., 2020;14:3187-94.

Community-level awareness of proper immediate steps regarding ocular chemical injury in Asir Region

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Abstract

Background: Although the eyes represent 0.1% of the total human body, such organs are exposed to multiple injuries, some of which possibly lead to permanent loss of vision. Chemical injuries occurring on the eyes is deemed to be a major ophthalmic emergency, requiring immediate clinical assessment and initiation of treatment. Concerning the awareness of the Saudi population regarding the risks of chemical-based ophthalmic injuries and the permanent repercussions brought about by such incidents, together with the proper steps and actions that should be taken in such cases, this has unfortunately still a degree of paucity within the state. In addition, it is of great importance to recognize areas of shortcomings by health care workers, in order to provide accurate and non-complex medical facts regarding chemical-based ophthalmic injuries

Aims: This study focused on evaluating the general population's awareness of the immediate responses that are required, following ophthalmic chemical injury incidents within the Asir province of Saudi Arabia.

Methodology: This study contained a questionnaire that was randomly distributed across all segments of population in the Asir province of the Kingdom of Saudi Arabia (KSA), through various social media, entitled 'The eyes are arguably the most important sensory organ of the human body'. This investigation lasted a total time span of six months (May – October 2021) and its design was classified as a descriptive cross-sectional survey of the local Asir community.

Results: In relation to overall population awareness regarding chemical eye injury within the Asir region, KSA, among this cohort, 288 (48%) had good awareness level regarding chemical eye injury and its management, while 312 (52%) had poor awareness. Through our research we found out that individuals in the Asir population require greater awareness regarding the immediate steps of management in cases of ocular chemical eye injuries. Furthermore, there is a need to establish that the only solution required to irrigate the eye is water, with a mechanism of eye washing from the middle part of the face to the tip of the eye.

Conclusions: These results should be evaluated by the Ministry of Health and the appropriate actions should be made, such as health awareness campaigns, regarding ocular chemical injuries and immediate corrective actions, in order to improve knowledge and to create a healthier society.

Key words: ocular chemical injury, community awareness, Abha

Introduction

Although the eyes represent 0.1% of the total human body, such organs are exposed to multiple injuries, some of which possibly lead to permanent loss of vision [1].

Chemical injuries of the eyes is deemed to be a major ophthalmic emergency, requiring immediate clinical assessment and initiation of treatment [2]. A previous study conducted across Saudi Arabia alone, reviewed datasets regarding local chemical injuries presenting at two major state-run hospitals. Among a total of 59 patients (3:1, male:female ratio; mean age, 25 years), alkaline drain cleaners were the most common cause of chemical burns (75% of all cases). Concerning the remaining cases, causes for such ophthalmic injuries included concentrated sulfuric acid, car battery acid, and topical application of herbs [3–7].

In addition, on focusing on other nations regarding ophthalmic injuries of a chemical nature, approximately 7% of work-related ophthalmic injuries treated in hospital emergency departments in the United States of America are linked to chemical injuries [8].

Concerning the awareness of the Saudi population regarding the risks of chemical-based ophthalmic injuries and the permanent repercussions brought about by such incidents, together with the proper steps and actions that should be taken in such cases, this has unfortunately still a degree of paucity within the state. In addition, it is of great importance to recognize areas of shortcomings by health care workers, in order to provide accurate and non-complex medical facts regarding chemical-based ophthalmic injuries.

Knowledge regarding the proper action in case of a chemical agent injury to the eye is pivotal to promote a safer and healthier population. Consequently, it would be of great benefit to local Saudi Arabian communities such as Asir, to identify any lacunae in knowledge regarding the nature, medical risks and treatments regarding chemical-based ophthalmic injuries.

The aim of this study focused on evaluating the general population's awareness of the immediate responses that are required, following ophthalmic chemical injury incidents within the Asir province of Saudi Arabia. In addition, this study also assessed Asir's community level awareness regarding the danger of chemical exposure to the eyes, what types of chemical injuries can lead to loss of vision, and the role of physician and allied health professionals promoting population awareness regarding the appropriate steps to deal with such perilous injuries. Furthermore, this study also focused on highlighting the population demographic that stands at greater risk of incurring chemical-based ophthalmic injuries throughout their lifetime.

Methodology

This study contained a questionnaire that was randomly published across all segments of population in the Asir province of the Kingdom of Saudi Arabia (KSA), through various social media, entitled as 'The eyes are arguably the most important sensory organ to the human body'.

This investigation lasted a total time span of six months (May – October 2021) and its design was classified as a descriptive cross-sectional survey of the local Asir community. The study cohort consisted of all accessible population members who fulfilled the eligibility criteria (minimum of 380 individuals), who were consequently invited to participate in the study.

Consecutive sampling techniques were applied, in order to match the online data collection methodology, through an online questionnaire, as described hereunder.

Following approval by the ethics committee of King Khalid University (KKU), data was collected using a pre-structured online questionnaire that was developed by researchers following intensive literature searches. The questionnaire design and content was confirmed and finalized by ophthalmology consultants of KKU Ophthalmological Department. The Questionnaire contained items of information-gathering details, medical history of ophthalmic injuries, employment details (medical-related or other), together with awareness items pertaining to the investigation theme. Following termination of individual questionnaires, all were separately uploaded onto social media platforms by the researchers and their relatives. Prior to release of the questionnaire across the entire Asir community, a preliminary pilot study consisting of 25 participants was performed in order to assess questionnaire validity, reliability, applicability and approximate filling in time.

Data analysis

Datasets were extracted, revised, coded, and analyzed through IBM SPSS® version 22 (SPSS, Inc.). All statistical analyses were performed using two tailed tests. P value 0.05 was deemed to be statistically significant. Regarding awareness items, each correct answer scored one point and total summation of discrete scores for differing items was calculated. A patient with a score < 60% (0-11 points) of the total score was considered to have poor awareness, while good awareness was considered if they had a score of 60% (12 points or more) of the total or above. Descriptive analysis based on frequency and percent distribution was performed for all variables, including participant socio-demographic data, family and personal history of chemical injury, and job title. Furthermore, participant awareness regarding chemical-based eye injury, risk factors, causative substances, and management methods were demonstrated within frequency tables. Cross-tabulation was used to assess distribution of public awareness level regarding chemical eye injury, according to their personal data and job title. Correlations were probed using Pearson chi-square test and exact probability test for small frequency distributions.

Results

A total of 600 participants fulfilling the inclusion criteria successfully completed the study questionnaire (Table 1). Participants' ages ranged from 18 to 64 years, with mean age of 28.6 ± 12.7 years old. Among this cohort, 381 (63.5%) participants were males and 441 (73.5%) had a tertiary educational level, while 23 (3.8%) had pre-secondary educational level. Regarding monthly income, 56.5% had a monthly income < 5000 SR while 23.5% had an income > 9000 SR. Concerning participant employment details, 255 (42.5%) were students, 260 (43.3%) were non-health care workers, and 70 (11.7%) were health care workers. Among this cohort, 151 (25.2%) participants reported that they have a relative who was exposed to direct injury with a chemical substance.

Tables 2 & 3 depict awareness regarding chemical-based eye injury among participants within the Asir region, KSA. Among this cohort, 98.2% of the participants had prior knowledge that chemicals can cause eye damage and 91.7% correctly knew that substances that can cause eye damage include chlorine and detergents. In addition, 84.2% know that chemical eye injury can causes blindness due to eye perforation (53.3%) or scarring (51.3%). Regarding management of chemical-based ophthalmic injuries, 72.8% correctly reported that eye washing with large volumes of water, with 77.7% correctly knowing that only water should be used, regardless of the causative substance that provoked the chemical injury. Regarding eye washing time, only 6.3% knew it should be for 30 minutes or more. Regarding the mechanism of eye washing, 29% correctly reported that it should be performed by passing water from the middle part of the face to the tip of the eye. Additionally, 23% correctly knew that the level of pain does not correlate to the severity of the injury. Conversely, 85.7% agreed that rubbing the eye post-exposure to a chemical exacerbates ophthalmic damage, while 35.2% reported corneal opacity as the most dangerous sign. Wearing contact lenses as a protective measure was refused by 65.3% of the participants and only 11.8% reported that in eventualities where the eye is exposed to a chemical substance, one should keep wearing contact lenses. In addition, 92.7% agreed that after handling chemicals, they should wash their hands prior to touching the eyes.

Figure 1 depicts the overall population awareness regarding chemical eye injury within the Asir region, KSA. Among this cohort, 288 (48%) had good awareness level regarding chemical eye injury and its management, while 312 (52%) had poor awareness.

Table 4 highlights the distribution of overall awareness regarding chemical-based eye injury among participants, according to personal data, within the Asir region, KSA. Good awareness level was detected among 51.5% of younger participants (18-30 years), compared to 33% of middle-aged participants, with recorded statistical significance (P=.006). In addition, 61.4% of health care workers had a good awareness level regarding chemical eye injury, in comparison to 37.3% of non-health care workers (P=.001). Additional factors were not statistically proven to be associated with participants' levels of awareness.

Table 1. Socio-demographic data of study participants, Asir region, Saudi Arabia

Socio-demographic data	No	%
Age in years		
18-30	421	70.2%
31-40	88	14.7%
> 40	91	15.2%
Gender		
Male	381	63.5%
Female	219	36.5%
Education		
Below secondary	23	3.8%
Secondary	136	22.7%
Tertiary / above	441	73.5%
Income		
< 5000 SR	339	56.5%
5000-9000 SR	120	20.0%
> 9000 SR	141	23.5%
Job		
Unemployed	15	2.5%
Student	255	42.5%
Non-health care worker	260	43.3%
Health care worker	70	11.7%
Have you or any of your relatives been exposed to direct injury with a chemical substance?		
Yes	151	25.2%
No	449	74.8%

Table 2. Awareness regarding chemical-based eye injury among participants, Asir region, Saudi Arabia

Awareness items		No	%
Chemicals can cause eye damage?	Agree	589	98.2%
	Disagree	3	.5%
	Don't know	8	1.3%
Damage that can result from the ocular chemical injury?	Eye perforation	320	53.3%
	Eye scarring	308	51.3%
	Blindness	505	84.2%
	Keratoconus	158	26.3%
	Cataract	186	31.0%
	Eye cancer	181	30.2%
Which of the following substances can **cause eye damage?**	Chlorine and detergents	550	91.7%
	Car battery materials	520	86.7%
	Vinegar	290	48.3%
	Water	15	2.5%
What is your first step in dealing with eye exposure to a chemical?	Eye wash with a large amount of water.	437	72.8%
	Eye wash with a little amount of water.	14	2.3%
	Go to ER	130	21.7%
	Cover eye	8	1.3%
	Go to the pharmacy and take eye drops	11	1.8%
What material will you use to deal with the injury?	Water at any case	466	77.7%
	Alkaline substance if the injury is an acidic substance	14	2.3%
	An acidic substance if the injury is alkaline	24	4.0%
	Don't know	96	16.0%
The method of dealing with injury **differs according to the causing substance?**	Disagree	77	12.8%
	Agree	406	67.7%
	Don't know	117	19.5%
How long is the appropriate period of eye wash?	30 minutes or more	38	6.3%
	5-15 minutes	283	47.2%
	<5 minutes	160	26.7%
	Don't know	119	19.8%

Table 3. Awareness regarding chemical-based eye injury among participants, Asir region, Saudi Arabia, continued

Awareness items, continued		No	%
What is the appropriate way to wash the eye?	Pass the water from the middle part of the face to the tip of the eye.	174	29.0%
	Pass the water from the side of the eye to the middle part of the face	100	16.7%
	Put water in a cup and cover the eye with it	149	24.8%
	Don't know	177	29.5%
The level of pain indicates the severity of the injury?	Disagree	138	23.0%
	Agree	351	58.5%
	Don't know	111	18.5%
Rubbing the eye after exposure to a chemical increases the damage?	Yes	514	85.7%
	No	12	2.0%
	Don't know	74	12.3%
Which of the following signs is more dangerous?	Corneal opacity	211	35.2%
	Severe eye pain	175	29.2%
	Eye redness	55	9.2%
	Eyelid adhesion	159	26.5%
Wearing contact lenses during chemical injury protects eye?	Disagree	392	65.3%
	Agree	97	16.2%
	Don't know	111	18.5%
In case the eye is exposed to a chemical substance you should?	Keep contact lenses	71	11.8%
	Remove contact lenses	376	62.7%
	Don't know	153	25.5%
Do you think that wearing protective glasses helps reduce the incidence of eye chemical injury?	Agree	517	86.2%
	Disagree	34	5.7%
	Don't know	49	8.2%
After handling chemicals, should you wash your hands before touching the eyes?	Agree	556	92.7%
	Disagree	10	1.7%
	Don't know	34	5.7%

Figure 1. Overall population awareness regarding chemical eye injuries in Asir region, KSA.

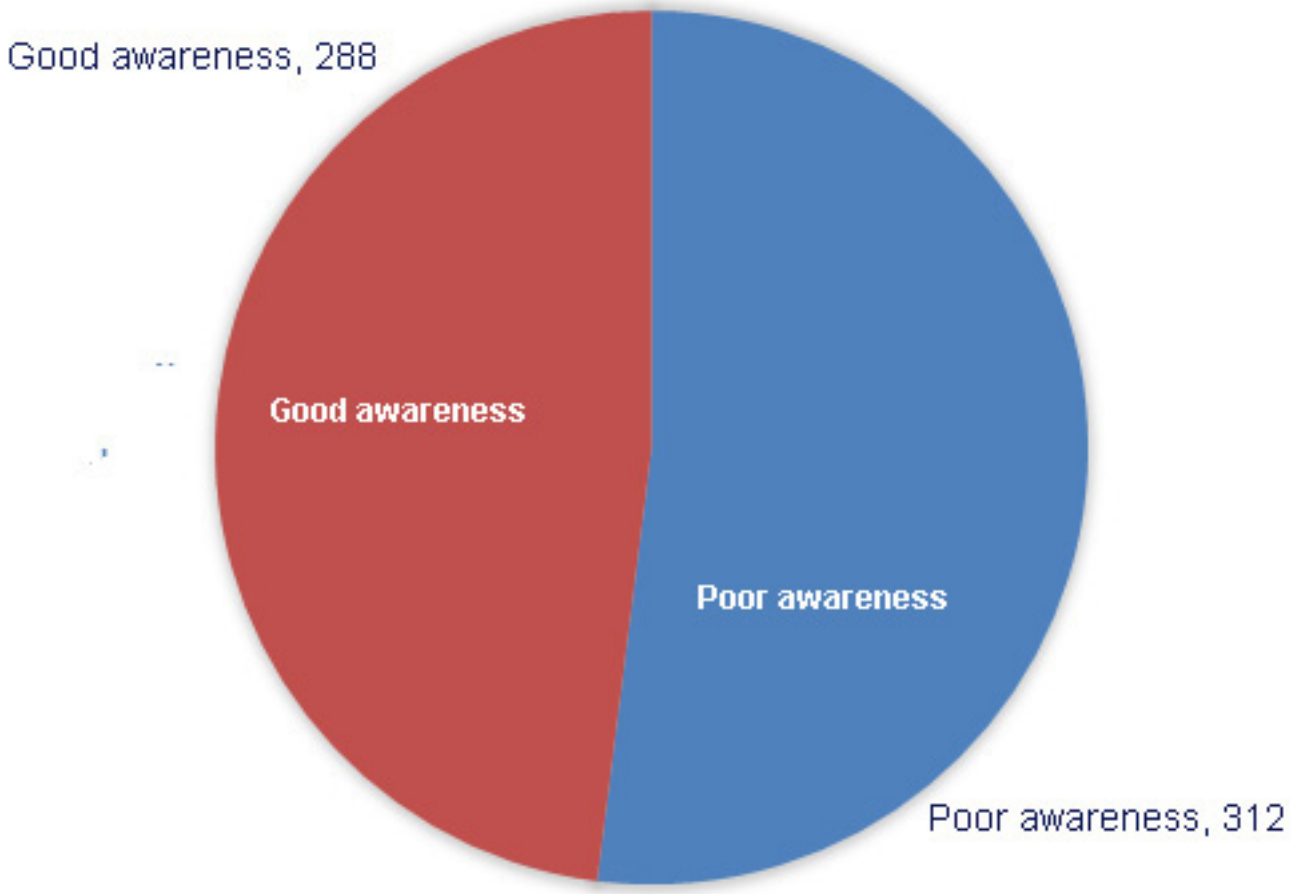

Table 4. Distribution of overall awareness regarding chemical-based eye injury among participants by their personal data, Asir region, Saudi Arabia

Personal data	Overall awareness level				p-value
	Poor (0-11)		Good (12-19)		
	No	%	No	%	
Age in years					
18-30	204	48.5%	217	51.5%	.006*
31-40	59	67.0%	29	33.0%	
> 40	49	53.8%	42	46.2%	
Gender					
Male	200	52.5%	181	47.5%	.750
Female	112	51.1%	107	48.9%	
Education					
Below secondary	13	56.5%	10	43.5%	.158
Secondary	80	58.8%	56	41.2%	
University / above	219	49.7%	222	50.3%	
Income					
< 5000 SR	166	49.0%	173	51.0%	.114
5000-9000 SR	72	60.0%	48	40.0%	
> 9000 SR	74	52.5%	67	47.5%	
Job					
Not working	7	46.7%	8	53.3%	.001*
Student	115	45.1%	140	54.9%	
Non-health care worker	163	62.7%	97	37.3%	
Health care worker	27	38.6%	43	61.4%	
Have you or any of your relatives been exposed to direct injury with a chemical substance?					.922
Yes	78	51.7%	73	48.3%	
No	234	52.1%	215	47.9%	

Discussion

Vision is one of the most important human senses. Loss of vision from chemical injury can consequently greatly affect the quality of life. This study focused on assessing the knowledge of immediate corrective action in cases of chemical eye injury, among individuals residing within the Asir region of KSA, in order to reduce the incidence of ocular injuries and related complications through increased awareness.

Other studies and meta-analyses have also investigated ophthalmic injuries among varying population cohorts and working environments within other nations. The systematic review and meta-analysis carried out by Nowrouzi-Kia and colleagues identified and scrutinized 12 investigations having quantitative Critical Appraisal Skills Program (CASP) scorings on eye injuries occurring as an occupational hazard [9]. This investigation focused on four major factors leading to eye injuries at the place of work, namely the utilization (or otherwise) of protective equipment for the eyes, being of male gender, occupational-linked exposures to chemical / biological hazards for the eyes and risk behavior (i.e. health and safety breaches) [9]. The outcomes of this investigation highlighted that variations in health and safety risk-taking procedures across nations and nature of occupation were the major factors in affecting such CASP scorings and suggested employers ascertain availability of all the necessary protective equipment for members of staff who are typically exposed to chemical hazards for ocular injuries in their line of work [9].

Interestingly, the systematic review performed by Chau and colleagues focused solely on awareness and clinical effectiveness of eye irrigation techniques for managing emergency ocular chemical burns within adult and pediatric cases across multiple quasi-/randomized controlled trials / observational investigations on this theme of research [10]. Overall, four studies carried out on 302 adults and pediatric cases with ocular chemical burns were scrutinized as part of this investigation, with one of the dataset outcomes demonstrating that techniques such as extended water irrigation of the eyes post-injury distinctly led to reduced hospitalizations and absence from the place of work [10].

Furthermore, the comprehensive study conducted by Jovanovic and colleagues focused on the demographic parameters typically linked to poor visual outcomes following eye injuries, due to mechanical / chemical or physical causes, across 298 clinical cases of hospitalizations within Bosnia and Herzegovina during 2006 – 2014 [11]. One of the major conclusions of this study suggested that patients of age > 36 years had increased risk of developing reduced visual faculties post-injury [11].

Within our specific investigation, participants were asked whether chemical substances can cause eye complications, whereby we found that 98.2% of participants agreed with this statement. This is consistent with the findings of another study conducted among the Saudi community, whereby 88.3% of study participants agreed that chemicals could induce ophthalmic injuries [3]. Other findings from our study highlighted a 48% overall good population awareness regarding chemical eye injury and its management within the Asir region of KSA. Specifically, 51.5% of this cohort who had good awareness levels for chemical ocular injuries were younger participants (18-30 years), in comparison to the middle-aged and elderly participant groups. This finding corroborates with previous outcomes from other studies that demonstrated elderly populations to have reduced perceptions of such risks and were therefore more prone to suffer such injuries [11]. In addition, 61.4% of health care workers had good awareness level regarding chemical eye injury, in comparison to 37.3% of non-health care workers. This is most possibly due to the fact that most employers ensure that such staff members who are at increased risk of chemical ocular injuries participate within induction / regular training sessions delivered by appropriate health and safety experts within their line of industry, thereby promoting prior knowledge and awareness due to the specific nature of the individual employment daily tasks and responsibilities. Lacunas in knowledge regarding the immediate removal of contact lenses in such emergency events, was also not a major cause for concern within the Asir population.

Conclusions

The eye is one of the most important organs in the body and chemical eye injuries can rapidly lead to loss of vision - having a sudden life-changing detriment in quality of life. This investigation revealed that individuals in the Asir population need greater awareness regarding the immediate steps of management in cases of ocular chemical eye injuries. Furthermore, there is a need to establish that the only solution used to irrigate the eye is water, with emphasis on the eye washing/flushing technique commencing from the central facial area towards the tip of the eye. Rubbing of the eye after chemical exposure will increase the damage and keeping contact lens after chemical exposure should be done. These results should be evaluated by the ministry of health and the appropriate actions should be made such as health awareness campaigns regarding ocular chemical injuries and immediate corrective actions, in order to improve knowledge and to create a healthier society.

References

1. Belkin, M. Ocular War Injuries in the Yom Kippur War. J Ocul Ther Surg. 1983, 40–49.
2. Kuckelkorn, R.; Makropoulos, W.; Kottek, A.; Reim, M. Retrospective study of severe alkali burns of the eyes. Klin Monbl Augenheilkd 1993, 203, 397–402, doi:10.1055/s-2008-1045695.
3. Pitkanen, J.; Al-Qattan, M.M. Epidemiology of Domestic Chemical Burns in Saudi Arabia. Burns 2001, 27, 376–378, doi:10.1016/s0305-4179(00)00126-1.
4. Merle, H.; Gérard, M.; Schrage, N. [Ocular burns]. J Fr Ophtalmol 2008, 31, 723–734, doi:10.1016/s0181-5512(08)74391-2.
5. Singh, P.; Tyagi, M.; Kumar, Y.; Gupta, K.K.; Sharma, P.D. Ocular Chemical Injuries and Their Management. Oman J Ophthalmol 2013, 6, 83–86, doi:10.4103/0974-620X.116624.
6. Pargament, J.M.; Armenia, J.; Nerad, J.A. Physical and Chemical Injuries to Eyes and Eyelids. Clin Dermatol 2015, 33, 234–237, doi:10.1016/j.clindermatol.2014.10.015.
7. Hemmati, H.; Colby, K. Treating Acute Chemical Injuries of the Cornea.; 2012;
8. Xiang, H.; Stallones, L.; Chen, G.; Smith, G.A. Work-Related Eye Injuries Treated in Hospital Emergency Departments in the US. Am J Ind Med 2005, 48, 57–62, doi:10.1002/ajim.20179.
9. Nowrouzi-Kia, B.; Nadesar, N.; Sun, Y.; Gohar, B.; Casole, J.; Nowrouzi-Kia, B. Types of Ocular Injury and Their Antecedent Factors: A Systematic Review and Meta-Analysis. Am J Ind Med 2020, 63, 589–599, doi:10.1002/ajim.23117.
10. Chau, J.P.; Lee, D.T.; Lo, S.H. Eye Irrigation for Patients with Ocular Chemical Burns: A Systematic Review. JBI Libr Syst Rev 2010, 8, 470–519, doi:10.11124/01938924-201008120-00001.
11. Jovanovic, N.; Peek-Asa, C.; Young, T.; Nisic, F.; Musa, S. Eye Injury and Demographic Parameters Associated with Poor Visual Outcome Lésion Oculaire et Paramètres Démographiques Associés à Un Faible Résultat Visuel. J Fr Ophtalmol 2019, 42, 864–873, doi:10.1016/j.jfo.2019.03.018.

Relationship Between Early Onset Type 2 Diabetes Mellitus And Late-Night Dinner Along With Skipping Breakfast In AL Madinah, Saudi Arabia: Case Control Study

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Abstract

The aim of this study is to detect the magnitude of bad nutritional habits and assess the strength of association between T2DM and late-night dinner and skipping breakfast in Medina, Saudi Arabia.

Methods: A case control study was conducted at Diabetic centre and PHC centres. The cases were Early-onset T2DM (30–45 years of age). A self-administered questionnaire consisted of three parts including socio-demographic information, eating behaviors and questions focusing on DM. Data were analyzed by using SPSS version 28 statistical package software.

Results: A total 47 cases with diabetes mellitus type 2 and 188 controls were included. Cases were more prone to be obese with median BMI 30.5. Overall, 74.5% of cases were reported to be physically inactive. 72.4% of cases were skipping breakfast weekly as compared to 65% of controls [p-value 0.015]. Smoking, frequency of exercise, BMI and frequency of eating of fast food were found to be significant risk factors for developing T2DM with OR 4.0, 3.6, 5.5 and 2.0 respectively.

Conclusions: Our data confirmed that skipping breakfast and late-night dinner were prevalent, and many risk factors associated with diabetes mellitus have been identified. Therefore, we recommend introducing health education programs to address misconceptions towards prevention and better control of diabetes mellitus.

Keywords: Diabetes mellitus type 2, skipping breakfast, late-night dinner.

Introduction

Diabetes mellitus (DM) is rapidly becoming one of the main health issues in the 21st century and the number of patients is steadily increasing, both in the developed and developing countries.

The World Health Organization (WHO) has reported that Saudi Arabia ranks the second highest in the Middle East and is seventh in the world for the rate of diabetes(1). T2DM is the most common form of DM, which accounts for 90% to 95% of all diabetic patients and according to the IDF, adult diabetes prevalence in Saudi Arabia is 18.3%(2,3).

Although there are a variety of factors affecting the development of type 2 diabetes, lifestyle habits typically associated with urbanization are likely the most important ones.(4).

Ending dinner early and fasting until breakfast provides an ample opportunity for the body to "run low" on glucose and glycogen and begin to metabolize a larger percent of stored body fat (5).

There is lack of evidence-based recommendations regarding eating habits (timing, quantity, energy content, and frequency) in adults in most nutritional guidelines (6). In a study conducted in October 2013, they found breakfast skipping was significantly associated with higher HbA1C values, even after adjusting for age, sex, race, BMI, and percentage of daily caloric intake at dinner. An additional study in Japan also found such has been suspected as a risk factor for type 2 diabetes, but the associations are not entirely consistent across ethnicities or sexes(7,8) .

Rong et al's study reported that skipping breakfast was significantly associated with the risk of cardiovascular mortality(9). So, improved understanding of the impact of skipping breakfast on the onset of diabetes may help to inform guideline development and public health interventions.

We hypothesized that late night dinner and skipping breakfast has an association with increased risk of T2DM. This association is well studied overall though but there is little published data available on the Saudi population. Thus, we conducted this case control study to detect the magnitude of these bad nutritional habits and to assess the strength of association between T2DM and late-night dinner and skipping breakfast.

Subjects and Methods

Study Design and Setting
A case control study was carried out in Madinah, Saudi Arabia from 5/2021 to 2/2022

The cases were Early-onset T2DM (30–45 years of age), selected from the Diabetic centre and PHC centres; we chose this age group to control the effect of aging and genetic causes of T2DM.

The controls were group matched with cases as 4:1 ratio.

Selection of cases
The inclusion criteria were adults with type 2 diabetes, aged between 30-45, non-insulin dependent diabetes mellitus, or late-onset diabetes (above 45 years old).

The exclusion criteria were patients with type 1 diabetes, impaired glucose tolerance, metabolic syndrome, maturity onset diabetes of youth, and gestational diabetes and new onset diabetes after organ transplant.

Sample size was calculated by Epi info, with 95% confidence interval and 80% power. The proportion of controls with exposure was 35. The total sample size was calculated as 235 participants and 47 of them were cases.

Data Collection Tools and Instruments
The data was collected by using a self-administered semi-structured questionnaire which included two parts:
Part I: questions on socio-demographic information such as age, gender, smoking status, BMI, exercise status, and doing exercise 3 to 4 times per week was considered regular physical activity.
Part II: The UK Diabetes and Diet Questionnaire was used, which focuses on three eating behaviors (having a bedtime snack, having a late dinner, and skipping breakfast) over the last six months and was assessed. Having bedtime snacks at least three times per week was considered positive. Having dinner within 2 hours before bedtime at least three times per week was considered a late dinner and skipping breakfast at least three times per week was considered skipping breakfast.
Part III: questions focusing on DM, as type of diabetes, how long they had been diagnosed with diabetes, using insulin and so on.

Pilot study:
Before the start of the study, the semi-structured questionnaires were pre-tested on 10 patients to explore if there was any ambiguity or items leading to misunderstanding in order for the questionnaire to reach its current final form. The findings of the pilot study were not included in the final analysis.

Statistical Analysis
Data was coded, entered, and analyzed using the Statistical Package for Social Science (SPSS) version 28.0 (SPSS, Chicago, IL, USA). We calculated odds ratios using unconditional logistic regression. Chi square and t-test were used to compare between categorical and continuous variables, respectively. Statistical significance was taken as <0.05.

Ethical considerations:
Official permission was obtained from the scientific ethical committee of the Ministry of Health. Informed consent was obtained from all the participants after describing the aim of the study. Privacy and confidentiality was duly assured.

Results

Cases were found to be significantly older (P=0.02) than controls, but they were equally distributed regarding gender. We found that 38.3% of cases were smokers as compared to only 15.4% of controls with p<0.001. Cases were more prone to be obese with median BMI 30.5 in contrast to BMI of controls which was in the range of overweight (median 26.6) and which was still considered as a risk for developing T2DM.

Overall 74.5% of cases were reported to be physically inactive in comparison to 55.3% of controls; walking was noted as the main type of physical activity among 71.8% of controls and 57.4% of cases. Both groups were found to have inadequate sleep pattern with no significant difference regarding average night sleep as 80.9% of cases sleep less than 5-6 hours while it was 67% in controls. [See Table 1].

More than one third (38%) of controls were eating snacks usually after dinner as compared to 40.4% of cases with a statistically higher significant (p value 0.001) trend among cases.

Cases and controls usually reported as eating dinner within 3 hours of bedtime, 74.5%, 72.4% respectively.

Regarding breakfast, 72.4 of cases were skipping breakfast weekly while 35% of controls were regularly eating breakfast which is a significant difference (p value 0.015) and those eating breakfast, used to have it within 2 hours of waking up, 53.2%, 56.4% respectively.

Moreover, it was found that controls were more likely to eat dinner before 8 pm and at regular times.

It was noted that both groups had bad dietary habits of not eating enough fruit & vegetables 17%,17.6%, also both groups have a low fibre diet, 63.8%, 54.3% for cases and controls respectively

Both groups do not eat processed meat but cases were more prone to eat fast food than controls ; (61.7%, 42.6% respectively) and the difference was statistically significant (p value 0.01).

It was reported that 78.2% of controls used to drink full fat or skimmed milk compared to 85.1% of cases (p value 0.001).

From Table 2 we noticed of most patients diagnosed with diabetes for more than 6 months 25.6% of them were on diet and exercise only since diagnosis and they did not use medication and most of them, 74.5%, did not complain of any other disease.

Table 3 shows that smoking habit, exercise frequency, BMI and frequency of eating fast food all significantly showed risk factors for developing T2DM with OR 4, 3.6, 5.5 and 2 respectively.

Nonetheless, male gender, eating dinner at a regular time, eating high fibre diet and drinking milk were protective factors, but without any significant difference.

On applying binary logistic regression, 82% of the predictability of the model is confirmed and also Hosmer test verified that with p value of.48. For every one unit increase in smoking status, exercise and BMI, the logit is increased significantly to 142%, 123% and 143% respectively, while Fast food consumption per unit increase lead to 41% increase in the logit of being diabetic.

Table 1: Characteristics of Cases and Control

Variables	Case (N=47)	Control (N=188)	P value
Age	40(36-44)*	37(34-41)*	0.026
Gender			0.89
Male	23(48.9%)	94(50%)	
Female	24(51.1%)	94(50%)	
Smoking			0.001
Never smoked	19(40.4%)	138(73.4%)	
Quit smoking	10(21.3%)	21(11.2%)	
Light smoker	10(21.3%)	22(11.7%)	
Heavy smoker	8(17%)	7(3.7%)	
Nationality			0.67
Saudi	45(95.7%)	177(94.1%)	
Non-Saudi	2(4.3%)	11(5.9%)	
BMI	**30.5(27.5-34.5)	**26.6 (23.8-30.1)	0.001
Exercise Frequency			0.001
3 to 4 times per week	5 (10.6%)	47(25%)	
1 to 2 times per week	7(14.9%)	57(30.3%)	
1 to 2 times per month	14(29.8%)	47(25%)	
Not at all	21(44.7%)	37(19.7%)	
Exercise Type			0.03
walking	27(57.4%)	135(71.8%)	
jogging	3(1.6%)	3(1.6%)	
yoga	0	2(1.1%)	
strengthening exercise	1(2.1%)	13(6.9%)	
not at all	16(34%)	35(18.9%)	
Average daily night sleep			
less than 5 hours	24(51.1%)	67(35.6%)	0.177
5 to 6 hours	14(29.8%)	59(31.4%)	
6 to 7 hours	5(10.6%)	37(19.7%)	
7 to 8 hours	4(8.5%)	16(8.5%)	
More than 8 hours	0	9(4.8%)	
Eating snack after dinner			0.001
1-2 times per week	5(10.6%)	42(22.3%)	
≥ 3 times per week	14(29.8%)	30(16%)	
Rarely	11(23.4%)	82(43.6%)	
Not at all	17(36.2%)	34(18.1%)	
Eating dinner within 3 hours before bedtime			0.066
1-2 times per week	6(12.8%)	52(27.7%)	
≥ 3 times per week	29(61.7%)	84(44.7%)	
Rarely	8(17%)	43(22.9%)	
Not at all	4(8.5%)	9(4.8%)	
Skipping breakfast in last 3 months			0.015
1-2 times per week	6(12.8%)	39(20.7%)	
≥ 3 times per week	28(59.6%)	83(44%)	
Rarely	2(4.3)	38(20%)	
Not at all	11(23.4%)	28(15%)	

Table 1: Characteristics of Cases and Control (continued)

Eating breakfast within about 2 hours of waking			0.69
Yes	25(53.2%)	106(56.4%)	
No	22(46.8%)	82(43.6%)	
Eating dinner usually before 8 p.m.			0.29
Yes	7(14.9%)	42(22%)	
No	40(85%)	146(77.7%)	
Eating dinner regularly at same time			0.41
Yes	14(29.8%)	45(23.9%)	
No	33(70.2%)	143(76.1%)	
Frequency of eating a vegetables & fruit			0.88
Never or very rarely	2(4.3%)	19(10%)	
Once a week or less	21(44.7%)	75(39.9%)	
2-4 times a week	16(34%)	61(32.4%)	
5 - 6 times a week	3(6.4%)	14(7.4%)	
1 - 2 times a day	4(8.5%)	16(8.5%)	
3 or more times a day	1(2.1%)	3(1.6%)	
Frequency of eating higher fibre breads, brown rice or wholegrain pasta / noodles			0.74
Never or very rarely	16(34%)	57(30.3%)	
Once a week or less	14(29.8%)	45(23.9%)	
2-4 times a week	7(14.9%)	37(19.7%)	
5 - 6 times a week	4(8.5%)	22(11.7%)	
1 - 2 times a day	6(12.8%)	22(11.7%)	
3 or more times a day	0	5(2.7%)	
Frequency of eating sweets, chocolate or sugary beverage			0.82
Never or very rarely	1(2.1%)	12(6.4%)	
Once a week or less	10(21.3%)	48(25.5%)	
2-4 times a week	16(34%)	61(32.4%)	
5 - 6 times a week	8(17%)	26(13.8%)	
1 - 2 times a day	10(21.3%)	32(17%)	
3 or more times a day	2(4.3%)	9(4.8%)	
Frequency of eating processed meat			0.57
Never or very rarely	36(76.6%)	153(81.4%)	
Once a week or less often	8(17%)	19(10.1%)	
2-4 times a week	2(4.3%)	6(3.2%)	
5 - 6 times a week	0	4(2.1%)	
1 - 2 times a day	1(2.1%)	6(3.2%)	
3 or more times a day	0	0	
Frequency of eating 'fast foods', crisps, corn chips, full-fat cheese, or butter			0.01
Never or very rarely	2(4.3%)	19(10.1%)	
Once a week or less	16(34%)	89(47.3%)	
2-4 times a week	15(31.9%)	54(28.7%)	
5 - 6 times a week	4(8.5%)	13(6.9%)	
1 - 2 times a day	10(21.3%)	10(5.3%)	
3 or more times a day	0	3(1.5%)	

Table 1: Characteristics of Cases and Control (continued)

Type of milk they drink			0.001
Full fat	31(66%)	136(72.3%)	
Semi-skimmed	9(19.1%)	11(5.9%)	
Skimmed	0	26(13.8%)	
Soya, oat, rice or other nondairy milk or None	7(14.9%)	15(8%)	

Table 2: Clinical profile of Cases

Variables	Cases (N=47)
How long they have had diabetes	
Less than 6 months	9(19.1%)
More than 6-12 months	38(80.9%)
Level of HbA1c	7(6.5-9)
Treatment of diseases at the beginning	
Diet	9(19.1%)
Exercise and diet	7(14.9%)
Hypoglycaemic agent	10(21.3%)
Diet and hypoglycaemic	2(4.3%)
Exercise & diet & hypoglycaemic	19(40.4%)
Treatment of diseases at the beginning	
Diet	6(12.8%)
Exercise and diet	6(12.8%)
Hypoglycaemic agent	12(25.5%)
Diet and hypoglycaemic	9(19.1%)
Exercise & diet & hypoglycaemic	14(29.8%)
Complain of other diseases:	
Dyslipidemia	8(17%)
Hypertension	3(6.4%)
Stroke	0
Kidney Disease	0
DyslipidemiaAnd HTN	1(2.1%)
No Disease	35(74.5%)

Table 3: Association of sociodemographic and eating habits among cases and controls

Variable	Case	Control	OR(95%CI)
Gender			
Male	23(19%)	94(80%)	0.95(0.50- 1.8)
Female	24(20%)	94(80%)	
Smoking			
Yes	28(59.6%)	50(26.6%)	4(2.08 - 7.9)
No	19(40.4%)	138(73.4%)	
BMI			
Overweight	43(91.5%)	124(66%)	5.5(1.9 - 16.1)
Normal	4(8.5%)	64(34%)	
Exercise Frequency			
1 to 2 times per month or less	35(74.5%)	84(44.7%)	3.6(1.7 -7.4)
1 to 4 times per week	12(25.5%)	104(55.3%)	
Average daily night sleep			
Not adequate sleep	24(51.1%)	67(35.6%)	1.9(1 - 3.6)
Adequate sleep	23(48.9%)	121(64.4%)	
Eating snack after dinner			
Yes	19(40.4%)	72(38.3%)	1.1(0.57 - 2)
No	28(59.6%)	116(61.7%)	
Eating dinner within 3 hours before bedtime			
Yes	35(74.5%)	136(72.3%)	1.1(0.5 - 2.3)
No	12(25.5%)	52(27.7%)	
Skipping breakfast in last 3 months			
Yes	34(72.3%)	122(64.9%)	
No	13(27.7%)	66(35.1%)	1.4(0.7 - 2.9)
Eating breakfast within about 2 hours of waking			
No	22(46.8%)	82(43.6%)	1.1(0.5 - 2.2)
Yes	25(53.2%)	106(56.4%)	
Eating dinner usually before 8 pm			
No	40(85%)	146(77.7%)	1.6(0.7 - 4)
Yes	7(15%)	42(22%)	
Eating dinner regularly at same time			
No	33(70.2%)	143(76.1%)	0.7(0.4 -1.5)
Yes	14(29.8%)	45(23.9%)	
Frequency of eating vegetables & fruit			
Less than 2-4 times/week	39(83%)	155(82.4%)	1 (0.44 - 2.4)
More than 5-6 times/week	8(17%)	33(17.6%)	
Frequency of eating higher fibre breads, brown rice or wholegrain pasta / noodles			
Low	30(63.8%)	102(54.3%)	1.5 (0.77 - 2.8)
High	17(36.2%)	86(45.7%)	
Frequency of eating sweets, chocolate, or sugary beverage			
Acceptable	36(76.6%)	128(68.1%)	1.5(0.7 - 3.2)
Not acceptable	11(23.4%)	60(31.9%)	
Frequency of eating processed meat			
Not acceptable	11(23.4%)	35(18.6%)	1.3(0.6 - 2.8)
Acceptable	36(76.6%)	153(81.4%)	

Table 4: Logistic Regression:

Variables	B	S.E.	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Smoking status	1.426	.368	<.001	4.162	2.024	8.556
Exercise frequency	1.236	.394	.002	3.441	1.591	7.443
BMI	1.434	.570	.012	4.194	1.371	12.825
Fast-food consumption	.410	.369	.267	1.507	.731	3.105
Constant	-.391	.333	.240	.677		

Discussion

The primary aim of this study was to detect the magnitude of bad nutritional habit and assess the association between T2DM and late-night dinner and skipping breakfast in Al Madinah city, Saudi Arabia. This study found that obesity, smoking and being physically inactive are risk factors for T2DM, which is similar to studies conducted in Europe(10–12), Korea(13) and also this study found controls are more likely to be overweight which is a risk factor for developing diabetes and they must control their weight and this is similar to the finding of Radzeviciene L(10).

This study found both groups do not have enough sleep which is risk factor for developing T2DM as reported in a previous study(14). Cases are eating more snacks after dinner and this is most probably to overcome a hypoglycaemic episode, but it is not associated with increased risk of T2DM in contrast to finding of Mekary(15) that found this habit associated with increased T2DM.

Also, this study found approximately 2/3 of cases and control have bad nutritional habits such as skipping breakfast, not eating dinner within 3 hours before bedtime and not eating dinner before 8 pm, but it is not associated with increased risk of T2DM, and this is possibly because both groups have this bad habit with similar percentages and notice that people have the wrong idea, and they think if they are skipping breakfast, they will be healthier. While in previous Japanese studies it was found skipping breakfast was positively associated with T2DM incidence, others found skipping breakfast and late-night dinners were associated with poor glycemic control(8,16,17).

This study found eating fast-food was associated with increased risk of T2DM as in a previous study(18) while consuming milk is protective, but it is insignificant. The same result was found by Liu's study and meta-analysis(19,20).

This study is limited by possibility of recall bias, low response rate in newly diagnosed diabetics and most of them deny that they have a disease. However, this study has several strengths. Firstly, our study design was a case control study. Secondly, there is limited study assessing skipping breakfast and late-night dinner in our middle east countries. Thirdly, this study was carried out in a multicenter rather than one center, so it is possible to generalize our results to diabetic patients elsewhere in Saudi Arabia. Fourthly, in this study 82% of variability is explained by logistic model.

In conclusion, this study indicates that there are widespread bad nutritional habits such as skipping breakfast and late night dinner, and numerous risk factors associated with diabetes mellitus have been identified. Therefore, we recommend to increase health education programs directed to the general population and for diabetic patients specifically to improve their knowledge and influence their attitudes to live healthier lives.

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Refernces

1. Abdulaziz Al Dawish, M. et al. Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Current Diabetes Reviews 12, 359–368 (2016).
2. Wu, Y., Ding, Y., Tanaka, Y. & Zhang, W. Risk Factors Contributing to Type 2 Diabetes and Recent Advances in the Treatment and Prevention. International Journal of Medical Sciences 11, 1185–1200 (2014).
3. Diabetes in Saudi Arabia: Prevalence, Prevention, and Progress. (2020), https://saudigazette.com.sa/article/598121, accessed at 13-12-2021
4. Hu, F. B. Globalization of Diabetes: The role of diet, lifestyle, and genes. Diabetes Care 34, 1249–1257 (2011).
5. Kelly, K. P. et al. Eating breakfast and avoiding late-evening snacking sustains lipid oxidation. PLOS Biology 18, e3000622 (2020).
6. Ofori-Asenso, R., Owen, A. J. & Liew, D. Skipping Breakfast and the Risk of Cardiovascular Disease and Death: A Systematic Review of Prospective Cohort Studies in Primary Prevention Settings. Journal of Cardiovascular Development and Disease 6, 30 (2019).
7. Reutrakul, S. et al. The Relationship Between Breakfast Skipping, Chronotype, and Glycemic Control in Type 2 Diabetes. Chronobiology International 31, 64–71 (2014).
8. Uemura, M. et al. Breakfast Skipping is Positively Associated With Incidence of Type 2 Diabetes Mellitus: Evidence From the Aichi Workers’ Cohort Study. Journal of Epidemiology 25, 351–358 (2015).

9. Rong, S. et al. Association of Skipping Breakfast With Cardiovascular and All-Cause Mortality. J Am Coll Cardiol 73, 2025–2032 (2019).
10. Radzeviciene, L. & Ostrauskas, R. Adding salt to meals as a risk factor of type 2 diabetes mellitus: A case-control study. Nutrients 9, (2017).
11. Drogan, D. et al. Untargeted metabolic profiling identifies altered serum metabolites of type 2 diabetes mellitus in a prospective, nested case control study. Clinical Chemistry 61, 487–497 (2015).
12. Hu, F. B. et al. Walking Compared With Vigorous Physical Activity and Risk of Type 2 Diabetes in Women A Prospective Study. https://jamanetwork.com/.
13. Cho, N. H. et al. Cigarette smoking is an independent risk factor for type 2 diabetes: a four-year community-based prospective study. Clinical Endocrinology 71, 679–685 (2009).
14. Yaggi, H. K., Araujo, A. B. & Mckinlay, J. B. Sleep Duration as a Risk Factor for the Development of Type 2 Diabetes. http://diabetesjournals.org/care/article-pdf/29/3/657/593990/zdc00306000657.pdf (2006).
15. Mekary, R. A., Giovannucci, E., Willett, W. C., van Dam, R. M. & Hu, F. B. Eating patterns and type 2 diabetes risk in men: breakfast omission, eating frequency, and snacking. The American Journal of Clinical Nutrition 95, 1182–1189 (2012).
16. Azami, Y. et al. Long working hours and skipping breakfast concomitant with late evening meals are associated with suboptimal glycemic control among young male Japanese patients with type 2 diabetes. Journal of Diabetes Investigation 10, 73–83 (2019).
17. Sakai, R. et al. Late-night-dinner is associated with poor glycemic control in people with type 2 diabetes: The KAMOGAWA-DM cohort study. Endocrine Journal 65, 395–402 (2018).
18. Polsky, J. Y., Moineddin, R., Glazier, R. H., Dunn, J. R. & Booth, G. L. Relative and absolute availability of fast-food restaurants in relation to the development of diabetes: A population-based cohort study. Canadian Journal of Public Health 107, eS27–eS33 (2016).
19. Liu, S. et al. A Prospective Study of Dairy Intake and the Risk of Type 2 Diabetes in Women. Diabetes Care 29, 1579–1584 (2006).
20. Tong, X., Dong, J.-Y., Wu, Z.-W., Li, W. & Qin, L.-Q. Dairy consumption and risk of type 2 diabetes mellitus: a meta-analysis of cohort studies. European Journal of Clinical Nutrition 65, 1027–1031 (2011).

Acceptance of a COVID-19 vaccine and its related determinants among the general adult population in Jeddah, Saudi Arabia

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is a global pandemic caused by a highly infectious respiratory virus (SARS-CoV-2). With all the consequences that threaten the health of the individual and society due to this infection, it has become necessary to have a vaccination that limits the spread of this virus.

Objectives: To assess the acceptance of COVID-19 vaccines in Saudi Arabians and to uncover the barriers associated with vaccination.

Method: This was a cross-sectional study of 518 subjects, who gave their responses through an online Google form. Data were analyzed using SPSS software version 23. The level of significance was 0.05%.

Results: The vaccine acceptance rate was 68.7%; it was significantly more common among people in Makkah city, among those with high income, and those with relatives who had the COVID-19 infection. The majority of those who accepted the vaccine were advised by health care workers ($p < 0.05$). Sound knowledge, attitude and practice were significantly behind increased acceptance of the vaccination against COVID-19 infection. Health care workers have a significant role in convincing people to accept the vaccine. Web sites and smartphones are important channels to increase the acceptance of the population.

Conclusions: About one-third of the population did not accept the vaccine, particularly, those with low income. Increasing the knowledge of the people about the clinical aspects, and health impact of the virus of COVID-19 on the community are important intervention tools to increase the acceptance rate of COVID-19 vaccination among the population.

Keywords: COVID-19, KAP, clinical aspects and acceptance of COVID-19 infection.

Introduction

Coronavirus disease 2019 (COVID-19) is a global pandemic caused by a highly infectious respiratory virus (SARS-CoV-2). (1) In the spring of 2020, governments worldwide implemented precautionary measures, such as social distancing, quarantine, and mask-wearing, to control the spread of the disease (2). The COVID-19 pandemic led to more than 108 million confirmed cases of COVID-19 and over one million deaths around the world (3, 4). In the Kingdom, COVID-19 caused a total of 341,495 laboratory-confirmed cases with 5144 deaths (5). COVID-19 can cause a wide range of symptoms, from asymptomatic to mild flu-like symptoms to acute respiratory distress syndrome and death (3-5). COVID-19 has also been linked to long-term lung, cardiac and neurological conditions (6). A systematic review of 53,000 hospitalized patients indicated that 20.2% of COVID-19 cases developed severe disease with a mortality rate of ~3.1% (7). In the elderly and among those with comorbidities, such as cardiovascular disease, chronic kidney disease, and chronic obstructive pulmonary disease, mortality increases significantly (8). Covid-19 also has a negative impact on mental health. In a study conducted in Saudi Arabia during the initial phase of the COVID-19 pandemic, more than 29% of the respondents had moderate-to-severe depression, and 26.6% reported moderate-to-severe anxiety (9). With all these consequences that threaten the health of the individual and society, it has become necessary to have a vaccination that limits the spread of this virus. KSA planned early COVID-19 vaccination to the population as soon as a safe and effective vaccine became available. The same day that the Phase III trial of the Pfizer-BioNTech COVID-19 vaccine was published, the SFDA (Saudi Food and Drug Authority) imparted emergency use authorization to the vaccine. On December 16, 2020, KSA received its first two shipments of BNT162b2 then it immediately started free of charge campaigns to vaccinate KSA populations (10). KSA planned a phased approach vaccination program. The initial phase targeted the most vulnerable group as healthcare workers (HCWs), people with comorbid diseases, and the elderly. The second and third phases targeted all populations, to vaccinate at least 70% (11).

Any vaccination program's success is determined by the percentage of the population that are willing to be vaccinated. Vaccine hesitancy (delay in acceptance or refusal of vaccination) is a complex issue and the factors influencing this condition are highly variable across populations. Vaccine hesitancy has been linked to several factors, including the vaccine's side effects, misconceptions about the need for vaccination, a lack of trust in the health system and the vaccine's safety and efficacy (12). The percentage of the general populations' COVID-19 acceptance varied from one research to another. Only 45 percent of 3,100 people in a study conducted among the Saudi population said they would be willing to have the COVID-19 vaccine (13). Another public survey in Saudi Arabia with almost 1000 participants showed a 65% acceptance rate (14). In A recent national cross-sectional survey in KSA of 1512 HCWs, 70% were willing to receive a COVID-19 vaccine (15). In another cross-sectional study of 673 HCWs in KSA, 50.52 % said they would be willing to get the COVID-19 vaccination, with 49.71% saying they would get it as soon as it became available in the country and 50.29% saying they would wait until the vaccine's safety is confirmed (16).

Many factors have affected vaccine acceptability, for example, gender differences. Male gender was a positive predictor for acceptance of COVID-19 vaccination (17, 18). A study reported that those aged 45 years and above, and being married, are more likely to accept the COVID-19 vaccine than their counterparts (14). Another study demonstrated that younger participants tended to be more accepting of vaccination in contrast with older participants (19). One of the strongest factors of vaccine acceptability was whether participants thought their healthcare provider would recommend they get vaccinated against COVID-19 or not (20). Another important factor was that people who thought they were at a higher risk of catching COVID-19 were more willing to accept the vaccine, but only for the 95 percent effective vaccine. A positive attitude toward immunization is linked to a perception of danger or susceptibility to infection (21-23). Adequate vaccine coverage and high vaccine uptake rates in the population are required for COVID-19 immunization to be successful. Recent studies have documented uncertainties regarding the COVID-19 vaccine as a result of the public's mistrust of authority and the presence of scientific illiteracy regarding the virus and phases of development of the vaccine, and misinformation transmitted via social media (24). Thus, this study aimed to assess the acceptance of COVID-19 vaccines in Saudi Arabia and to uncover the barriers associated with vaccination.

Methodology

It was a cross-sectional study; the sampling method was a non-probability convenient one. Data were collected, through an online Google form, on residents of Saudi Arabia. Sample size was determined using G*power software, where $\alpha = 0.05$, Power = 0.95 effect size = 0.3, and degree of freedom= 5 (25). The minimal sample size required was 277 subjects; thus, 518 subjects were enrolled in the present study. Data were collected using a structured questionnaire that provided information on socio-demographic and personal characteristics, and detailed information on COVID-19 infection and vaccination. The questionnaire included questions about COVID-19 infection, and its clinical aspects, its impact on health, life style and the community. It also included questions on the knowledge, attitude and practice (KAP) towards the acceptance of the COVID-19 vaccine for its impact on health and the barriers and fake news about it. The software SPSS (IBM compatible version 23) was used to analyze the data. Chi-square test was used to analyze the data. The level of significance for the present study was 0.05%.

Availability of the data: the raw data is available at the research center of ISNC and all results of the data are included in the paper.

Results

The present study included 518 subjects (67.2% females, while 32.2% were males). The majority of the respondents were aged 18 to 29 years (65.6%), while those older than 64 years were only 1.4%. Those aged 30 to 40, or 50 to 64 years old, were 16.2% and 18.8% respectively. Table 1 shows distribution of the studied subjects by acceptance of COVID-19 vaccination and sociodemographic characteristics and factors affecting it. Gender and nationality were not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine from Makkah region (75%), was higher than those who didn't, from the same region, ($p < 0.05$). Educational level was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine from those having monthly income over 15,000 SR (40.4 %), was higher than those who didn't, where $p < 0.05$. The percentage of subjects who accepted the vaccine from those who have a chronic condition (26.1%), was higher than those who didn't, where $p < 0.05$. The percentage of subjects who accepted the vaccine from people who took the COVID-19 test (64.0%), was higher than those who didn't where $p < 0.05$. Getting COVID-19 infection was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine from people who have relatives infected with COVID-19 (91.9%), was higher than those who didn't where $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think that health care providers will advise them to get the COVID-19 vaccine (96.3%), was higher than those who didn't where $p < 0.05$. Knowledge level about COVID-19 was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$).

Table 2 shows the distribution of studied subjects by acceptance of COVID-19 vaccination and their knowledge about it and factors affecting it. The percentage of subjects who accepted the vaccine from those who believe that COVID-19 in 65 years old subjects is dangerous (88.2%), was higher than those who didn't where $p < 0.05$. The percentage of subjects who accepted the vaccine among those who believe that COVID-19 spread among subjects (98.3%), was higher than those who didn't where $p < 0.05$.

The percentage of subjects who accepted the vaccine from those who don't believe that COVID-19 is caused by the Flu virus (65.4%), was higher than those who didn't where $p < 0.05$. The percentage of subjects who accepted the vaccine from those who don't know if COVID-19 is caused by the Flu virus (22.8%), was higher than those who didn't where $p < 0.05$. The percentage of subjects who accepted the vaccine from those who don't think that COVID-19 always show signs and symptoms of being sick (86.2%), was higher than those who didn't, where $p < 0.05$. The idea that people who get COVID-19 only have mild symptoms was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The idea that people who get COVID-19 will have fever, cough, shortness of breath, runny nose, headache, fatigue, diarrhea, rash on face, blurry vision, earache, and hair loss, was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine among those who believe that COVID-19 can cause muscles or body ache (79.8%), was higher than those who didn't, where $p < 0.05$. The percentage of subjects who accepted the vaccine among those who believe that COVID-19 can cause loss of smell or taste (92.7%), was higher than those who didn't, where $p < 0.05$.

Table 3 shows distribution of studied subjects by Acceptance of COVID-19 Vaccination and knowledge about COVID-19 infection and factors affecting it. The percentage of subjects who accepted the vaccine from those who stated that they can't get the infection again (87.4%), was higher than those who didn't admit that (78.4%), where $p < 0.05$. The amount of information about COVID-19 and sources of information about COVID-19 were not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$).

The percentage of subjects who accepted the vaccine from those who trust national news as a source of information about COVID-19, (42.1%), was significantly higher than those who didn't where the $p < 0.05$. The percentage of subjects who accepted the vaccine from those who received the same information on COVID-19 across different courses, (69.1%), was higher than those who didn't, ($p < 0.05$). The percentage of subjects who accepted the vaccine from those who received a little fake information about COVID-19, (36.2%), was higher than those who didn't ($p < 0.05$).

The percentage of subjects who accepted the vaccine from those who received moderate fake information about COVID-19, (36.8%), was higher than those who didn't $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think that COVID-19 comes from animals, (42.1%), was higher than those who didn't ($p < 0.05$). The percentage of subjects who accepted the vaccine from those who tested to see if they have COVID-19 (61.2%), was higher than those who didn't, t ($p < 0.05$).

Table 4 shows the distribution of studied subjects by Acceptance of COVID-19 Vaccination and knowledge about COVID-19 infection and factors affecting it. The amount of information told by the doctor that you have COVID-19, and a relative diagnosed with COVID-19 was not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$).

The percentage of subjects who accepted the vaccine from those who did not think that they had COVID-19 because of symptoms but they had never tested (74.7%), was higher than those who didn't the $p < 0.05$. The percentage of subjects who accepted the vaccine among those who moderately think that COVID-19 is a threat to physical health (36.5%), was higher than those who didn't the $p < 0.05$. COVID-19 as a threat to mental health and financial safety was not significantly associated with acceptance

of COVID-19 vaccination (p > 0.05). The percentage of subjects who accepted the vaccine from those who had a major thought that COVID-19 is a threat to the health of Saudi Arabia's population (33.1%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine among those who moderately think that COVID-19 is a threat to the local community (42.7%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine among those who majorly think that COVID 19 is a threat to the local community (23.6), was higher than those who didn't the p < 0.05.

Table 5 shows the distribution of studied subjects by Acceptance of COVID-19 Vaccination and Practice and factors affecting it. Fear of getting COVID-19 was not significantly associated with acceptance of COVID-19 vaccination (p > 0.05). The percentage of subjects who accepted the vaccine from those who stated that they worry about friends and family due to COVID-19 (78.4 %), was higher than those who didn't where p < 0.05. Experiencing boredom, frustration, anxiety, depression, sleeping trouble, increased or decreased sexual activity, loneliness, and confusion due to COVID-19 were not significantly associated with acceptance of COVID-19 vaccination (p > 0.05). Table 6 reveals the distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude and factors affecting it. The chance of getting COVID-19 in the future was not significantly associated with acceptance of COVID-19 vaccination (p > 0.05). The percentage of subjects who accepted the vaccine from those who stated that it would be moderately serious if they got COVID-19 (37.1%), was higher than those who didn't and the percentage of subjects who accepted the vaccine from those who stated that it would be very serious if they got COVID-19 (13.5%), was higher than those who didn't the p < 0.05. Needing normal routines instead of worrying about protective behavior was not significantly associated with acceptance of COVID-19 vaccination (p > 0.05). The percentage of subjects who accepted the vaccine from those who strongly agree that It's a crime if people know they have COVID-19 and don't do protective behaviors (78.9%), was higher than those who didn't admit that the p < 0.05. The percentage of subjects who accepted the vaccine among those who strongly agree that people who test positive for COVID-19 should be isolated (84.3%), was higher than those who didn't admit that the p < 0.05. The percentage of subjects who accepted the vaccine from those who stated that they would be willing to get the COVID-19 vaccine if it was free (100.0%), was higher than those who didn't admit that; the p < 0.05. The percentage of subjects who accepted the vaccine from those who stated that Doctors would recommend taking the COVID-19 vaccine (97.5%), was higher than those who didn't admit p < 0.05. The percentage of subjects who accepted the vaccine from those who stated that they disagree with If they decided to get the COVID-19 vaccine it would be hard to find a provider or clinic (32.9%), was higher than those who didn't and the percentage of subjects who accepted the vaccine from those who stated that they strongly disagree with If they decided to get the COVID-19 vaccine it would be hard to find a provider or clinic (24.7%), was higher than those who didn't where p < 0.05.

Table 7 shows the Distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude and factors affecting it. The percentage of subjects who accepted the vaccine from those who strongly agree that the COVID-19 vaccine might have side effects, like fever or soreness in the arm (55.9%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine of those who agree that COVID-19 might have side effects, like fever or soreness in the arm (38.8%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think that COVID-19 vaccine effectiveness is moderate (59.0%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think that COVID-19 vaccine effectiveness is high (27.8%), was higher than those who didn't; the p < 0.05. The percentage of subjects who accepted the vaccine of those who think that age is an important factor to decide whether or not to get the COVID-19 vaccine (14.3%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine of those who think that health history is an important factor to decide whether or not to get the COVID-19 vaccine (28.9%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine according to the vaccines protection period (13.2%), was higher than those who didn't; the p < 0.05. The percentage of subjects who accepted the vaccine from those who think it's extremely important for them that getting the COVID-19 vaccine would protect their health (60.7%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think it's very important for them that getting the COVID-19 vaccine would protect their health (21.1%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think it's extremely important for them that getting the COVID-19 vaccine would protect the health of their relatives (72.8%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think it's very important for them that getting the COVID-19 vaccine would protect the health of their relatives (18.5%), was higher than those who didn't); the p < 0.05.

Table 8 shows the distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude and factors affecting it. The percentage of subjects who accepted the vaccine from those who think it's extremely important for them that getting the COVID-19 vaccine would protect the health of their community (71.3%), was higher than those who didn't the p < 0.05. The percentage of subjects who accepted the vaccine from those who think it's very important for them that getting the COVID-19 vaccine would protect the health of their community (19.7%), was higher than those who didn't (p < 0.05).

The percentage of subjects who accepted the vaccine from those who think that people their age want to receive information about COVID-19 through the website (24.7%), was higher than those who didn't the $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think that people their age want to receive information about COVID-19 through a smartphone app (36.0%), was higher than those who didn't the $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think prevalence is important information about COVID-19 (46.9%), was higher than those who didn't the $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think symptoms are important information about COVID-19 (75.3%), was higher than those who didn't; the $p < 0.05$. The percentage of subjects who accepted the vaccine from those who think transmission mode is important information about COVID-19 (68.3%), was higher than those who didn't the $p < 0.05$. The importance of avoidance information is not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine from those who think how to get tested is important information about COVID-19 (39.0%), was higher than those who didn't the $p < 0.05$. The importance of treatment information is not significantly associated with acceptance of COVID-19 vaccination ($p > 0.05$). The percentage of subjects who accepted the vaccine from those who think that management is important information about COVID-19 (68.8%), was higher than those who didn't; the $p < 0.05$.

Table 1: Distribution of studied subjects according to acceptance of COVID-19 vaccination and sociodemographic characteristics.

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Gender	Male	53	32.7	117	32.9	170	32.8	.001 (.973)
	Female	109	67,3	239	67.1	348	67.2	
Nationality	Saudi	118	72.8	267	75.0	385	74.3	.272 (.602)
	Non-Saudi	44	27.2	89	25.0	133	25.7	
Region of residency	Riyadh	26	16	22	6.2	48	9.3	25.738 (.001)
	Makkah	101	62.3	270	75.8	371	71.6	
	Eastern	21	13.0	22	6.2	43	8.3	
	Madinah	12	7.4	26	7.3	38	7.3	
	Tabuk	0	0.0	6	1.7	6	1.2	
	Aseer	2	1.2	5	1.4	7	1.4	
	Najran	0	0.0	1	0.3	1	0.2	
	Albaha	0	0.0	4	1.1	4	0.8	
Educational Level	< High school	9	5.6	10	2.8	19	3.7	4.537 (.209)
	High school	59	36.4	112	31.5	171	33.0	
	University	73	45.1	174	48.9	247	47.7	
	>University	21	13.0	60	16.9	81	15.6	
Income/ month SR	<5,000	48	29.6	65	18.3	113	21.8	14.118 (.001)
	5,000 -	73	45.1	147	41.3	220	42.5	
	> 15,000	41	25.3	144	40.4	185	35.7	
Chronic condition	Yes	34	21.0	93	26.1	127	24.5	1.587 (.208)
	No	128	79.0	263	73.9	391	75.5	
Tested for COVID-19	Yes	82	50.6	228	64.0	310	59.8	8.354 (.004)
	No	80	49.4	128	36.0	208	40.2	
Diagnosed with COVID-19 infection	Yes	31	19.1	64	18.0	95	18.3	.100 (.752)
	No	131	80.9	292	82.0	423	81.7	
Relatives infected	Yes	136	84.0	327	91.9	463	89.4	7.328 (.007)
	No	26	16.0	29	8.1	55	10.6	
Healthcare providers advice on the COVID-19 vaccine	Yes	125	77.2	343	96.3	468	90.3	47.004 (.000)
	No	37	22.8	13	3.7	50	9.7	
Knowledge level about covid19	None	2	1.2	3	0.8	5	1.0	3.194 (.363)
	A little	13	8.0	31	8.7	44	8.5	
	Moderate	95	58.6	181	5.8	267	53.3	
	A lot	52	32.1	141	39.6	193	37.3	

Table 2: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and their knowledge about it.

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Covid-19 is dangerous in subjects65+years	Yes	128	79.0	314	88.2	442	85.3	9.437 (.009)
	No	18	11.1	16	4.5	34	6.6	
	DN	16	9.9	26	7.3	42	8.1	
Covid-19 is infectious	Yes	148	91.4	350	98.3	498	96.1	22.890 (.000)
	No	10	6.2	0	0.0	10	1.9	
	DN	4	2.5	6	1.7	10	1.9	
COVID-19 is caused by the Flu virus	Yes	35	21.6	42	11.8	77	14.9	8.504 (.014)
	No	93	57.4	233	65.4	326	62.9	
	DN	34	1.0	81	22.8	115	22.2	
COV-19 always showS&S of being sick	Yes	31	19.1	33	9.3	64	12.4	10.637 (.005)
	No	122	75.3	307	86.2	429	82.8	
	DN	9	5.6	16	4.6	25	4.8	
People who get COVID-19 only have mild symptoms	Yes	82	50.6	140	39.3	222	42.9	5.823 (.054)
	No	66	40.7	180	50.6	246	47.5	
	DN	14	8.6	36	10.1	50	9.7	
Fever can beS&S of COVID-19	Yes	146	90.1	316	88.8	462	89.2	.213 (.644)
	No	16	9.9	40	11.2	56	10.8	
Cough can be aSign of COVID-19	Yes	127	78.4	279	78.4	406	78.4	.000 (.995)
	No	35	21.6	77	21.6	112	21.6	
SOB/sore throat can be signs of Covid19	Yes	143	88.3	329	92.4	472	91.1	2.363 (.124)
	No	19	11.7	27	7.6	46	8.9	
A runny nose can be a Sign of COVID-19	Yes	69	42.6	153	43.0	222	42.9	.007 (.0935)
	No	93	57.4	203	57.0	296	57.1	
Muscle pain can be aSign of COVID-19	Yes	111	68.5	284	79.8	395	76.3	7.791 (.005)
	No	51	31.5	72	20.0	123	23.7	
Headaches can be a Sign of COVID-19	Yes	140	86.4	307	86.2	447	68.3	.003 (.955)
	No	22	13.6	49	13.8	71	13.7	
Fatigue can be aSign of COVID-19	Yes	68	42.0	175	49.2	243	46.9	2.306 (.129)
	No	94	58.0	181	50.8	275	53.1	
Diarrhoea can be a Sign of COVID-19	Yes	84	51.9	217	61.0	301	58.1	3.790 (.052)
	No	78	48.1	139	39.0	217	41.9	
Loss of smell/taste is a Sign of Covid-19	Yes	137	84.6	330	92.7	467	90.2	8.288 (.004)
	No	25	15.4	26	7.3	51	9.8	
Rash on the face can be a Sign of COVID-19	Yes	18	11.1	37	10.4	55	10.6	.606 (.806)
	No	144	88.9	319	89.6	463	89.4	
Blurry vision can be a Sign of COVID-19	Yes	10	6.2	28	7.9	38	7.3	.469 (.493)
	No	152	93.8	328	92.1	480	92.7	
Earache is a Sign of Covid-19	Yes	14	8.6	42	11.8	56	10.8	1.150 (.284)
	No	148	91.4	314	88.2	462	89.2	
Hair loss can be aSign of COVID-19	Yes	14	8.6	35	9.8	49	9.5	.184 (.668)
	No	148	91.4	321	90.2	469	90.5	

Table 3: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and knowledge about COVID-19 infection

Variable	categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
COVID-19 after a person has recovered from it	Can't get it again	127	78.4	311	87.4	438	84.6	7.620 (.022)
	Can get it again	18	11.1	19	5.3	37	7.1	
	I don't know	17	10.5	26	7.3	43	8.3	
The amount of information about COVID-19	A little	14	8.6	23	6.5	37	7.1	1.339 (.512)
	A moderate	59	36.4	121	34.0	180	34.7	
	A lot	89	54.9	212	59.6	301	58.1	
Sources from which I received information on COVID-19	Newspaper	0	0.0	1	0.3	1	0.2	1.066 (.957)
	Magazines	1	0.6	2	0.6	3	0.6	
	Radio	19	11.7	44	12.4	63	12.2	
	Local news	17	10.5	31	8.7	48	9.3	
	National news	99	61.1	215	60.4	314	60.6	
	Social media	26	16.0	63	17.7	89	17.2	
Sources you would trust the most for news and information about COVID-19	Magazines	1	0.6	3	0.8	4	0.8	26.331 (.000)
	Radio	2	1.2	5	1.4	7	1.4	
	Local news	16	9.9	67	18.8	83	16.0	
	National news	48	29.6	150	42.1	198	38.2	
	Social media	42	25.9	58	16.3	100	19.3	
	Internet	46	28.4	70	19.7	116	22.4	
	Newspaper	7	4.3	3	0.8	10	1.9	
The information on COVID-19 across different sources	the same	94	58.0	246	69.1	340	65.6	6.056 (.014)
	conflicting	68	42.0	110	30.9	178	34.4	
Fake news about the COVID-19 vaccine	None at all	12	7.4	6	1.7	18	3.5	12.289 (.006)
	A little	54	33.3	129	36.2	183	35.3	
	A moderate	50	30.9	131	36.8	181	34.9	
	A lot	46	28.4	90	25.3	136	26.3	
Information about Covid-19	Came from animals	43	26.5	150	42.1	193	37.3	30.980 (.000)
	Was made on purpose in a lab	101	62.3	131	36.8	232	44.8	
	Made accidentally in a lab	12	7.4	61	17.1	73	14.1	
	Does not exist	6	3.7	14	3.9	20	3.9	
Tested by PCR for COVID-19	Yes	79	48.8	218	61.2	297	57.3	7.078 (.008)
	No	83	51.2	138	38.8	221	42.7	
Places you went to get tested for COVID-19	A drive-thru	52	32.1	139	39.0	191	36.9	3.713 (.156)
	A test was mailed to my home	9	5.6	27	7.6	36	6.9%	
	Other	101	62.3	190	53.4	291	56.2	

Table 4: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and knowledge about COVID-19 infection

Variable	Categories	Acceptance of COVID-19 Vaccination		Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Have been told that you have COVID-19 by a doctor	Yes	23	14.2	46	12.9	69	13.3	.157 (.692)
	No	139	85.8	310	87.1	449	86.7	
Thought you had COVID-19 due to symptoms only	Yes	60	37.0	90	25.3	150	29.0	7.480 (.006)
	No	102	63.0	266	74.7	368	71.0	
Relatives diagnosed with COVID-19	Yes	106	65.4	248	69.7	354	68.3	.921 (.337)
	No	56	34.6	108	30.3	164	31.7	
COVID-19 is a threat to your physical health	Not a threat	43	26.5	51	14.3	94	18.1	16.122 (.001)
	Minor	47	29.0	108	30.3	155	29.9	
	Moderate	37	22.8	130	36.5	167	32.2	
	Major	35	21.6	67	18.8	102	19.7	
COVID-19 is a threat to your mental health	Not a threat	93	57.4	206	57.9	299	57.7	1.472 (.689)
	Minor	37	22.8	71	19.9	108	20.8	
	Moderate	23	14.2	50	14.0	73	14.1	
	Major	9	5.6	29	8.1	38	7.3	
COVID-19 is a threat to the health of Saudi Arabia's population	Not threat	14	8.6	19	5.3	33	6.4	16.642 (.001)
	Minor	47	29.0	62	17.4	109	21.0	
	Moderate	70	43.2	157	44.1	227	43.8	
	Major	31	19.1	118	33.1	149	28.8	
COVID-19 is a threat to your financial safety	Not a threat	45	27.8	106	29.8	151	29.2	2.213 (.529)
	Minor	31	19.1	80	22.5	111	21.4	
	Moderate	45	27.8	99	27.8	144	27.8	
	Major	41	25.3	71	19.9	112	21.6	
COVID-19 is a threat to your local community	Not a threat	30	18.5	41	11.5	71	13.7	14.621 (.002)
	Minor	52	32.1	79	22.2	131	25.3	
	Moderate	57	35.2	152	42.7	209	40.3	
	Major	23	14.2	84	23.6	107	20.7	

Table 5: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and Practice

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Fear of getting COVID-19	Yes	67	41.4	178	50.0	245	47.3	3.336 (.068)
	No	95	58.6	178	50.0	273	52.7	
Worry about friends and family due to COVID-19	Yes	101	62.3	279	78.4	380	73.4	14.630 (.000)
	No	61	37.7	77	21.6	138	26.6	
Experienced Boredom due to COVID-19	Yes	70	43.2	151	42.2	221	42.7	.029 (.865)
	No	92	56.8	205	57.6	297	57.3	
Experienced frustration due to COVID-19	Yes	57	35.2	108	30.3	165	31.9	1.206 (.272)
	No	105	64.8	248	69.7	353	68.1	
Experienced anxiety due to COVID-19	Yes	61	37.7	150	42.1	211	40.7	.926 (.336)
	No	101	62.3	206	57.9	307	59.3	
Experienced depression due to COVID-19	Yes	58	35.8	123	34.6	181	34.9	.077 (.782)
	No	104	64.2	233	65.4	337	65.1	
Experienced sleeping trouble due to COVID-19	Yes	35	21.6	66	18.5	101	19.5	.667 (.414)
	No	127	78.4	290	81.5	417	80.5	
Experienced increased sexual activity due to COVID-19	Yes	6	3.7	10	2.8	16	3.1	.298 (.585)
	No	156	96.3	346	97.2	502	96.9	
Experienced decreased sexual activity due to COVID 19	Yes	6	3.7	20	5.6	26	5.0	.856 (.355)
	No	156	96.3	336	94.4	492	95.0	
Experienced loneliness due to COVID-19	Yes	41	52.3	118	33.1	159	30.7	3.215 (.073)
	No	121	74.7	238	66.9	359	69.3	
Experienced confusion due to COVID-19	Yes	33	20.4	76	21.3	109	21.0	.064 (.800)
	No	129	79.6	280	78.7	409	79.0	

Table 6: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
The chance that you will get COVID-19 in the future	No chance	23	14.2	33	9.3	56	10.8	4.962 (.175)
	A little	94	58.0	198	55.6	292	56.4	
	Moderate	32	19.8	96	27.0	128	24.7	
	High	13	8.0	29	8.1	42	8.1	
It would be serious if you got COVID-19	Not at all	30	18.5	40	11.2	70	13.5	9.267 (.026)
	A little	71	43.8	136	38.2	207	40.0	
	Moderately	44	27.2	132	37.1	176	34.0	
	Very	17	10.5	48	13.5	65	12.5	
We need our normal routines instead of worrying about protective behaviours	Strongly agree	56	34.6	117	32.9	173	33.4	6.996 (.136)
	Agree	38	23.5	56	15.7	94	18.1	
	Not sure	20	12.3	67	18.8	87	16.8	
	Disagree	35	21.6	81	22.8	116	22.4	
	Strongly disagree	13	8.0	35	9.8	48	9.3	
It's a crime if people know they have COVID-19 and don't do protective behaviours.	Strongly agree	83	51.2	281	78.9	364	70.3	50.862 (.000)
	Agree	40	24.7	51	14.3	91	17.6	
	Not sure	18	11.1	17	4.8	35	6.8	
	Disagree	12	7.4	3	0.8	15	2.9	
	Strongly disagree	9	5.6	4	1.1	13	2.5	
People who test positive for COVID-19 should be isolated	Strongly agree	91	56.2	300	84.3	391	75.5	58.988 (.000)
	Agree	48	29.6	50	14.0	98	18.9	
	Not sure	11	6.8	5	1.4	16	3.1	
	Disagree	10	6.2	1	0.3	11	2.1	
	Strongly disagree	2	1.2	0	0.0	2	0.4	
You're willing to get the COVID-19 vaccine if it was free	Definitely	0	0.0	356	100.0	356	68.7	518.000 (.000)
	Probably	44	27.2	0	0.0	44	8.5	
	Not sure	40	24.7	0	0.0	40	7.7	
	Probably not	29	17.9	0	0.0	29	5.6	
	Not	49	30.2	0	0.0	49	9.5	
Doctors would recommend taking the COVID-19 vaccine	YES	120	74.1	347	97.5	467	90.2	68.669 (.000)
	NO	42	25.9	9	2.5	51	9.8	
If I decided to get the COVID-19 vaccine, it would be hard to find a provider or clinic	Strongly agree	16	9.9	33	9.3	49	9.5	15.175 (.004)
	Agree	27	16.7	37	10.4	64	12.4	
	Not sure	53	32.7	81	22.8	134	25.9	
	Disagree	32	19.8	117	32.9	149	28.8	
	Strongly disagree	34	21.0	88	24.7	122	23.6	

Table 7: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
The COVID-19 vaccine might have side effects, like fever or soreness in the arm.	Strongly agree	76	46.9	199	55.9	275	53.1	37.890 (.000)
	Agree	50	30.9	138	38.8	188	36.3	
	Not sure	26	16.0	18	5.1	44	8.5	
	Disagree	6	3.7	1	0.3	7	1.4	
	Strongly disagree	4	2.5	0	0.0	4	0.8	
Your opinion on the effectiveness of the COVID-19 vaccine	Not at all	60	37.0	12	3.4	72	13.9	159.437 (.000)
	A little	42	25.9	35	9.8	77	14.9	
	A Moderate	53	32.7	210	59.0	263	50.8	
	High	6	3.7	99	27.8	105	20.3	
	Other	1	0.6	0	0.0	1	0.2	
Factors would matter to you in deciding whether or not to get the COVID-19 vaccine	My age	9	5.6	51	14.3	60	11.6	28.245 (.002)
	My ethnicity	1	0.6	1	0.3	2	0.4	
	My health state	38	23.5	103	28.9	141	27.2	
	If I had recently travelled	15	9.3	14	3.9	29	5.6	
	Coverage by health insurance	1	0.6	4	1.1	5	1.0	
	If a doctor recommends it	6	3.7	15	4.2	21	4.1	
	Effect of vaccine	31	19.1	52	14.6	83	16.0	
	Period of vaccine protection	15	9.3	47	13.2	62	12.0	
	Side effects of the vaccine	24	14.8	22	6.2	46	8.9	
	The opinions of relatives	4	2.5	14	3.9	18	3.5	
	Magnitude of COVID-19	18	11.1	33	9.3	51	9.8	
COVID-19 vaccine protects your health	Extremely	5	3.1	216	60.7	221	42.7	276.026 (.000)
	Very	17	10.5	75	21.1	92	17.8	
	Fairly	38	23.5	50	14.0	88	17.0	
	Slightly	23	14.2	10	2.8	33	6.4	
	Not at all	79	48.8	5	1.4	84	16.2	
COVID-19 vaccine would protect the health of your relatives	Extremely	25	15.4	259	72.8	284	54.8	235.476 (.000)
	Very	21	13.0	66	18.5	87	16.8	
	Fairly	42	25.9	23	6.5	65	12.5	
	Slightly	24	14.8	4	1.1	28	5.4	
	Not at all	50	30.9	4	1.1	54	10.4	

Table 8: Distribution of studied subjects by Acceptance of COVID-19 Vaccination and attitude

Variable	Categories	Acceptance of COVID-19 Vaccination				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
The importance that getting the COVID-19 vaccine would protect the health of your community	Extremely	20	12.3	254	71.3	274	52.9	246.164 (.000)
	Very	25	15.4	70	19.7	94	18.3	
	Fairly	52	32.1	25	7.0	77	14.9	
	Slightly	9	5.6	6	1.7	15	2.9	
	Not at all	56	34.6	1	0.3	57	11.0	
People your age want to receive information about COVID-19 through	Website	36	22.2	88	24.7	124	23.9	24.629 (.003)
	Smartphone app	37	22.8	128	36.0	165	31.9	
	Email	5	3.1	6	1.7	11	2.1	
	Text messages	23	14.2	54	15.2	77	14.9	
	Telephone call with a health educator	13	8.0	24	6.7	37	7.1	
	DVD sent through the mail	1	0.6	0	0.0	1	0.2	
	Brochure sent through the mail	1	0.6	5	1.4	6	1.2	
	In-person with a health educator	16	9.9	22	6.2	38	7.3	
	Video chat with a health educator	10	6.2	14	3.9	24	4.6	
	OTHER	20	12.3	15	4.2	35	6.8	
Prevalence is important information about COVID-19	YES	49	30.2	167	46.9	216	41.7	12.716 (.000)
	NO	113	69.8	189	53.1	302	58.3	
Symptoms are important information about COVID-19	YES	103	63.6	268	75.3	371	71.6	7.499 (.006)
	NO	59	36.4	88	24.7	147	28.4	
The transmission mode is important information about COVID-19	YES	81	50.0	243	68.3	324	62.5	15.844 (.000)
	NO	81	50.0	113	31.7	194	37.5	
Avoidance is important information about COVID-19	YES	88	54.3	220	61.8	308	59.5	2.582 (.108)
	NO	74	45.7	136	38.2	210	40.5	
How to get tested is important information about COVID-19	YES	41	25.3	139	39.0	180	34.7	9.265 (.002)
	NO	121	74.7	217	61.0	338	65.3	
Treatment is important information about COVID-19	YES	84	51.9	196	55.1	280	54.1	.460 (.497)
	NO	78	48.1	160	44.9	238	45.9	
Management is important information about COVID-19	YES	87	53.7	245	68.8	332	64.1	11.055 (.001)
	NO	75	46.3	111	31.2	186	35.9	

Discussion

The present study aimed to assess the acceptance of a COVID-19 vaccine and its related determinants among the general adult population in Jeddah, Saudi Arabia. Previous studies found that older females display hesitation toward COVID-19 vaccination (19), while the male gender was an important determinant for acceptance of COVID-19 vaccination. This result could be due to the reportedly high rates of COVID-19-related morbidity and mortality among male infected patients (17). Furthermore, women tend to support conspiracy theories in a higher proportion than men, which may be one of the factors that can explain women's higher resistance to vaccination (19). However, in the present study gender and nationality were not significantly associated with acceptance of COVID-19 vaccination.

Vaccination is considered one of the most outstanding public health inventions in the 21st century. However, its acceptance is varied with space, time, social class, ethnicity, and contextual human behavior (26). In the present study, subjects residing in the Makkah region had the highest acceptance rate compared to other areas. Previous studies revealed that college and/or graduate degree holders (75%) compared to people with less than a college degree were more likely to accept the vaccine (27). In the present study, educational level was not significantly associated with acceptance of COVID-19 vaccination. In the present study subjects with high monthly income were more likely to accept the vaccine against COVID-19 infection. This is in line with previous studies (28-30). In the present study, the presence of self-reported health status (having chronic medication) was associated with higher acceptance of the COVID-19 vaccine. This is in line with a previous study (31). In the present study, participants who had tested negative for COVID-19 were more willing to take the COVID-19 vaccine. This is consistent with a previous study (32). On the other hand, in the present study, getting COVID-19 infection was not significantly associated with acceptance of COVID-19 vaccination, while those with relatives infected with COVID-19 were more willing to get the vaccine. In the present study, participants' trust in the health system and perceived risk of acquiring infection were found to be significantly associated with the acceptance of the COVID-19 vaccine. This is in line with a previous study (14). Higher knowledge about COVID-19 was not significantly associated with acceptance of COVID-19 vaccination. This is not in line with a previous study (32). Older age on admission to hospital with COVID-19 infection was associated with increased death (33). In the present study, those who accepted the vaccine realized that. COVID-19 spreads primarily through contact with an infected person when they cough or sneeze. It also spreads when a person touches a surface or object that has the virus on it, then touches their eyes, nose or mouth, and it is more harmful than flu (34, 35). In the present study, acceptance of the vaccine was associated with increased knowledge about clinical aspects of the COVID-19 infection. This was in line with a previous study (32). Participants who were concerned about acquiring infection with the COVID-19 virus were more likely to accept the COVID-19 vaccine compared with those who were not concerned with the infection (14). This was not in line with findings from the present study. Acceptance of the vaccine was associated with the perception that COVID-19 infection was a threat to the community. This was in line with a previous study (36). The chance of getting COVID-19 in the future was not significantly associated with acceptance of COVID-19 vaccination. This was in line with a report from a previous study (37). Acceptance of the vaccine was associated with the perception of the severity and harmful effects of getting infected with COVID-19. This was in line with a previous study (7). Acceptance of the vaccine was associated with the conception that it was a crime if one got infected and did not isolate from the public. This was in line with a previous study (38).

A previous study revealed that the majority of the participants were willing to have the COVID-19 vaccine if it was provided free by the government (16). This was similar to findings from the present study. One of the strongest correlates of vaccine acceptability was whether participants thought their healthcare provider would recommend they get vaccinated against COVID-19. Provider recommendations are a key determinant of vaccination behaviors (20). This was similar to findings from the present study. Acceptance of the vaccine was associated with the perception that the vaccine has moderate or high effectiveness. This was in line with previous studies (21, 22). Acceptance of the vaccine was associated with the perception that the vaccine is important for the elderly, and the health history and the health of their relatives and friends. These were in line with previous studies (3, 7). Acceptance of the vaccine was significantly associated with getting source information from official and government websites, mainstream news media, and social media. This was consistent with a previous study (39). Because early clinical presentations of infected patients are non-specific, testing is needed to confirm the diagnosis of COVID-19 (40). This was similar to findings from the present study, particularly among those who accepted the vaccine.

Limitations

There are some limitations to this study: as this study is cross-sectional, the causal relationship remains unknown, and we do not know if the effects of these variables on acceptance of the COVID-19 vaccine during the COVID-19 pandemic will persist in the long term. It is also a nonprobability convenient sample, and its generalization to the population may be defective; however, it is an exploratory study.

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Conclusion

About one-third of the population does not accept the vaccine, particularly, those with low income. Increasing the knowledge of the people about the clinical aspects, and health impact of the virus of COVID-19 on the population and the community are important interventions to increase the acceptance rate of the population.

References

1- Almaghaslah D, Alsayari A. The effects of the 2019 novel coronavirus disease (COVID-19) outbreak on academic staff members: a case study of a pharmacy school in Saudi Arabia. Risk management and healthcare policy. 2020;13:795.

2- Schwarzinger M, Watson V, Arvidson P, Alla F, Luchini S. COVID-19 vaccine hesitancy in a representative working-age population in France: a survey experiment based on vaccine characteristics. The Lancet Public Health. 2021;6(4):e210-e21.

3-Hammoud MM, Standiford T, Carmody JB. Potential implications of COVID-19 for the 2020-2021 residency application cycle. JAMA. 2020;324(1):29-30.

4-COVID W. Weekly Operational Update. 2020. Accessed 30/11/20 from https://www. who. int/docs/default-source

5-Bhattacharya M, Sharma AR, Patra P, Ghosh P, Sharma G, Patra BC, et al. Development of epitope-based peptide vaccine against novel coronavirus 2019 (SARS-COV-2): Immunoinformatics approach. Journal of medical virology. 2020;92(6):618-31.

6-Del Rio C, Collins LF, Malani P. Long-term health consequences of COVID-19. JAMA. 2020;324(17):1723-4.

7-Rodriguez-Morales AJ, Cardona-Ospina JA, Gutiérrez-Ocampo E, Villamizar-Peña R, Holguin-Rivera Y, Escalera-Antezana JP, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. Travel medicine and infectious disease. 2020;34:101623.

8-Verity R, Okell LC, Dorigatti I, Winskill P, Whittaker C, Imai N, et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. The Lancet infectious diseases. 2020;20(6):669-77.

9-Reiter PL, Pennell ML, Katz ML. Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? Vaccine. 2020;38(42):6500-7.

10-Saudi Press Agency. Saudi Food and Drug Authority (SFDA) Approves Registration of Pfizer-BioNTech COVID-19 Vaccine. Saudi Press Agency; December 10 A few. 2021

11- Assiri A, Al-Tawfiq JA, Alkhalifa M, Al Duhailan H, Al Qahtani S, Dawes RA, et al. Launching COVID-19 vaccination in Saudi Arabia: lessons learned, and the way forward. Travel Medicine and Infectious Disease. 2021:102119.

12-Seton M, Raude J. Factors in vaccination intention against the pandemic influenza A/H1N1. European journal of public health. 2010;20(5):490-4.

13- Magadmi RM, Kamel FO. Beliefs and barriers associated with COVID-19 vaccination among the general population in Saudi Arabia. 2020.

14- Al-Mohaithef M, Padhi BK. Determinants of COVID-19 vaccine acceptance in Saudi Arabia: a web-based national survey. Journal of multidisciplinary healthcare. 2020;13:1657.

15- Barry M, Temsah M-H, Alhuzaimi A, Alamo N, Al-Eyadhy A, Aljamaan F, et al. COVID-19 vaccine confidence and hesitancy among healthcare workers: a cross-sectional survey from a MERS-CoV experienced nation. Medrxiv. 2020.

16- Qattan A, Alshareef N, Alsharqi O, Al Rahahleh N, Chirwa GC, Al-Hanawi MK. Acceptability of a COVID-19 vaccine among healthcare workers in the Kingdom of Saudi Arabia. Frontiers in Medicine. 2021;8:83.

17- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. The Lancet. 2020;395(10223):507-13.

18- Allington D, Duffy B, Wessely S, Dhavan N, Rubin J. Health-protective behaviour, social media usage and conspiracy belief during the COVID-19 public health emergency. Psychological medicine. 2020:1-7.

19- Magadmi RM, Kamel FO. Beliefs and barriers associated with COVID-19 vaccination among the general population in Saudi Arabia. BMC Public Health. 2021;21(1):1-8.

20- Rodriguez SA, Mullen PD, Lopez DM, Savas LS, Fernández ME. Factors associated with adolescent HPV vaccination in the US: A systematic review of reviews and multilevel framework to inform intervention development. Preventive medicine. 2020;131:105968.

21- Rajamoorthy Y, Radam A, Taib NM, Rahim KA, Munusamy S, Wagner AL, et al. Willingness to pay for hepatitis B vaccination in Selangor, Malaysia: a cross-sectional household survey. PLoS One. 2019;14(4): e0215125.

22- Rajamoorthy Y, Radam A, Taib NM, Rahim KA, Wagner AL, Mudatsir M, et al. The relationship between perceptions and self-paid hepatitis B vaccination: a structural equation modelling approach. PloS one. 2018;13(12):e0208402.

23- Sundaram N, Purohit V, Schaetti C, Kudale A, Joseph S, Weiss MG. Community awareness, use and preference for pandemic influenza vaccines in Pune, India. Human vaccines & immunotherapeutics. 2015;11(10):2376-88.

24- Palamenghi L, Barello S, Boccia S, Graffigna G. Mistrust in biomedical research and vaccine hesitancy: the forefront challenge in the battle against COVID-19 in Italy. European journal of epidemiology. 2020;35(8):785-8

25- Faul F, Erdfelder E, Lang A-G, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioural, and biomedical sciences. Behaviour Research Methods. 2007; 39 (2): 175-191.

26- Xiao X, Wong RM. Vaccine hesitancy and perceived behavioural control: a meta-analysis. Vaccine. 2020;38(33):5131-8.

27- Malik, A. A., McFadden, S. M., Elharake, J., & Omer, S. B. (2020). Determinants of COVID-19 vaccine acceptance in the US. EClinicalMedicine, 26, 100495

28- Wellcome. Wellcome Global Monitor 2018. Available online: HTTPS:// Wellcome.ac.UK/reports/Wellcome-global-monitor/2018 (accessed on 27 March 2021).
29- Bhopal, S.; Nielsen, M. Vaccine hesitancy in low- and middle-income countries: Potential implications for the COVID-19 response. Arch. Dis. Child. 2021, 106, 11 3 – 11 4 . [Google Scholar] [CrossRef]
30- World Bank Blogs. New Country Classifications by Income Level: 2019–2020. 1 July 2019. Available online: https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2019-2020 (accessed on 24 March 2021).
31- Wong, Martin CS, et al. "Acceptance of the COVID-19 vaccine based on the health belief model: A population-based survey in Hong Kong." Vaccine 39.7 (2021): 1148-1156
32- Bono, Suzanna Awang, et al. "Factors affecting COVID-19 vaccine acceptance:
An international survey among Low-and Middle-Income Countries." Vaccines 9.5 (2021): 515.
33- Sun, Haiying, et al. "Risk factors for mortality in 244 older adults with COVID19
in Wuhan, China: a retrospective study." Journal of the American Geriatrics
Society 68.6 (2020): E19-E23
34- Bakar, Nashirah Abu, and Sofian Rossi. "Effect of Coronavirus disease (COVID-19) on the tourism industry." International Journal of Advanced Engineering Research and Science 7.4 (2020): 189-193
35- Piroth, Lionel, et al. "Comparison of the characteristics, morbidity, and mortality of COVID-19 and seasonal influenza: a nationwide, population-based retrospective cohort study." The Lancet Respiratory Medicine 9.3 (2021):251-259.
36- Mannan DKA, Farhana KM. Knowledge, attitude and acceptance of a COVID-19 vaccine: A global cross-sectional study. International Research Journal of Business and Social Science. 2020;6(4).
37- Lin Y, Hu Z, Zhao Q, Alias H, Danaee M, Wong LP. Understanding COVID-19 vaccine demand and hesitancy: A nationwide online survey in China. PLoS neglected tropical diseases. 2020;14(12):e0008961.
38- Yu X, Yang R. COVID-19 transmission through asymptomatic carriers is a challenge to containment. Influenza and other respiratory viruses. 2020;14(4):474.
39- Charron J, Gautier A, Jestin C. Influence of information sources on vaccine hesitancy and practices. Medecine et maladies infectieuses. 2020;50(8):727-33.
40- Peeling, Rosanna W., et al. "Serology testing in the COVID-19 pandemic response." The Lancet Infectious Diseases (2020).

Neurological Manifestations of COVID-19

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Abstract

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China [1]. It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency [2, 3]. On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009 [4].

Keywords: COVID-19,
Neurological manifestations

Introduction

Most patients infected by SARS-CoV-2 have presented with a mild clinical course: beginning with fever and dry cough, progressing to a form of mild or moderate respiratory disease, and resolving without specific treatment [5]. Serious complications of the infection, however, remain a central concern. Acute respiratory distress syndrome, acute heart injury or failure, acute kidney injury, sepsis, disseminated intravascular coagulation, and life-threatening metabolic derangements have all been reported in COVID-19 patients, particularly among those with underlying comorbidities or advanced age [6, 7].

Coronaviruses are not always confined to the respiratory tract, and under certain conditions they can invade the central nervous system and cause neurological pathologies. The potential for neuro invasion is well documented in most human coronaviruses (OC-43, 229E, MERS and SARS) [8].

Neurological manifestations of SARS-CoV-2

More than 80 percent of hospitalized patients may have neurologic symptoms at some point during their disease course [9].

In a local retrospective study which is considered to be the first in Qatar, neurologic manifestations (48.5%) were reported in hospitalized COVID-19 patients. Patients with COVID-19 are at high risk of developing neurological manifestations. The most common COVID-19-related acute neurological manifestations were myalgia, headache, dizziness, and acute ischemic stroke. Prompt recognition, early diagnosis, and appropriate management of these manifestations could potentially lead to better patient outcomes in COVID-19 patients (10).

Two large cohort-based studies on neurological manifestations of COVID-19 have been reported so far. In a study done in Wuhan, China, Mao et al. [11] noted neurological manifestations in 36.4% of 214 COVID-19 patients and these were significantly more common in patients with severe disease. Central nervous system (CNS) and peripheral nervous system manifestations were seen in 24.8% and 8.9%, respectively. In a study conducted in France, Helms et al. [12] found 84% of 58 patients admitted to the intensive care unit because of acute respiratory distress syndrome due to COVID-19 had neurological signs. The differences in percentage between the two studies may be because the second study focused on more severely affected COVID-19 patients. Table 1 summarizes the common neurological manifestations in COVID-19.

Smell and taste disorders:

Anosmia and dysgeusia have been reported as common early symptoms in patients with COVID-19, occurring in greater than 80 percent of patients in one series [13]. In a meta-analysis of 83 studies involving more than 27,000 patients, olfactory dysfunction was reported in 48 percent [14].

Dizziness

Numerous studies, appearing daily from various parts of the world, have revealed vertigo as one of the significant clinical manifestations of COVID-19. One of them cites vertigo as the most common neurological manifestation of COVID-19, thought to follow the neuro invasive potential of the virus [15]. Some researchers hypothesized that the virus enters neuronal tissue from the circulation and binds angiotensin-converting enzyme 2 receptors (ACE2), which are located in the capillary endothelium. Other mechanisms that lead to dizziness during COVID-19 infection are direct inflammatory action of the virus on nervous tissue, indirect immune response, hypoxia, and hypercoagulopathy [15].

Cerebrovascular disease

Li et al.,(16) who analyzed the cohort of patients described by Mao et al. and seven more, found 5% to have acute ischemic stroke. Stroke was also reported in five patients younger than 50years from New York(17). Based on brain magnetic resonance imaging (MRI) findings from 13 of their 58 patients, Helms et al.(18) reported two to have acute cerebral ischemic stroke and one to have subacute cerebral ischemic stroke. In a retrospective cohort-based study from New York, 0.9% had imaging-proven acute ischemic stroke and most (65%) strokes were cryptogenic, possibly related to an acquired hypercoagulability(19). A recent systematic review showed the incidence of acute ischemic stroke in COVID-19 to be 0.9% to 2.7% with a mortality rate of 38%(20). The CVD in COVID-19 may be due to high levels of inflammation and/or a hypercoagulable state. Raised serum interleukin and C-reactive protein concentration have been reported, and coagulation abnormalities are increasingly noted with raised D-dimer concentration pointing to a poorer prognosis(21).

Delirium:

Delirium for patients with COVID-19 has been especially common. Rarely it is present at onset and typically associated with sepsis, but it is otherwise seen in the critical care setting where causes are multifactorial. In one series 84 % of COVID-19 patients in the ICU had delirium with a combination of acute attention, awareness, and cognition disturbances [22].

Table 1. Cohort studies on neurological manifestations in COVID-19

Cohort studies on neurological manifestations in COVID-19.

Study	N	Headache (%)	Dizziness (%)	Impaired consciousness (%)	Acute cerebrovascular disease (%)	Skeletal muscle injury (%)	Ataxia (%)	Seizure (%)
Li et al.[8]	221	NA	NA	NA	5.8	NA	NA	NA
Mao et al.[6]	214	13.1	16.8	7.5	2.8	10.7	0.5	0.5
Qin et al.[9]	452	11.4	8.1	NA	NA	NA	NA	NA
Helms et al.[7]	58	NA	NA	NA	23 (3/13)[a]	NA	NA	NA
Wang et al.[10]	138	6.5	9.4	NA	NA	34.5[b]	NA	NA

COVID-19: coronavirus disease 2019; N: number of patients; NA: not analyzed (all studies were conducted in 2020); MRI: magnetic resonance imaging.

[a]Brain MRI scans were done in 13 patients and cerebral ischemic stroke was identified in three.

[b]Only myalgia was considered.

Outside of a true encephalitis, delirium in the ICU may arise from medications including sedative-hypnotics, anticholinergics, and corticosteroids; from the prolonged course of many COVID-19 sufferers' needs for mechanical ventilation; and from isolation. This latter component is especially challenging for patients. As with any respiratory virus setting, both the physical barriers of personal protection equipment and the limited contact with the medical team can lead to prolonged periods of isolation in the ICU. And because of social distancing requirements and many hospitals' need to restrict visitors, critically ill COVID-19 patients are almost always isolated from loved ones as well. The combination of these factors have been especially challenging for patients and it is not uncommon to hear stories of post-ICU trauma and anxiety that arise and persist well past the critical phase of illness (23).

Seizures and status epilepticus

Seizures and status epilepticus have been reported in patients with severe COVID-19 infection [24,25]. In one series of 32 patients with COVID-19 who presented to the hospital with seizures, 40 percent had no history of epilepsy or other central nervous system diagnoses [26]. In rare instances, seizures have been the presenting symptom for patients without signs of infection who have tested positive for COVID-19 [26,27]. A systematic review of case series and reports identified 47 patients with COVID-19 who developed status epilepticus [28].

Conclusion

The nervous system may also be affected via indirect methods such as hypoxia, inflammation or an immune-mediated damage. Future studies using brain imaging, EEGs, CSF analysis and histopathology would provide a clearer understanding of the effect of SARS-CoV-2 on the nervous system (29).

References

1. CDC. 2019 Novel Coronavirus, Wuhan, China. CDC. Available at https://www.cdc.gov/coronavirus/2019-ncov/about/index.html. January 26, 2020; Accessed: December 1, 2021.
2. Gallegos A. WHO Declares Public Health Emergency for Novel Coronavirus. Medscape Medical News. Available at https://www.medscape.com/viewarticle/924596. January 30, 2020; Accessed: December 1, 2021.
3. Ramzy A, McNeil DG. W.H.O. Declares Global Emergency as Wuhan Coronavirus Spreads. The New York Times. Available at https://nyti.ms/2RER70M. January 30, 2020; Accessed: December 1, 2021.
4. The New York Times. Coronavirus Live Updates: W.H.O. Declares Pandemic as Number of Infected Countries Grows. The New York Times. Available at https://www.nytimes.com/2020/03/11/world/coronavirus-news.html#link-682e5b06. March 11, 2020; Accessed: December 1, 2021.
5. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497–506.
6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu L, Shan H, Lei CL, Hui DS, Du B. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020;382(18):1708–20.Nath A. Neurologic complications of coronavirus infections. Neurology. 2020;94(19):809–10.
7. Bhatraju PK, Ghassemieh BJ, Nichols M, Kim R, Jerome KR, Nalla AK, Greninger AL, Pipavath S, Wurfel MM, Evans L, Kritek PA. Covid-19 in critically ill patients in the Seattle region—case series. N Engl J Med. 2020;382(21):2012–22.–90.
8. Carod-Artal FJ. Neurological complications of coronavirus and COVID-19. Rev Neurol. 2020 May 1;70(9):311-322. English, Spanish. doi: 10.33588/rn.7009.2020179. PMID: 32329044
9. Liotta EM, Batra A, Clark JR, et al. Frequent neurologic manifestations and encephalopathy-associated morbidity in Covid-19 patients. Ann Clin Transl Neurol 2020; 7:2221.
10 Ali L, Muhammad A, Khan A, et al. (March 14, 2022) Acute Neurological Manifestations of COVID-19 Patients From Three Tertiary Care Hospitals in Qatar. Cureus 14(3): e23150. doi:10.7759/cureus.23150
11. Mao, L, Jin, H, Wang, M, et al. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA Neurol 2020; 77: 683–690.
12.Helms, J, Kremer, S, Merdji, H, et al. Neurologic features in severe SARS-CoV-2 infection. N Engl J Med 2020; 382: 2268–2270.
13.Lechien JR, Chiesa-Estomba CM, De Siati DR, et al. Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. Eur Arch Otorhinolaryngol 2020; 277:2251.
14.Saniasiaya J, Islam MA, Abdullah B. Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients. Laryngoscope 2021; 131:865.
15.Mao L., Jin H., Wang M., et al. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA Neurology. 2020;77(6):683–690. doi: 10.1001/jamaneurol.2020.1127. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
16. Li, Y, Li, M, Wang, M, et al. Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study. Stroke Vasc Neurol. Epub ahead of print 2 July 2020. DOI: 10.1136/svn-2020-000431.
Google Scholar | Crossref
17.Oxley, TJ, Mocco, J, Majidi, S, et al. Large-vessel stroke as a presenting feature of COVID-19 in the young. N Engl J Med 2020; 382: e60.
Google Scholar | Crossref | Medline
18. Helms, J, Kremer, S, Merdji, H, et al. Neurologic features in severe SARS-CoV-2 infection. N Engl J Med 2020; 382: 2268–2270.
Google Scholar | Crossref | Medline
19. Yaghi, S, Ishida, K, Torres, J, et al. SARS2-CoV-2 and stroke in a New York Healthcare System. Stroke. Epub ahead of print 20 May 2020. DOI: 10.1161/strokeaha.120.030335.Google Scholar | Crossref
20. Tan, Y-K, Goh, C, Leow, AST, et al. COVID-19 and ischemic stroke: a systematic review and meta-summary

print 13 July 2020. DOI: 10.1007/s11239-020-02228-y. Google Scholar | Crossref
21. Becker, RC. COVID-19 update: Covid-19-associated coagulopathy. J Thromb Thrombolysis 2020; 50: 54–67. Google Scholar | Crossref | Medline
22. Helms J., Kremer S., Merdji H. Delirium and encephalopathy in severe COVID-19: a cohort analysis of ICU patients. Crit Care. 2020;24:491. [PMC free article] [PubMed] [Google Scholar]
23. Nath A, Smith B. Neurological issues during COVID-19: An overview. Neurosci Lett. 2021;742:135533. doi:10.1016/j.neulet.2020.135533
24.Danoun OA, Zillgitt A, Hill C, et al. Outcomes of seizures, status epilepticus, and EEG findings in critically ill patient with COVID-19. Epilepsy Behav 2021; 118:107923.
25.Emami A, Fadakar N, Akbari A, et al. Seizure in patients with COVID-19. Neurol Sci 2020; 41:3057.
26.Asadi-Pooya AA, Kouhanjani MF, Nemati H, et al. A follow-up study of patients with COVID-19 presenting with seizures. Epilepsy Behav 2021; 122:108207.
27.Anand P, Al-Faraj A, Sader E, et al. Seizure as the presenting symptom of COVID-19: A retrospective case series. Epilepsy Behav 2020; 112:107335.
28.Dono F, Nucera B, Lanzone J, et al. Status epilepticus and COVID-19: A systematic review. Epilepsy Behav 2021; 118:107887.
29.Rahman, Asma et al. “Neurological manifestations in COVID-19: A narrative review.” SAGE open medicine vol. 8 2050312120957925. 10 Sep. 2020, doi:10.1177/20503 12120957925

Perspective of Adolescents Regarding Need of Adolescent Health Services; A Mixed Method Study in Rawalpindi, Pakistan

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Abstract

Adolescence is a transitional period of physical and mental development that develops between childhood and adulthood. This change includes biological, social, and psychological changes. The study has tried to establish the need for adolescent health services in Pakistan. The study was designed to determine perspective of adolescents regarding need of Adolescents health services and to advocate students, parents and peers about the needs of adolescents. The study has theoretical and practical significance. A Mixed method study was conducted at the Department of Public Health, Armed Forces Post Graduate Medical Institute, National University Medical Sciences Rawalpindi from March 2022 to May 2022 by combining quantitative and qualitative research method. The data collection and analysis has followed the survey research type protocol and descriptive research methodology. Students of 1st year and 2nd year were the study population. The sample size was 380 and the duration of study was based on 2 months. Simple Random Sampling technique was used in Quantitative research method, while the focus group discussion was done with 8-10 participants. The quantitative data collection was done through closed ended questionnaire and qualitative data collection was done through open ended structured interview guide. The quantitative data was analysed statistically on SPSS and qualitative data was analysed through thematic content analysis. This study has found that regarding the knowledge about puberty and bodily changes, there were mixed opinions of the participants and adolescents have no standardized prior knowledge of bodily changes and personal hygiene to a satisfactory level. It was found that their source of guidance, was internet, friends and their close circles which is ambiguous to some extent. The study found that adolescents do not face severe anxiety or depression and other emotional complexities but they face frustration and hindrance because of lack of background knowledge. It was also found that the participants were inclined to share their experiences with their mothers, friends, relatives and their sisters. It found that the majority of the participants have not smoked or run away from home. The study also found that there is a need of adolescent health services in Pakistan.

Keywords: adolescent health services, Rawalpindi

Introduction

Adolescence is a transitional period of physical and mental development that develops between childhood and adulthood. This change includes biological, social, and psychological changes [1]. Historically, the definition of adolescence has been based solely on age classification. However, a study [2] argues that the definition of adolescence is a fluid classification process. To demonstrate this fluidity, the United Nations defines youth as 15 to 24 years old, teen as 15 to 19 years old and young adult as 20 to 24 years old [3].

A study states: "Adolescence is not determined by age and health, but by the gender distribution, roles, responsibilities, and relationships that govern men and women" [4].

Adolescent research needs to highlight the various factors influencing identity development beyond physical development. For example, where young Italians in Italy feel unfamiliar and alienated from their country's national ideology, young people in Central Europe (Bratislava, Slovakia) are more involved in political life. For the study of youth in these countries, it is useful to understand the social structure of unemployment, homelessness and drug addiction [5].

Mental illness and suicide are now recognized as global health problems for young people. About 20% of the world's 1.2 billion young people suffer from mental illness. Adolescent suicide is one of the leading causes of death in developed countries. Evidence indicates that approximately 20% of adolescents suffer from depression and stress-related problems each year [6].

According to a study on the history and needs of adolescent health, in recent years, less attention has been paid to the health and needs of adolescents compared to children and even adults. Children and teens commit crimes for a variety of reasons, mostly social [7].

This study is helpful to evaluate the perceptions of adolescents regarding presence of adolescent health services in the community. This study may be helpful to highlight the problems faced by adolescents in discussing and provision of health care needs. As surveys and studies regarding this subject are quite limited in third world countries, there remains a dire need for such a study.

The aim of this study is to promote the adolescent health, to determine perspective of Pakistani adolescent girls and boys regarding need of adolescent health services, and to advocate students, parents and peers about the needs of adolescents.

Materials and Methodology

Design:
A Mixed method study was conducted from March 2022 to May 2022 by combining both quantitative and qualitative research method. The study was conducted in the following two institutes located in Rawalpindi, Pakistan: Global College System for Boys; Islamabad College of Management and Commerce (ICMC), for girls. This study has followed descriptive research methodology.

Inclusion criteria:
Students of 1st and 2nd year have been included in our study.

Exclusion criteria:
Students other than 1st and 2nd year have been excluded from our study.

Sample size calculation:
The current study followed simple random sampling technique. At a 5% margin of error, 95% level of confidence, 50% response distribution, and population size of 20,000, the recommended sample size obtained was 377 as calculated by Raosoft sample size calculator (Raosoft, Inc., Seattle, WA). However, we kept the sample size of our study at 380. The following formulae has been used by the software where the sample size n and margin of error E are given by:

$$x=Z(^{c}/_{100})^{2}r(100-r)$$

$$n=^{N\,x}/_{((N-1)E^{2}+x)}$$

$$E=Sqrt\,[(^{N-n)x}/_{n(N-1)}]$$

Where population size is represented by *N,* fraction of responses represented by r, and Z(c/100) representing the critical value for the confidence level *c*.

Data collection:
Simple Random Sampling technique was used in Quantitative research method, while focused group discussion was done with 8-10 participants for qualitative sampling. The total duration of study was 2 months. For collection of quantitative data, a validated questionnaire (having 10 questions) was used, while an interview guide was used for qualitative data collection. The qualitative data was collected through semi-structured open ended interview guide which was collected from two focus groups. One focus group was based on 8 girls and the other was based on 8 boys.

Statistical Analysis:
SPSS version 23.0 (IBM Corp., Armonk, NY), was used for evaluating quantitative and qualitative data. Numerical variables were described using mean and +/- standard deviations. Categorical variables were presented in frequencies and percentages. Paired-Samples T-Tests were performed where a higher t-score indicates that a large difference exists between the two sample sets and smaller t-score means more similarity exists between the two sample sets. The collected qualitative data was analysed through thematic analysis. The details about themes and sub-themes are given in the supplementary file.

Ethical Consideration:
Permission was acquired from the Department of Public Health, Armed Forces Post Graduate Medical Institute, National University Medical Sciences Rawalpindi where the study was conducted. The data was collected after obtaining informed consent. It was ensured that the confidentiality of the participants was maintained.

Informed Consent:
Written consent was taken from the participants regarding aims and objectives of the study. It was ensured that all the participants understood the information given. The informed consent and questionnaire took 10-15 minutes to complete. The participants were given the choice to withdraw from the study at any point. Incomplete responses were excluded from the final analysis.

Results

The demographical details of the participants is shown in Table 1 which shows that the number of girls and boys in our study were equal in number. Around half the participants were of 17-18 years of age. Our study consisted of identical number of participants from each year of study.

The majority of the participants responded with "sometimes" when they were asked about their overall happiness; getting along with their families; having at least one adult they can talk to; if they were satisfied with their height and weight; if they missed more than 7 days of school the previous year; and if they use different ways to lose weight. A substantial number of the participants included did not run away from their homes and have not been a part of a gang. A big majority of them felt safe in their home, school and community. The number of participants who thought that their grades got worse than they used to be and who think otherwise were of almost equal number as shown in Table 2.

Table 1. Demographical details of the participants

		Frequency – n (%)
Gender	Boys	190 (50)
	Girls	190 (50)
Age	Below 16 years old	48 (12.6)
	17-18 years old	188 (49.5)
	19 years old	144 (37.9)
Year of study	1st year	190 (50)
	2nd year	190 (50)

Table 2. Response of the participants to the questions asked

Question asked	Response – n		
	Yes	Sometimes	No
In general, are you happy with the things that are going for you?	98	217	65
Do you get along with your family?	86	225	69
Do you have at least one adult you can really talk to?	127	205	48
Do you feel safe at home, at school and at your community?	143	128	109
Do you think you are about the right weight and height?	112	177	91
Have you missed more than 7 days of school in the last year?	34	197	149
Are your grades worse than they used to be?	137	104	139
Have you ever run away from home?	45	31	304
Have you ever been in a gang (now or in the past)?	48	144	188
Do you ever skip meals, use laxatives or diet pills, or throw up on purpose to lose weight or to control your weight?	98	217	65

Knowledge about Puberty and Bodily Changes:
Regarding this perspective, there were mixed opinion of the participants, few of the participants were of the view that they had knowledge about puberty and bodily changes and few had a contrary opinion.

Participant 11 claimed:
"I had no prior knowledge about the bodily changes and puberty until I started experiencing it."

P3 claimed:
"It was total on novel experience to me. I had heard nothing about such things before and it was quite something unbelievable to me. To some extent these rapid bodily changes gave me a sort of anxiety"

On the other hand, few of the participants were of the view that they had a bit of Knowledge about puberty and bodily changes. P8 claimed:
"I had an idea about puberty and bodily changes but I believe it wasn't sufficient enough to deal with the changes I started experiencing."

Then there were very few of the participants who believe that they had sufficient knowledge about puberty and bodily changes.

Knowledge of Personal Hygiene:
In regards to knowledge of Personal Hygiene, again there was mixed opinion. Most of the participants were of the view that they had no standardize knowledge about Personal Hygiene and fewer were of the view that they had insufficient knowledge and there were only one or two participants who believed that they had sufficient knowledge.

P7 claimed:
"I had no prior knowledge of Personal Hygiene but after I reached to the age of puberty and adolescent, I got guidance from different sources."

P4 claimed:
"I had a bit of prior knowledge about Personal Hygiene before I entered in the era of Adolescent"

Source of Guidance/Knowledge:
Regarding the source of guidance, participants had mixed views. The majority of the participants were of the view that they gain guidance and knowledge from their mothers, a few of the participants were of the view that they gained knowledge from their friends or sisters and cousins, aunties and a few of the participants claimed that they gain knowledge from the Internet and from various sites.

A participant claimed:
"My mother and aunt guided me"

P12 claimed:
"My mother was my source of guidance and she guided me even before I reached the age of puberty. She guided me about the adolescent age and related changes and the bodily changes and she also guided me how to conduct Personal Hygiene and related things."

P8 claimed:
"No one was there to guide me so I gained all the knowledge from the Internet."

P6 claimed:
"My whole knowledge is based on the Internet and YouTube."

Internet and Websites:
It was found that internet has a decent role and a significant influence on the lives of adolescents. Almost all of the participants were of the view that they have access to the internet and they use internet on regular basis. Regarding different websites or favourite websites there were mixed reviews; a few of the participants claimed that they like You Tube, two were in the favour of Whatsapp and a few favoured Instagram and a few of them favoured Google.

P4 claimed:
"I spend most of my time on YouTube and Google."

P13 was of the view that:
"Whatsapp is my favourite application and I spend my time over there having fun with my friends, cousins and social circle."

P7 shared thoughts:
"Instagram,obviously Instagram is a source of knowledge, source of entertainment and most favourite app of youth"

P1 was of the view that:
"Google because it helped me in studying my subjects along with that it aids me in gaining knowledge."

Mental Health Issues
It was found that the majority of the participants had no mental related issues or psychological problems but they were having concerns regarding the puberty and the physical changes and the experience and the lack of knowledge and guidance in the society.

P14 claimed:
I cannot say that I had depression because you know depression is a strong feeling but yes I had faced problems while I was experiencing the physical changes and gradually the problems went away with the proper guidance I received from my mother and from my aunt.

P6 was of the view that:
Ah I was having stress, i still feel stress on certain issues related to my bodily changes and my physical beings but I guess I cannot say that I was having strong sort of depression or some other severe issues.

P8 shared thoughts that:
Lack of guidance sometime frustrates me

Sharing Issues with Others
In terms of sharing the stress or other psychological issues and adolescent concerns it was found that the participants were inclined to share their experiences with their mothers, friends, relatives and their sisters.

P15 shared:
I share each and everything with my mother no matter what is the problem.

P16 claimed:
I share my issues with my best friend.

P7 was of the view:
I share my problems stress and issues with my elder sister

Smoking Experience
The majority of the participants claimed that they had never smoked.

P8 claimed that:
I have never smoked in my life.

Opinion about Adolescent Health Services
Almost all of the participants claimed that there is a need for adolescent health services in Pakistan.

P 10 claimed that:
I am in huge favour of such services. There is dire need of such services in Pakistan.

P1 claimed that
Right now, there is lack of any proper channel and standardized services to guide the adolescents about puberty and bodily changes and this lack of services is creating so many problems for adolescents.

P2 was of the view that:
I can say from my experiences that adolescence is one of the most significant phases of someone's life and it is very much important to have proper guidance to deal with the bodily changes someone is going to experience and right now there are more such services in Pakistan. I believe in West, they have proper channels and they have proper guidelines but in our country there are no such services and this is creating so much psychological chaos among the adolescents and I believe that there be a proper channel and there should be some adolescent health related services.

Discussion

Around the globe, adolescence is considered a period of opportunity and danger. This provides a window of opportunity, as steps can be taken during this period to prepare for healthy adulthood and reduce the likelihood of complications in future years, and develop and practice healthy eating habits and on the other hand this is a dangerous time, when serious immediate health consequences can and do occur (such as road traffic injuries, sexually transmitted infections, and unintended pregnancies from unprotected sex); this is when difficult behaviours (such as smoking and drinking) begin with serious side effects [8].

In the USA, adolescents are considered a diverse group. For example, a 12-year-old boy is at a very different stage of personal development than an 18-year-old boy. People who grow up in loving and financially secure homes can grow and develop better. Even two boys of the same age who are raised in the same environment, in different ways and at different times can grow and develop differently. This has been found by some studies [9].

This study is in line with most of the available literature like another study [10]. This study has found that regarding knowledge about puberty and bodily changes, there were mixed opinion of the participants; few of the participants were of the view that they had knowledge about puberty and bodily changes and a few had a contrary opinion.

The study has confirmed the findings of Berwick et al. which claimed that adolescents have no standardized knowledge about Personal Hygiene to satisfactory level. In terms of source of knowledge [11], the study has supported the findings of another study [12], as his study was of the view that regarding the source of guidance, adolescents are guided by the internet, friends and their close circles.

The finding of our study is contrary to the findings of Alizay et al. whose findings revealed that a lot of adolescents started facing various emotional and psychological problems and anxiety at the very initial stage of their adolesence [13]. In terms of sharing the stress or other psychological issues and adolescent concerns it was found that the participants were inclined to share their experiences with their mothers, friends, relatives and their sisters and this finding of the study was supported by previous studies like [14].

Our study also contradicted the findings of John et al., who has stated that majority of the adolescents smoke in Pakistan [15]. Moreover, the finding of the study confirmed the findings of Pallant et al. [16] that there is a need of adolescent health services in Pakistan.

Conclusion

Unsurprisingly, one of the main factors influencing adolescent health behaviours is whether health-seeking behaviours get them into trouble with their parents or guardians.

Some of the barriers that young people face in accessing health services include emergency pregnancy and safe abortion. They cannot get medical care as healthcare facilities may be far from their life/studies/work or health care is too expensive and out of reach. Finally, health services may be "friendly" to some young people, such as wealthy families, but are not "friendly" to others, such as young people who live and work on the streets. In other words, it may be available, accessible and acceptable, but it is not necessarily neutral.

Practical implications

Our findings have many practical implications for adolescent healthcare.

Information is primarily required for marketing and publicity efforts, with emphasis on service objectives, specific activities, areas of consultation, service practices and privacy policies. It aims to increase awareness and understanding of these services and remove barriers to public perceptions of youth health services that address only or primarily sexual issues. It is important to pass this information on to teens and parents.

Thoughtful and strategic decisions about promoting or dropping gender issues are key to marketing and delivery efforts. Schools can be potential starting points for disseminating information and building relationships between youth, parents, and service agencies. Efforts to promote youth access to health care, familiarity with these health care concepts, and a sense of 'normal' and comfort during visits are also important, by definition. It is especially important to work actively with women's under-representation, women's health, masculinity and youth health services to identify interventions for boys and young people. Parental awareness, acceptance, and participation in adolescent health services has the potential to increase adolescent acceptance, thereby increasing their access to these services.

Therefore, youth health services must be accessible not only to young people, but also to those who support them. This requires engaging young people and their support networks and allowing them to influence their health care. Youth health services in Pakistan were found to increase access, convenience, and motivation for young people by promoting competence, caring, and respectful quality of staff, as well as providing appropriate behavioural arrangements; and attempting to provide a positive experience for young people.

Study Limitations

First of all, for the participants' convenience where possible, they were not explicitly asked if they had visited a secondary healthcare provider before, but based on general or personal experiences according to their preferences. Therefore, it is important to note that in some cases participants' stories may be based on assumptions rather than life experiences. However, during the discussion, most participants chose to speak publicly about accessing these services.

Secondly, using schools and youth organizations established to recruit, participants must know each other before joining. Predetermined groups of people may have internal social dynamics that facilitate or hinder the participation of members of different groups in discussions. Influential members can move the conversation forward, helping to create a non-representative graph of ideas in the group. Although qualitative research does not require representation or simplification like qualitative research, the usefulness of qualitative research is widely discussed. Detailed search sequences and sample descriptions are recommended to facilitate use of the results in other contexts.

One potential limitation is movement or fear of expression when sharing personal experiences or speaking against others, which may prevent participants from expressing opinions and ideas. On the other hand, sharing as a group can create a sense of security when sharing with others, especially those they are familiar with. In addition, focus groups may be preferred for individual interviews when examining behaviours and practices between people, as was the case in the current study.

Future study recommendation

In practice, it is advisable to provide adequate opportunities for timely entry and reservation. However, more research is needed to reach agreement on the best solution for youth health services and the possibility of separating girls from boys. As a final note, it is important to ensure respectful and supportive behaviour of staff in all activities and interventions, as this is an important aspect of youth health services, according to the participants in this study.

References

1. Abuosi, A., 2021. Social Health Insurance and Quality of Care in Ghana's Hospitals. Bulletin of the World Health Organization, 10(3), pp. 20-21.
2. Waddington, C., & Sambo, C. , 2021. Financing health care for adolescents: a necessary part of universal health coverage. Bulletin of the World Health Organization, 93(1), pp. 13-13.
3. UNICEF, 2021. Global standards for quality health-care services for adolescents: a guide to implement a standards-driven approach to improve the quality of health care services for adolescents.. Volume 2, pp. 10-11.
4. Slife, B. D. &. W. R. N., 2021. What's behind the research?: Discovering hidden assumptions in the behavioral sciences. Sage, III(3), pp. 10-21.
5. Samargia, L. A. S. E. M. &. E. B. A., 2020. Foregone mental health care and selfreported access barriers among adolescents. The Journal of School Nursing, I(45), pp. 40-53.
6. Mitchell, P. H. F. S. &. J. B. M., 2021. Quality health outcomes model. Journal of Nursing Scholarship, IV(34), pp. 48-54.
7. Enuameh, Y. N. O. E. M. E. T. C. B. E. S. A. &. Z. C., 2021. Family Planning Needs of Adolescents in Predominantly Rural Communities. .Open Journal of Preventive Medicine, IX(23), pp. 47-54.
8. Campbell, S. M. R. M. O. &. B. S. A., 2021. Defining quality of care. Social Science& Medicine, IV(7), pp. 1611-1625.
9. Biddlecom, A. E. S. S. &. M. A., 2021. Adolescents' views of and preferences for sexual and reproductive health services. original research article. Journal of Reproductive Health, vI(4), pp. 45-63.
10. Boamah, 2021. Quality in healthcare: concepts and practice. VI(6), pp. 10-12.
11. Berwick, D. M. &. K. M. G., 2021. Theory and practice for measuring health care quality. Health Care Financing Review, VI(3), pp. 28-36.
12. Mngadi, P. T. F. E. Z. I. T. H. B. &. R., 2021. Health providers' perceptions of adolescent sexual and reproductive health care in Swaziland. International Nursing Review, VII(82), pp. 43-53.
13. Alizay, 2019. Improving the quality of health care services for adolescents, globally: A standards-driven approach. Journal of Adolescent Health, VI(3), pp. 12-15.
14. Tufail, Jamni, Zahin, & Kamal . 2021.
15. John, 2020. The definition of quality and approaches to its assessment. V(3), p. 19.
16. Pallant, J., 2021. SPSS survival manual: A step by step guide to using SPSS for windows (version 23). New South Wales, Australia: Allen & Unwin., VIX(35), pp. 39-53.

Prevalence of Depression in adults with type 2 Diabetes Mellitus in the Middle East countries and the factors associated with it: A systematic review

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Abstract

Aims and Objectives: This study aims to assess the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries and the factors associated with it.

Method: This narrative systematic review followed the Preferred Reporting Items for Systematic Review guidelines. Studies published from January 2000 to December 2020 were retrieved through database search engines from PubMed, EMBASE, Medline Ovid, and Google Scholar. Joanna Briggs Institute checklist for prevalence studies was used to assess the quality of the studies.

Results: A total of 12 studies were retrieved from search databases from 8 different countries in the Middle East including Saudi Arabia, Egypt, UAE, Iran, Iraq, Kuwait, Israel, and Palestine, and the data are summarized in narration. The prevalence of depression in type 2 diabetes mellitus in the Middle East is found to be fairly high ranging from 17% to 74.4%. Egypt has the highest prevalence of depression whereas UAE has the lowest. Female gender, uncontrolled glycemia, and diabetic complications are the major predictors of depression in type 2 diabetics. Longer duration of diabetes, low education, low socioeconomic status, physical inactivity, and insulin users are among other associated factors.

Conclusion: The prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries is high with a wide-ranging difference. The factors associated with the development of depression in type 2 diabetes need to be addressed and taken care of. Lack of meta-analysis is the major limitation of this study that could be considered for future reviews.

Keywords:
depression, adults, type 2 diabetes mellitus, Middle East

Introduction

Background:
Diabetes is a rapidly emerging non-communicable disease putting a huge burden on the global health system and economy. In 2015, 1.31 trillion USD (95% CI 1.28-1.36) or 1.8% (95% CI 1.8-1.9) of global gross domestic product (GDP) was the estimated cost of diabetes (1). According to the International Diabetes Federation Diabetes Atlas, 9th edition, the estimated prevalence of global diabetes in 2019 was 9.3% (463 million people). This number is expected to rise more to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045 (2).

Depression is a common accompaniment of many chronic illnesses including diabetes. A meta-analysis conducted in 2001 showed that the odds of depression in the diabetic group were twice that of the non-diabetic comparison group (OR = 2.0, 95% CI 1.8–2.2) (3). A more recent meta-analysis conducted in 2006 included studies from the USA, Europe, and Iraq, which also showed the prevalence of depression to be 17.6% higher among those with type 2 diabetes than those without (4). Among those with diabetes, depression is associated with a 50-70% increase in health service cost (5). There is a significant increase in mortality in those who are depressed and have diabetes (6). Depression is also found to be associated with poor glycemic control and its complications including retinopathy, nephropathy, neuropathy, and other macro-vascular events (7).

Self-care is one of the key elements of diabetes care to maintain the optimal wellbeing of people with type 2 diabetes (8). A healthy diet, physical activity, regular medication, and self-monitoring of blood glucose were found to be associated with significant improvement of HbA1c levels, and non-adherence of any of these factors may lead to diabetes-related complications (9). Depression imposes adverse outcomes in patients with diabetes leading to poor self-care, less physical activities, poor diet, and smoking, all of which are also the reasons for uncontrolled hyperglycemia and its sequel, ultimately affecting the quality of life. One meta-analysis has concluded that depression has a very high risk of mortality over a lifetime in people with diabetes approximating 1.5-fold (10,11).

The relation between diabetes and depression can be bidirectional (12). Diabetes is regarded as a risk factor for the development of depression and depression is also considered a major contributor to the development of diabetes. However, there is uncertainty about what causes depression in people with diabetes. A population-based study done in 2005 showed that the presence of other chronic co-morbidities was attributed to depression among people with type 2 diabetes (13). Depression is common by two folds in diabetes patients as compared to the general population (14). Diabetes and other chronic diseases can lead to high level of distress among people. However, the emotional problems of diabetic patients are not recognized by the health personnel most of the times (15).

The Middle East and North Africa (MENA) region has one of the highest prevalence of diabetes in the world estimated at around 9.2% (equivalent to 34.5 million) of the adult population in 2013 and is expected to rise to 11.6% by 2035. This increase is attributed hugely to an uprising economy and urbanization with changes in lifestyle leading to less physical activity, increased consumption of carbohydrate diets, and resulting obesity (16). Out of the 34.5 million diabetes cases, 17 million people in MENA region are undiagnosed and not aware of their condition. Several factors including access to healthcare, affordability of care, quality of healthcare service, etc. are considered to be the reasons for undiagnosed cases. As these cases remain undiagnosed, they are liable to more complications and poor outcomes thus demanding early screening. On the other hand, timely detection of depression in diabetes is essential to address the barriers to self-care which will eventually help in reducing the complications associated with it. Hence, more studies on this field in this part of the world are needed which could help raise awareness among the health professionals to be vigilant in assessing depression in such vulnerable groups and help the patients improve their quality of life.

Methodology

1 Aim:
This study aims to assess the prevalence of depression in adults with type 2 diabetes mellitus in Middle East countries.
2 Objectives:
The objective of this systematic review is to analyze the prevalence of depression in adults with type 2 diabetes in the Middle East countries and the factors associated with it. The purpose of this study is to consolidate the findings and help improve self-care and management thus reducing the adverse outcomes associated with it in these vulnerable groups.
3 Study Design:
A systematic review was conducted following the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines and the quality of findings was reported using the Joanna Briggs Institute (JBI) checklist (17,18)
4 Search Strategy:
All the studies were retrieved through databases including PubMed, EMBASE, Ovid Medline, and Google scholar. Appropriate Boolean operators (“AND” and “OR”) were incorporated into the search strategy. Key search terms used with MeSH headings were “Type 2 Diabetes Mellitus” OR “T2DM” OR “Type 2 Diabetes” OR “Non-Insulin Dependent Diabetes Mellitus” OR “NIDDM” AND “Depression” OR “Depressive Symptoms” OR “Major Depression” OR “Mental Health” AND “Middle East” OR “Gulf Countries” AND “Prevalence” OR “Occurrence” OR “Frequency” OR “Incidence” OR “Demography”. The reference lists of the included articles were searched for additional eligible studies by using the reference manager software program Zotero.

5 Study Selection:
All the studies were selected and reviewed based on the following criteria after screening the title and abstract and the entire article.

Inclusion criteria:
All the observational studies (cross-sectional, case-control, and cohort) on the prevalence of depression in type 2 diabetes conducted in adults above 18 years in Middle East countries with full texts published in the English language from January 2000 till December 2020 were included.
Exclusion criteria:
Type 1 diabetes, gestational diabetes, less than 18 years of age, preexisting depression or other mental health issues, review articles, and non-peer-reviewed (grey) literature were excluded.

The PRISMA flowchart is shown to demonstrate the screening process (17) and the reasons for exclusion of the studies (Figure.1).

6 Data Extraction
Different variables from the included studies, like population characteristics (age and sex), study aim and design (cross-sectional, case-control, and cohort), citation, country of studies, year of publication, population and sample size, sampling technique, and data analysis were formulated and compiled in a data extraction form (Table 1).
7 Quality assessment:
The quality of this study was assessed by the Joanna Briggs Institute (JBI) critical appraisal checklists for prevalence studies (Table 2) (19). The checklist looked into 9 criteria focusing on sampling frame, sampled population, study population, and settings, sufficient coverage of the identified population in data analysis, valid methods used for identification of the condition, measurement of statistical analysis, and response rate. A final score obtained by each study on the individual domain of the checklist was demonstrated.
8 Data Analysis:
A systematic narrative synthesis was performed summarizing the study design and the findings from all the studies and relevant tables presented to portray the prevalence of depression in type 2 diabetes. Quality of each study is assessed by JBI critical appraisal tool and summarized in a tabular form. The association of the different socio-demographic factors with depression and type 2 diabetes were discussed. The meta-analysis was not performed due to heterogeneity in study designs and study tools used to measure the outcome.

Ethical Approval:
This is a systematic review of previously published articles without human involvement and hence, will not require any ethical approval.

Results

A total of 3129 potentially relevant articles were retrieved from the search engines (Embase 83, Ovid Medline 25, PubMed Central 661, Google Scholar 2360). After excluding articles which were not relevant and done in non-Middle East countries (2936), 193 articles were selected. Fifteen articles were removed as were duplicate and so total 178 articles that were conducted in Middle east countries were included. However, out of these, 160 were removed after abstract reading, 2 removed as full articles couldn't be retrieved, 4 articles removed as they included both type 1 and type 2 diabetes and 1 removed as it contained age less than 18 years. One article was included from the reference list of one of the articles. Hence, in total, 12 articles were selected for final review. Full selection criteria are detailed in the PRISMA flow chart (Figure 1.).

1 Characteristics of the studies
Four studies are from Saudi Arabia, 2 from Egypt, and one each from UAE, Israel, Kuwait, Iran, Iraq, and Palestine. Eight studies are cross-sectional without control groups and 4 are cross-sectional including control groups. All the participants were known type 2 diabetics following up with their diabetes clinic. Different depression measurement tools were used in different studies (Table 1).

Two studies from Egypt showed the highest prevalence of depression in adults with type 2 diabetes mellitus (74.4% and 69% (20,21), whereas Saudi Arabia has a fairly high depression rate (62.5%, 49.6%, 37.9%, and 32.1%) (4,22–24). UAE has the lowest prevalence (17%) (25). Iraq (26), Palestine (27) and Iran (28) are the next with high prevalence (44.5%, 40.2%, and 37.8% respectively) whereas Israel (29) and Kuwait (30) have the similar figure (29%). Four cross-sectional studies with control showed that the prevalence of depression was almost double in the diabetic cases than their control. (24, 26, 28, 31)

Two studies from Egypt showed a statistically significant association between depression and poorly controlled diabetes, female gender, longer duration of diabetes, insulin users, and those with diabetic complications (32,33). Among 4 Saudi studies, two studies showed a significant association between depression and poorly controlled diabetes (23,34) and the other two showed higher depression rates significantly associated with diabetic complications (31,35). However, even though depression is highly prevalent in the female gender and longer duration of diabetes, there was no statistically significant association between depression and age, gender, and duration of diabetes.(23)

A study from Iran showed a significantly higher prevalence of depression in diabetic women than in non-diabetic women (39.7% vs 15%) and those with retinopathy than those with no retinopathy (55.6% vs 24%). However, the correlation between depression and diabetes duration, HbA1c level, and BMI has no statistical significance. The study concluded that diabetes was the only significant determinant of depression (P = 0.005, 95% CI = 0.118 – 0.667) (36),

Similarly, a study in Palestine also showed no significant association between depression and glycemic control and duration of diabetes. However, the study showed that female gender, low education level, joblessness, multiple additional illnesses, low medication adherence, and obesity are strongly associated with depression (37).

The study from Iraq showed both the diabetics and control groups scored more than 16, which is the lower threshold for diagnosis of depression in CES-D. The study postulated that almost all their population will have depression if these figures are applied in general (26).

A study conducted in people over the age of 50 years of age in Israel found that diabetic females were more likely to have depression compared to their male counterparts, and those with financial distress and limited physical activities were also more likely to be depressed (29). A study from Kuwait showed similar findings with diabetic females and physically inactive people being more likely to have depression.(30) They also showed that depression was more likely to be seen among Kuwaiti nationality, insulin users, people with high BMI, hypertensive, and those with uncontrolled HbA1c.

UAE, being one of the most developed countries in the Middle East has a sedentary lifestyle. However, it has a lower prevalence of depression in people with type 2 diabetes (17%) as compared to other studies in this review. In this study, depression was significantly associated with female gender, UAE nationality, having low education level, and unemployment (38).

2 Quality assessment of the studies

The quality of these studies was assessed based on the 9 criteria of the JBI checklists for prevalence studies (Table 2). The lowest score was observed for the question related to response rate of the participants (25%). All the studies except Alajmani et al. (2019), and Sehatah et al. (2009) did not report response rates in their studies (25,31). The highest scores (100%) were observed for the questions on sample representation of the target population, detailed description of subject and setting, measurement criteria, and reliability of the condition. Fifty percent of the studies did not clearly explain the sampling methods and 58.33% did not mention the adequacy of the sample size. The use of appropriate statistical analysis is not clearly shown in one study (29) and data analysis of the identified sample is not explained in another study (30). However, the overall score obtained by these studies for each domain of the checklist except for response rate was more than 50%. While the overall quality of the studies is acceptable, there is considerable room for improvement in the quantity and quality of research on this topic.

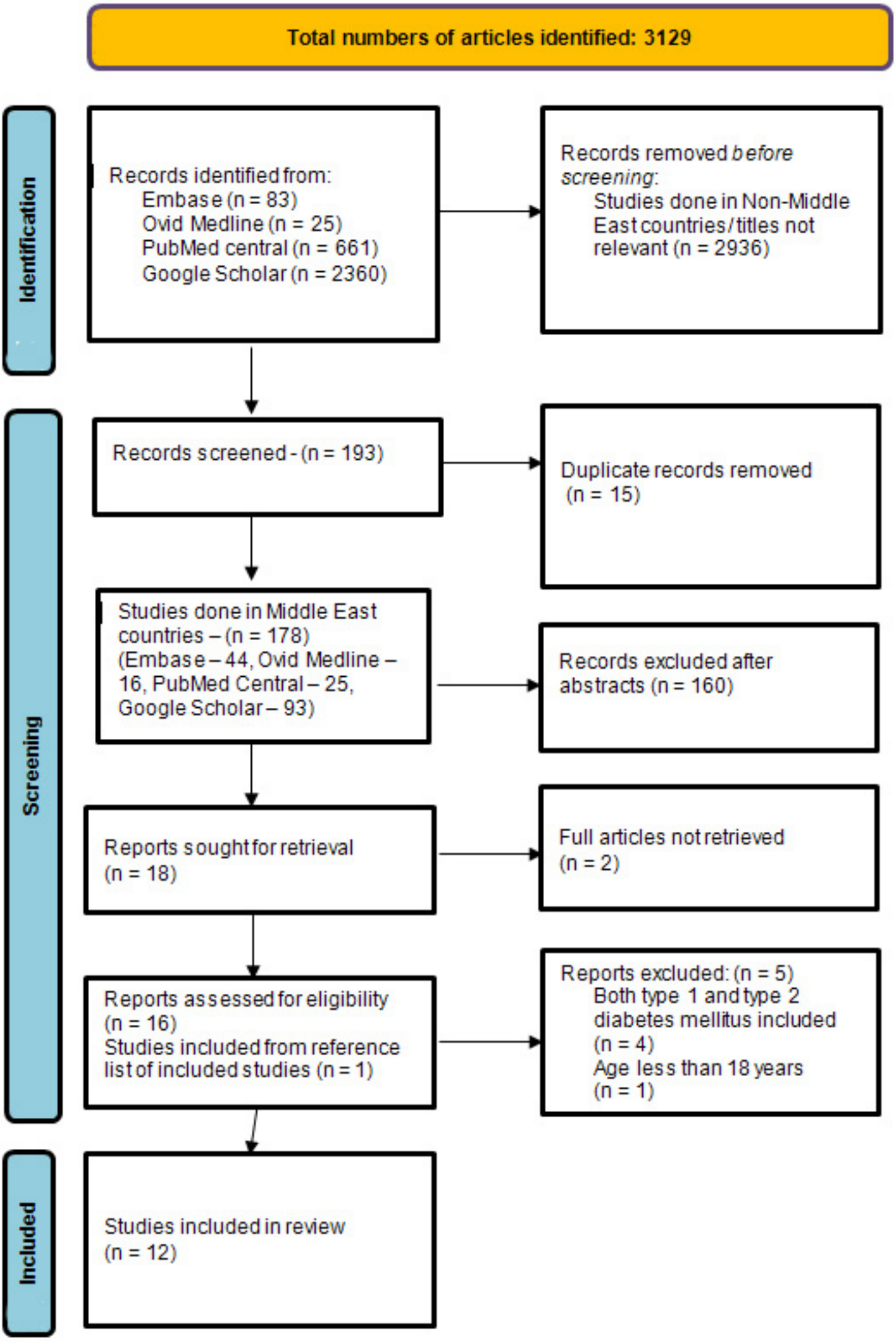
Table 1: Characteristics of the studies

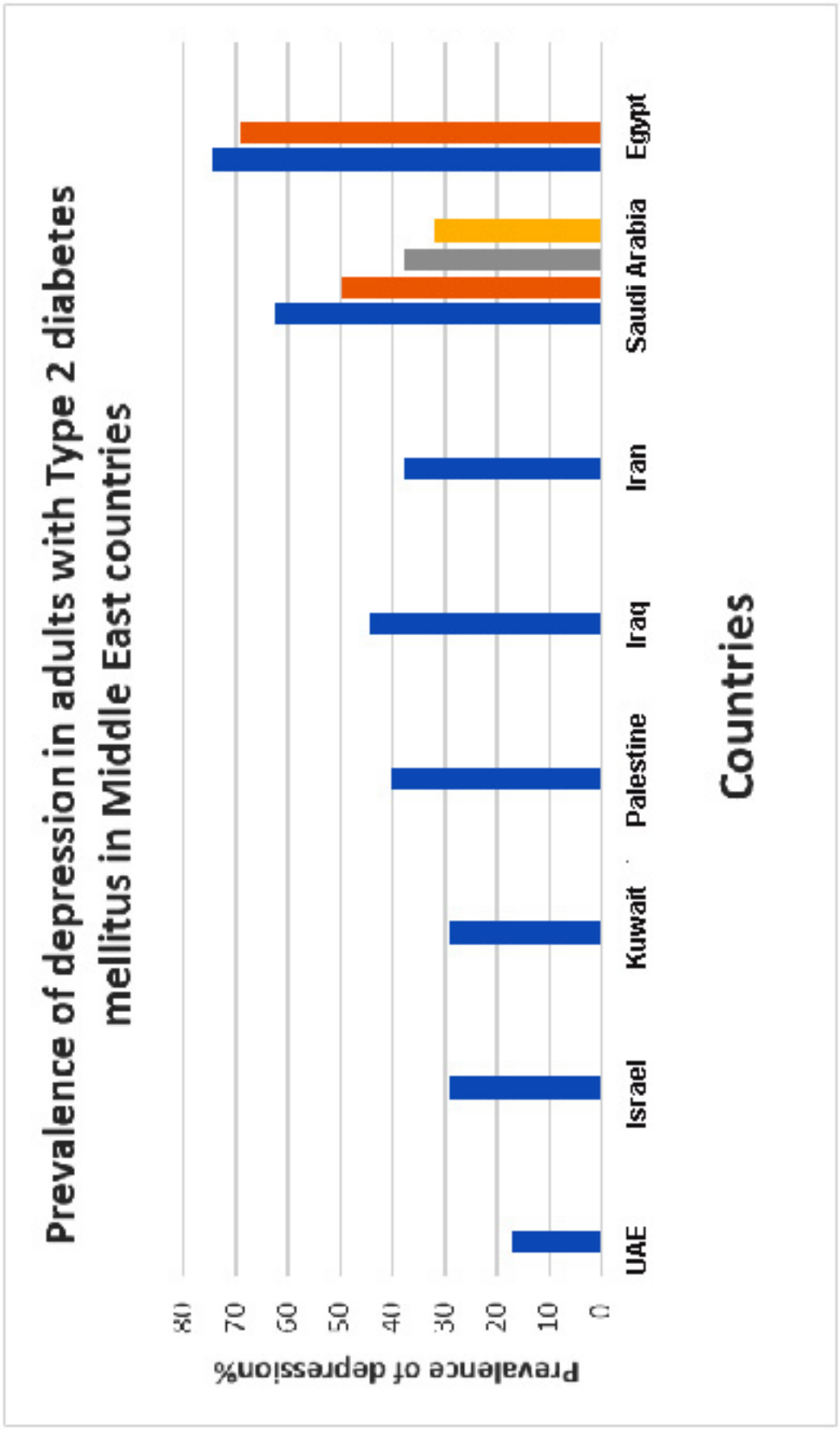
Author/year of publication	Country	Study Design	Sample size/population with T2DM	Mean Age (years)	Sex (female %)	Assessment of Diabetes	Mean duration of diabetes	Assessment of depression	Prevalence of depression %
Alajmani et al/2019	UAE	Cross-sectional	559		57	Known T2DM		BDI (Cutoff−16)	17
Albasheer et al/2017	Saudi Arabia	Cross-sectional	385					PHQ 9 (Cutoff−10)	37.9
Osnat Baskin/2018	Israel	Cross-sectional	561	> 50		Self-reported		EURO-D (Cutoff−3)	29
Al-Ozairi et al/2020	Kuwait	Cross-sectional	260	53.3	48.2	Known T2DM	12.5	PHQ9 (Cutoff−10)	29
El Mahalli A A/2015	Saudi Arabia	Cross-sectional	260			Known T2DM		CES-S (Arabic) (Cutoff−15)	49.6
Ismail et al/2019	Egypt	Cross-sectional	300	42 ±17.11		Known T2DM		PHQ 9 (Cutoff−5)	69.0
Kalantari et al/2014	Iran	Cross-sectional Case control	Case: 90 Control: 90			Known T2DM		BDI	37.8 Control: 16
Mansour and Jabir/2007	Iraq	Cross-sectional Case control	Case: 103 Control: 103	57.7 ±12.7		Known T2DM	At least 1 year	CES-D (Cutoff−16)	Depression Score: 44.5 ±11 Control: 34.4
Saadalla et al/2015	Saudi Arabia	Cross-sectional Case control	Case: 200 Control: 100			Known T2DM		BDI	62.5 Control: 29
Shehatah et al/2009	Saudi Arabia	Cross-sectional Case control	458 Control: 546	65± 8.9		Known T2DM	19±8.7	BDI-II (Cutoff−14)	32.1 Control: 16
Sweileh et al/2014	Palestine	Cross-sectional	294	Median 60		Self-reported	Median 10	BDI-II (Cutoff−16)	40.2
El Shafie et al/2011	Egypt	Cross-sectional	125	48± 5.9	58.4	Known T2DM		MADRS	74.4

Table 2: Critical appraisal of included studies

Study	Was the sample frame appropriate to address the target population?	Were study participants sampled in an appropriate way?	Was the sample size adequate?	Were the study subjects and the setting described in detail?	Was the data analysis conducted with sufficient coverage of the identified sample?	Were valid methods used for the identification of the condition?	Was the condition measured in a standard, reliable way for all participants?	Was there appropriate statistical analysis?	Was the response rate adequate, and if not, was the low response rate managed appropriately?
Alajmani et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Albasheer et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Osnat Baskin	Yes	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown	Unknown
Al-Ozairi et al	Yes	No	Unknown	Yes	Unknown	Yes	Yes	Yes	Unknown
El Mahalli A A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Ismail et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Kalantari et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Mansour and Jabir	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Sadalla et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Unknown
Sehatah et al	Yes	Unknown	Unknown	Yes	Yes	Yes	Yes	Yes	Yes
Sweileh et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
El Shafie et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown
Score %	100.0	50.0	58.33	100.0	91.66	100.0	100.0	91.66	25.0

Figure 1: PRISMA Flow chart




Prevalence of depression in adults with Type 2 diabetes mellitus in Middle East countries
Prevalence of depression%
0
10
20
30
40
50
60
70
80
UAE
Israel
Kuwait
Palestine
Iraq
Iran
Saudi Arabia
Egypt
Countries

Discussion

Depression is a common prevailing comorbid condition in diabetes mellitus (3) and is associated with poor glycemic control leading to microvascular and macro-vascular complications (7). Overall, 12 studies were included in this systematic review from 8 different countries in the Middle East including Saudi Arabia, Egypt, UAE, Iraq, Israel, Kuwait, Iran, and Palestine.

The majority of the participants in these studies scored higher than the cut-off value in the depression assessment tool (Table 1). The prevalence of depression in people with type 2 diabetes mellitus in this review ranged from 17% to 74.4% with the highest in Egypt and lowest in UAE. Four studies, 2 each from Egypt and Saudi Arabia have more than 50% depression prevalence. The rest of the studies showed that more than a quarter of their participants (>25%) have depression except in the UAE where even though more than 50% of the participants responded, the prevalence was down to 17% only. With a wide range of depression prevalence in these studies, it is evident that most people with type 2 diabetes in Middle East countries are depressed and the findings are consistent with the findings from countries in other regions.

A systematic review and meta-analysis in Ethiopia showed nearly 40% pooled estimated prevalence of depression in adults with diabetes mellitus regardless of the diabetes type (39). Similarly, one meta-analysis from India showed a 38% pooled prevalence of depression in type 2 diabetics (40) and another case-control study showed 35.8% (41). There are many factors associated with the development of depression in type 2 diabetes mellitus. Depression was more likely to be seen in female gender as compared to their male counterparts in most studies in this review. Similarly, the uncontrolled glycemia and diabetic complications also showed significant association in this review. A cross-sectional study in Trinidad and Tobago showed similar results of 17.9% as the one in UAE with higher prevalence among females and those with complications(42) . Similarly, a meta-analysis by S. Ali et al. (2006) also showed a depression prevalence of 17.6% in type 2 diabetics as compared to non-diabetic control where females had a higher prevalence than males. One study conducted in Germany showed 30.3% of depression prevalence in type 2 diabetics where females were more affected and those with higher HbA1c levels and diabetic complications had more depression prevalence (43). A similar study conducted in Nepal (44) showed 40.3% of depression prevalence in T2DM with higher prevalence in females (48.2%). A study by Anderson et al. (2001) also showed higher depression prevalence in females(3). A study also found that depression is 2 times higher in type 2 diabetes mellitus than in non-diabetic people (19.1% vs 10.7%) with female predominance (45). One study investigated the prevalence of depression in Arab women only with type 2 diabetes which showed significantly high depression prevalence at 34.1% (46).

The reason for the higher prevalence of depression in type 2 diabetes in the Middle East may be because type 2 diabetes itself is very prevalent in this region owing to urbanization and a sedentary lifestyle (47). The relation between depression and diabetes is not clear and is regarded to be bidirectional (48). Depression is regarded as a consequence of diabetes possibly due to its chronicity. Also, it is postulated that biochemical changes in depression may play a role in the development of diabetes as well as negative self-care behavior (49).

Physical inactivity, low socioeconomic condition, longer duration of diabetes, and Insulin users are among other associated factors. Improving the modifiable factors in type 2 diabetes, for instance, glucose level control, encouraging physical activity, diabetic education, and timely diagnosis of diabetes, etc. can have a positive impact on glycemia, eventually leading to fewer complications related to it and better mental health. Likewise, identification of depression in diabetic patients through screening programs in diabetic clinics, hospitals, or primary care centers can result in early detection of depression and its treatment triggering self-care and overall improvement of diabetes.

There are several limitations in this review. Firstly, out of 17 countries in the Middle East, studies from only 8 countries are included here. Many studies could not be retrieved in full texts, and some included both type 1 and 2 diabetes cases. So, studies from the rest of the countries were not included which could have yielded more results. Secondly, only those studies published in the English language are included. There must be many similar studies published in their local language which were excluded. Thirdly, only one independent reviewer is included in this review, and the decision to include or exclude the studies was taken by him which may be considered as a source of bias. Fourthly, this review included only cross-sectional and case control studies and so the causal nature and direct relationship between depression and type 2 diabetes mellitus cannot be interpreted. Finally, this is a narrative summary without meta-analysis and the pooled prevalence of depression was not done.

Despite the limitations, this review provides an overview of the varying ranges of prevalence for depression in type 2 diabetes. It also highlights that though most studies conducted in the region have acceptable quality, better-designed studies are necessary to provide stronger evidence related to prevalence in the study. The findings of this study also highlight the need for more countries in this part of the region to conduct not only the prevalence studies for depression in type 2 diabetes but also how to address and manage depression and other mental health issues in primary care and improve the quality of their life. It also paves way for designing intervention studies to increase awareness among health professionals to timely diagnose depression in type 2 diabetes and identify ways to improve mental health among type 2 diabetic patients.

Conclusion

There is no doubt that depression is a very prevalent comorbid condition in adults with type 2 diabetes mellitus in Middle East countries. Overall, epidemiological studies have shown that depression is 13% to 18% common in the general population in the Middle East and North Africa region (50) with the rate double in females than males. It has an intense effect on one's quality of life leading to many deaths including suicide. However, there may have been many undiagnosed and undetected people with depression. Timely detection and treatment for both diabetes and depression warrant priority. This can be carried out by setting protocols of routine screening of depression in those with type 2 diabetes mellitus in all chronic disease clinics, diabetic and endocrine clinics, and primary health centers. Appropriate depression tools and treatment protocols should be incorporated as a routine practice. Health care providers in all health care centers and hospitals must provide education that includes mental health issues to diabetic patients. More research is warranted in the Middle East region in this sector to investigate the causal factor of depression in diabetes and vice versa so that it can be implemented into practice to identify the condition in time and improve quality of life.

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References

1. Bommer C, Heesemann E, Sagalova V, Manne-Goehler J, Atun R, Bärnighausen T, Vollmer S. The global economic burden of diabetes in adults aged 20–79 years: a cost-of-illness study. The lancet Diabetes & endocrinology. 2017 Jun 1;5(6):423-30.
2. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9 th edition - PubMed [Internet]. [cited 2022 Jan 15]. Available from: https://pubmed.ncbi.nlm.nih.gov/31518657/
3. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. Diabetes Care. 2001 Jun;24(6):1069–78.
4. Ali S, Stone MA, Peters JL, Davies MJ, Khunti K. The prevalence of co-morbid depression in adults with Type 2 diabetes: a systematic review and meta-analysis. Diabet Med. 2006 Nov;23(11):1165–73.
5. Simon GE, Katon WJ, Lin EHB, Ludman E, VonKorff M, Ciechanowski P, et al. Diabetes complications and depression as predictors of health service costs. Gen Hosp Psychiatry. 2005 Oct;27(5):344–51.
6. Park M, Katon WJ, Wolf FM. Depression and Risk of Mortality in Individuals with Diabetes: A Meta-Analysis and Systematic Review. Gen Hosp Psychiatry. 2013;35(3):217–25.
7. Lustman PJ, Anderson RJ, Freedland KE, de Groot M, Carney RM, Clouse RE. Depression and poor glycemic control: a meta-analytic review of the literature. Diabetes Care. 2000 Jul;23(7):934–42.
8. Educators AA of D. AADE Guidelines for the Practice of Diabetes Self-Management Education and Training (DSME/T). Diabetes Educ. 2009 Nov 1;35(3_suppl):85S-107S.
9. Houle J, Beaulieu M-D, Chiasson J-L, Lespérance F, Côté J, Strychar I, et al. Glycaemic control and self-management behaviours in Type 2 diabetes: results from a 1-year longitudinal cohort study. Diabet Med. 2015 Sep;32(9):1247–54.
10. Danese A, Moffitt T, Harrington H, Milne B, Polanczyk G, Pariante C, et al. Adverse Childhood Experiences and Adult Risk Factors for Age-Related Disease: Depression, Inflammation, and Clustering of Metabolic Risk Markers. Archives of pediatrics & adolescent medicine. 2009 Dec 1;163:1135–43.
11. Dooren FEP van, Nefs G, Schram MT, Verhey FRJ, Denollet J, Pouwer F. Depression and Risk of Mortality in People with Diabetes Mellitus: A Systematic Review and Meta-Analysis. PLOS ONE. 2013 Mar 5;8(3):e57058.
12. Simmons JH, Chen V, Miller KM, McGill JB, Bergenstal RM, Goland RS, et al. Differences in the management of type 1 diabetes among adults under excellent control compared with those under poor control in the T1D Exchange Clinic Registry. Diabetes Care. 2013 Nov;36(11):3573–7.
13. Engum A, Mykletun A, Midthjell K, Holen A, Dahl A. Depression and Diabetes: A large population-based study of sociodemographic, lifestyle, and clinical factors associated with depression in type 1 and type 2 diabetes. Diabetes Care. 2005 Sep 1;28:1904–9.
14. Peyrot M, Rubin R. Peyrot, M. & Rubin, R. R. Behavioral and psychosocial interventions in diabetes: a conceptual review. Diabetes Care 30, 2433-2440. Diabetes care. 2007 Nov 1;30:2433–40.
15. Nurses' recognition and registration of depression, anxiety and diabetes-specific emotional problems in outpatients with diabetes mellitus - PubMed [Internet]. [cited 2022 Jan 15]. Available from: https://pubmed.ncbi.nlm.nih.gov/16442465/
16. Majeed W, Aslam B, Javed I, Khaliq T, Muhammad F, Ali A, et al. Breast cancer: major risk factors and recent developments in treatment. Asian Pac J Cancer Prev. 2014;15(8):3353–8.
17. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic Reviews. 2015 Jan 1;4(1):1.
18. critical-appraisal-tools - Critical Appraisal Tools | Joanna Briggs Institute [Internet]. [cited 2022 Jan 15]. Available from: https://jbi.global/critical-appraisal-tools
19. Munn Z, Moola S, Riitano D, Lisy K. The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. Int J Health Policy Manag. 2014 Aug 13;3(3):123–8.
20. El-Shafie TM, El-Saghier EOA, Ramadan IK. Depression among type 2 diabetic patients. The Egyptian Journal of Hospital Medicine. 2011 Jul 1;44(1):258–71.

21. Ismail MFS, Fares MM, Abd-Alrhman AG. Prevalence of Depression and Predictors of Glycemic Control among Type 2 Diabetes Mellitus Patients at Family Medicine Clinic, Suez Canal University Hospital Egypt. ME-JFM. 2019 Feb;17(2):4–13.
22. Saadalla A, Mirghani H, Mohammed O, Alyoussef A, Alfarraj M, Elbadawi A. Depression and type 2 diabetes mellitus: A case-control study in Tabuk, Saudi Arabia. 2015.
23. El Mahalli A. Prevalence and Predictors of Depression among Type 2 Diabetes Mellitus Outpatients in Eastern Province, Saudi Arabia. Int J Health Sci (Qassim). 2015 Apr;9(2):119–26.
24. S A, Ma S, Jl P, Mj D, K K. The prevalence of co-morbid depression in adults with Type 2 diabetes: a systematic review and meta-analysis. Diabetic medicine: a journal of the British Diabetic Association [Internet]. 2006 Nov [cited 2022 Jan 15];23(11). Available from: https://pubmed.ncbi.nlm.nih.gov/17054590/
25. Alajmani DSA, Alkaabi AM, Alhosani MW, Folad AA, Abdouli FA, Carrick FR, et al. Prevalence of Undiagnosed Depression in Patients With Type 2 Diabetes. Frontiers in Endocrinology [Internet]. 2019 [cited 2022 Jan 15];10. Available from: https://www.frontiersin.org/article/10.3389/fendo.2019.00259
26. Mansour AA, Jabir MA. THE PREVALENCE OF COMORBID DEPRESSION AMONG ADULTS WITH DIABETES IN SOUTHERN IRAQ. :3.
27. Sweileh WM, Abu-Hadeed HM, Al-Jabi SW, Zyoud SH. Prevalence of depression among people with type 2 diabetes mellitus: a cross sectional study in Palestine. BMC Public Health. 2014 Dec;14(1):1–11.
28. Kalantari S, Jafarinezhad A, Zohrevand B. Association of depression with type 2 diabetes and relevant factors. Advanced Biomedical Research. 2014 Jan 1;3(1):244.
29. Bashkin O. Depression Among Older Adults with Diabetes in Israel: Pattern of Symptoms and Risk Factors. Isr Med Assoc J. 2018 Apr;20(4):222–6.
30. Al-Ozairi E, Al Ozairi A, Blythe C, Taghadom E, Ismail K. The Epidemiology of Depression and Diabetes Distress in Type 2 Diabetes in Kuwait. J Diabetes Res. 2020;2020:7414050.
31. Shehatah A, Rabie MA, Al-Shahry A. Prevalence and correlates of depressive disorders in elderly with type 2 diabetes in primary health care settings. J Affect Disord. 2010 Jun;123(1–3):197–201.
32. El-Shafie TM, El-Saghier EOA, Ramadan IK. Depression among type 2 diabetic patients. The Egyptian Journal of Hospital Medicine. 2011 Jul 1;44(1):258–71.
33. Ismail MFS, Fares MM, Abd-Alrhman AG. Prevalence of Depression and Predictors of Glycemic Control among Type 2 Diabetes Mellitus Patients at Family Medicine Clinic, Suez Canal University Hospital Egypt. ME-JFM. 2019 Feb;17(2):4–13.
34. Alzughbi T, Badedi M, Darraj H, Hummadi A, Jaddoh S, Solan Y, et al. Diabetes-Related Distress and Depression in Saudis with Type 2 Diabetes. Psychol Res Behav Manag. 2020;13:453–8.
35. Iqbal Q, Bashir S, Iqbal J, Iftikhar S, Godman B. Assessment of medication adherence among type 2 diabetic patients in Quetta city, Pakistan. Postgraduate Medicine. 2017 Aug 18;129(6):637–43.
36. Kalantari S, Jafarinezhad A, Zohrevandi B. Association of depression with type 2 diabetes and relevant factors. Advanced biomedical research. 2014 Nov 29;3:244.
37. Sweileh WM, Abu-Hadeed HM, Al-Jabi SW, Zyoud SH. Prevalence of depression among people with type 2 diabetes mellitus: a cross sectional study in Palestine. BMC Public Health. 2014 Feb 13;14(1):163.
38. Alajmani DSA, Alkaabi AM, Alhosani MW, Folad AA, Abdouli FA, Carrick FR, et al. Prevalence of Undiagnosed Depression in Patients With Type 2 Diabetes. Frontiers in Endocrinology. 2019;10:259.
39. The Prevalence of Depression among Diabetic Patients in Ethiopia: A Systematic Review and Meta-Analysis, 2018 [Internet]. [cited 2022 Jan 15]. Available from: https://www.hindawi.com/journals/drt/2018/6135460/
40. Hussain S, Habib A, Singh A, Akhtar M, Najmi AK. Prevalence of depression among type 2 diabetes mellitus patients in India: A meta-analysis. Psychiatry Research. 2018 Dec 1;270:264–73.
41. Siddiqui S. Depression in type 2 diabetes mellitus—A brief review. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2014 Jan 1;8(1):62–5.
42. Prevalence of depression in type 2 diabetic patients in Trinidad and Tobago - PubMed [Internet]. [cited 2022 Jan 15]. Available from: https://pubmed.ncbi.nlm.nih.gov/24831901/
43. Jacob L, Kostev K. Prevalence of depression in type 2 diabetes patients in German primary care practices. Journal of Diabetes and its Complications. 2016 Apr 1;30(3):432–7.
44. Niraula K, Kohrt BA, Flora MS, Thapa N, Mumu SJ, Pathak R, et al. Prevalence of depression and associated risk factors among persons with type-2 diabetes mellitus without a prior psychiatric history: a cross-sectional study in clinical settings in urban Nepal. BMC Psychiatry. 2013 Nov 15;13(1):309.
45. Epidemiology of depression and diabetes: a systematic review - PubMed [Internet]. [cited 2022 Jan 15]. Available from: https://pubmed.ncbi.nlm.nih.gov/23062861/
46. Hawamdeh S, Dator WLT, Abunab HY. Prevalence of Depression among Arab Women with Type 2 Diabetes: A Systematic Review and Meta-Analysis. Health. 2016;08(07):650.
47. Majeed A, El-Sayed AA, Khoja T, Alshamsan R, Millett C, Rawaf S. Diabetes in the Middle-East and North Africa: an update. Diabetes Res Clin Pract. 2014 Feb;103(2):218–22.
48. Population-Based Cohort Analyses of the Bidirectional Relationship Between Type 2 Diabetes and Depression [Internet]. [cited 2022 Jan 15]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3554286/
49. The bidirectional relationship of depression and diabetes: a systematic review - PubMed [Internet]. [cited 2022 Jan 15]. Available from: https://pubmed.ncbi.nlm.nih.gov/21963669/
50. Razzak HA, Harbi A, Ahli S. Depression: Prevalence and Associated Risk Factors in the United Arab Emirates. Oman Med J. 2019 Jul;34(4):274–82.

Diagnosing Boerhaave Syndrome in a 16-year-old girl in a primary care centre

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Summary

Boerhaave syndrome is the spontaneous rupture of the oesophagus due to raised intra-oesophageal pressure and is a potentially fatal condition. The patient often presents with retrosternal chest pain and upper abdominal pain associated with significant history of retching and vomiting. The condition has a mortality rate of up to 40% hence early diagnosis and timely intervention is crucial. This emergency is rarely seen in children and young adolescents. We report a case of Boerhaave syndrome in a 16-year-old girl who presented to a primary care setting with vomiting, abdominal pain, and subcutaneous emphysema. The diagnosis of oesophageal rupture was made clinically. Thus, immediate referral to secondary care was vital in providing urgent management. This discussion highlights that this emergency can present in younger age adolescents, therefore high index of suspicion is imperative for good prognosis.

Key words: Boerhaave syndrome, oesophageal perforation

Background

Boerhaave syndrome is rare in children under the age of 18 years however it should be considered if there is a history of neck, chest or abdominal pain associated with preceding vomiting episodes. Focused clinical evaluation especially to look for subcutaneous emphysema, pneumothorax and pleural effusion is important. There should be a high index of clinical suspicion and awareness of this condition by front-line clinicians. These are the most important factors especially in a primary care setting where there is no access to immediate imaging like a chest X-ray. This case highlights a positive outcome after a timely referral to specialist services in hospital was made with a clinical diagnosis of oesophageal rupture in primary care. Absence of classic features can cause a diagnostic challenge.

Case Report

In a general practice surgery, a telephone call was triaged by a general practitioner (GP). The call was from a mother of a 16-year-old Caucasian girl who was previously fit and well with no significant past medical history. The mother mentioned that her daughter has recently been complaining of constipation and had vomited several times overnight. The patient reported passing small amount of stool the day before. The mother was advised to bring her daughter to the surgery for a medical consultation. The patient was reluctant to visit the surgery and declined a face-to-face appointment. Therefore, telephonic advice was given about managing the constipation and offering anti-sickness medication along with safety netting. The mother rang an hour later as she was concerned about the appearance of her daughter's chest and there was also complaint of mild chest and abdominal pain. An urgent review was arranged in the primary care. The patient appeared alert but unwell. Her blood pressure was 126/84 mmHg, heart rate was 133 beats/ minute, respiratory rate was 18 breaths/ minute, temperature 37.7° with oxygen saturation being 98% in air. Chest examination revealed a palpable subcutaneous emphysema over the anterior chest wall. There was no respiratory distress. Her abdomen was generally tender, and her urine dipstick showed presence of ketones.

The provisional diagnosis made by the GP was oesophageal rupture due to excessive vomiting, leading to subcutaneous emphysema. The patient was admitted urgently to the local hospital for further management under the care of surgical team. In the hospital, the patient had a chest x-ray showing a pneumomediastinum and subcutaneous emphysema as seen in Figure 1. This was also seen on CT thorax confirming the rupture of mid oesophagus (Figure 2). The patient was managed conservatively with nil oral intake along with nasogastric tube drainage, intravenous antibiotics, fluids, parenteral nutrition through a central line. She was an inpatient for nine days. The patient made a full recovery as no leak from the oesophagus was seen in the water-soluble contrast swallow study (Figure 3), on day 8 of admission at which point oral intake was commenced

Figure 1: Chest X-ray showing pneumomediastinum (red arrow) and subcutaneous emphysema (yellow arrow).

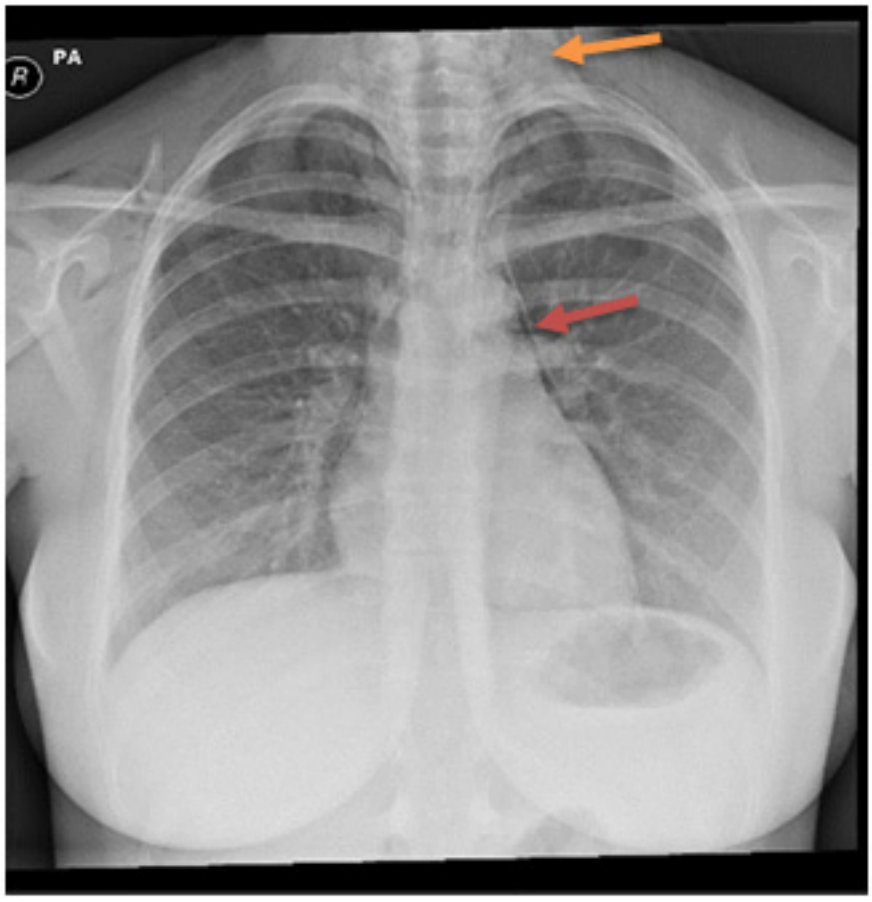


Figure 2: CT thorax coronal view showing pneumomediastinum as shown by the red arrow and subcutaneous emphysema indicated by the yellow arrow.

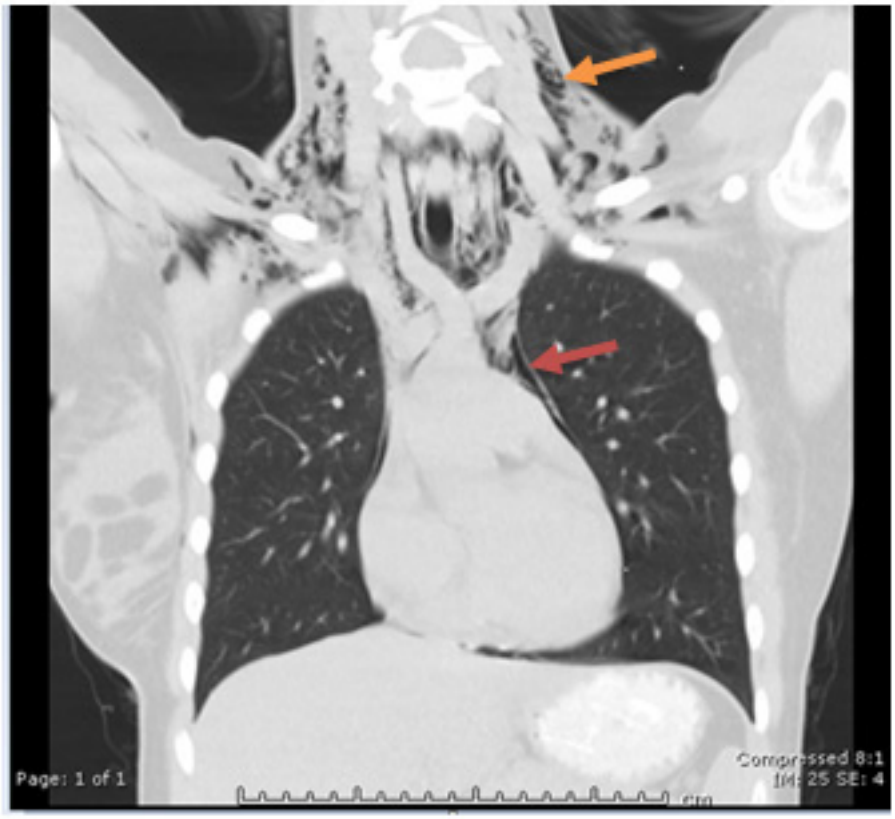
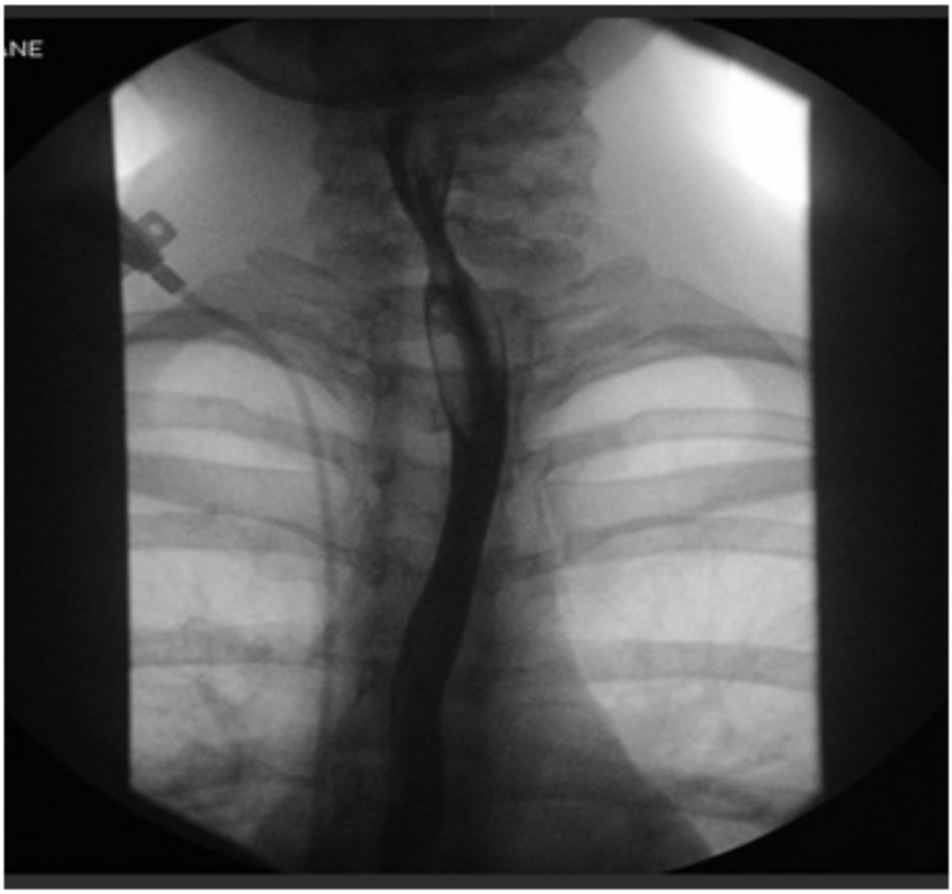


Figure 3: Water soluble contrast swallow where the contrast is seen flowing through the oesophagus with no evidence of perforation or leak on day 8 of admission. There is no bolus hold-up.



Discussion

Spontaneous transmural oesophageal rupture, also known as Boerhaave's syndrome, is a rare condition occurring due to sudden increased intra-oesophageal pressure. This is usually seen because of repeated vomiting or retching. The first case of Boerhaave syndrome was reported in the 18th century, where an elderly male developed vomiting after a large meal, leading to oesophageal rupture (1). The patient died 24 hours later with septic shock. Oesophageal ruptures most commonly occur in the distal third as it is inherently weaker than the rest of the oesophagus with lack of supportive surrounding tissues (2).

Vomiting is considered to be the most common cause for spontaneous oesophageal rupture, often linked to alcohol abuse, excessive food intake and bulimia (1,2,5). Other causes which can be implicated in increasing the oesophageal pressure are heavy lifting, during labour, straining at defecation and epileptic seizures (2, 5). Literature review shows men between the ages of 30-50 years are at greater risk for oesophageal perforation (5, 8). The rupture occurs typically in healthy oesophagus though there have been rare case reports of rupture seen in individuals with eosinophilic oesophagitis (5, 6, 7). In children under the age of 18 years, oesophageal rupture is extremely rare (6,10). Literature reviews in 2006 and 2009 found only 27 reported paediatric cases, with 12 being outside the neonatal period (8, 10).

This condition can have a wide spectrum of signs and symptoms; from relatively well looking individual to septic shock (4). The esophageal perforation can be a small air leak in the mediastinum to large air and fluid accumulation in the pleural cavity leading to life threatening complications. There can be non-specific chest pain that itself leads to a wide differential diagnosis (1). The non-specific vague symptoms or atypical presentation without the classic symptoms and signs causes a diagnostic delay, which can occur in up to one third of cases (3, 5, 9). The clinical symptoms may vary depending on the site of the rupture of oesophagus, degree of leakage and duration of perforation. The most common symptom is pain in the neck, chest or upper abdomen. The pain may radiate to the back and can be aggravated by swallowing (5, 9).
Commonly the rupture occurs in the left wall of distal third of oesophagus, though in children it is seen mostly on the right (10). This can lead to abdominal pain, mediastinitis, pleural effusion, emphysema, or necrosis due to spillage of gastric contents (5). As mid oesophagus lies next to right pleura, therefore mid-oesophageal or upper thoracic perforations tend to cause pleural effusion or hydropneumothorax on the right. Cervical oesophageal ruptures are usually benign as they often are more localized and their progression to the mediastinum through the retro-oesophageal space is slow, however it can cause neck or upper chest pain. The oesophageal perforation is the most lethal perforation of the gastrointestinal tract with mortality of 40-50% (1, 9). The life threatening complications like sepsis, shock, respiratory failure, cardiac and renal complications can occur (4,9).

Our reported case is unusual as a young 16-year-old girl with no known risk factors presented with spontaneous oesophageal rupture. The condition is rare in this age group. The patient presented with the classic features of the Mackler triad; vomiting, chest pain and subcutaneous emphysema. This triad is only present in 14 % cases of Boerhaave syndrome (1). These classical features can sometimes be accompanied with a crackling sound occurring with each heartbeat on auscultation, known as Hamman's sign, best heard in the left lateral decubitus position and is a manifestation of the pressure of the myocardium against the air infiltration in the mediastinal emphysema (3,5).

Initial management involves fluid resuscitation, broad spectrum antibiotics and gastric rest. The treatment options are conservative, endoscopic or surgical repair. Our patient underwent conservative management due to small contained rupture. With conservative management, the time to oral intake was 8 days similar to that reported in literature (4).

A retrospective study of 34 patients with oesophageal perforation, showed a diagnostic delay of more than 24 hours in 20 cases (4). Such a delay can lead to more tissue damage along with risk of sepsis and poorer outcome. The intensive care time was 1.5 days in early diagnosed and treated group compared to 6.5 days in those with delayed diagnosis (4). A delay of 24 hours or more in diagnosis doubles the mortality (9,10).

To our knowledge, this is first case of a teenage girl presenting to primary care where a prompt diagnosis of spontaneous oesophageal rupture was made clinically and emergency referral was made to the specialist services.
This potentially fatal condition can present in children with no associated risk factors as seen in this case. A positive outcome solely depends on rapid recognition and prompt treatment.

Learning Points

1. Boerhaave syndrome is rare but can present in children.

2. It should be considered if there is neck, chest or abdominal pain preceded by vomiting and retching, leading to focused clinical examination.

3. Delay in the diagnosis can be fatal. Early diagnosis of oesophageal perforations, within 12 to 24 hours, have the best outcomes.

References

1. Tzeng C-H, Chen W-K, Lu H-C, Chen H-H, Lee K-I, Wu Y-S, et al. Challenges in the diagnosis of Boerhaave syndrome. Medicine. 2020 Jan;99(2):e18765
2. Haba Y, Yano S, Akizuki H, Hashimoto T, Naito T, Hashiguchi N. Boerhaave syndrome due to excessive alcohol consumption: two case reports. International Journal of Emergency Medicine. 2020 Nov 30;13(1).
3. Spapen J, De Regt J, Nieboer K, Verfaillie G, Honoré PM, Spapen H. Boerhaave's Syndrome: Still a Diagnostic and Therapeutic Challenge in the 21st Century. Case Reports in Critical Care. 2013;2013(ID:161286):1–4.
4. Teh E, Edwards J, Duffy J, Beggs D. Boerhaave's syndrome: a review of management and outcome. Interactive CardioVascular and Thoracic Surgery. 2007 Jul 2;6(5):640–3.
5. Turner AR, Turner SD. Boerhaave Syndrome [Internet]. PubMed. Treasure Island (FL): StatPearls Publishing; 2020 [cited 2022 Jan 13]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430808/
6. Vernon N, Mohananey D, Ghetmiri E, Ghaffari G. Esophageal Rupture as a Primary Manifestation in Eosinophilic Esophagitis. Case Reports in Medicine. 2014;2014(ID 673189):1–5.
7. Donnet C, Destombe S, Lachaux A, Michaud L, Triolo V, Heissat S, et al. Esophageal perforation in eosinophilic esophagitis: five cases in children. Endoscopy International Open. 2020 Jun 16;08(07):E830–3.
8. Chikkappa MG, Morrison C, Lowe A, Gorman S, Antrum R, Gokhale J. Paediatric Boerhaave's syndrome: a case report and review of the literature. Cases Journal. 2009;2(1):8302.
9. Lewis AM, Dharmarajah R. Walked in with Boerhaave's... Emergency Medicine Journal. 2007 Apr 1;24(4):e24–4.
10. Antonis JHA, Poeze M, Van Heurn LWE. Boerhaave's syndrome in children: a case report and review of the literature. Journal of Pediatric Surgery. 2006 Sep;41(9):1620–3.

Predictors of COVID-19 Disease Course and Pulmonary Insult

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Abstract

Background: The novel coronavirus disease COVID-19 first appeared in Wuhan, Hubei. It is crucial to identify patients who are susceptible to severe forms of the disease. Imaging has an important role in the confirmation and treatment of COVID-19 pneumonia.

Aim: To assess the predictors of the COVID-19 disease course and pulmonary insult.

Methods: Our retrospective investigation included 115 patients with COVID-19, with a median age of 49.1-66.3 years old, at King Hussein Medical Center, Amman, Jordan. Patients were assigned into one of two groups based on the disease course: group I (n=63) included patients with moderate disease and group II (n=52) included patients with severe disease. Computed tomography (CT) scores of pulmonary insult were determined. Baseline CT findings showed ground-glass opacity, consolidation, crazy-paving pattern and reticular shadow. Each lung region was scored using the five-grade scale to calculate the CT score. Independent factors of moderate COVID-19 were evaluated using binary logistic regression. Multivariate logistic regression was used to predict the CT score in COVID-19.

Results: The independent factors for the COVID-19 disease course were baseline CT score ($P < 0.05$) and C-reactive protein (CRP) ($P< 0.05$). The factors for pulmonary insult were age, neutrophil, lymphocyte and CRP levels and CT score ($P < 0.05$). The cut-off value for CRP was 19.0 and the cut-off value for CT score was 9.0.

Conclusion: Age, baseline CT score, CRP, neutrophil and lymphocyte percentages may predict the CT score of pulmonary insult. A CRP value of more than 19 and baseline CT score of more than 9 were independent factors of severe COVID-19 disease.

Keywords: COVID-19, moderate, severe, pulmonary insult, computed tomography score, neutrophil, lymphocyte, CRP, age.

Introduction

The novel coronavirus COVID-19 is an infectious disease that can lead to pneumonia. It is of unknown cause and appeared primarily in Wuhan, Hubei, China in 2019, endangering public health systems with its fast spread (1). It is crucial to identify patients who are susceptible to severe forms of the disease. A specific epidemiologic history with fever and dry cough are highly indicative of infection with SARS-CoV-2 (the virus that causes COVID-19). Influenza A and B viruses lead to similar symptoms to COVID-19, and it is difficult to distinguish between them (2). For most of cases of suspected COVID-19, laboratory confirmation is time-consuming with false negative results.

Imaging has an important role in the confirmation and treatment of COVID-19 pneumonia. Computed tomography (CT) is the first-step imaging method used in highly suspected cases and for following up modifications during therapy. CT is a powerful tool for clinical confirmation of suspected COVID-19. It confirms negative reverse transcription–polymerase chains in suspected COVID-19. COVID-19 pneumonia is the most frequent clinical feature of the disease (3). The features of CT may give data about the intensity of the disease.

Our investigation aimed to predict pulmonary insult and the clinical course of COVID-19 based on the baseline information of patients, to determine a future therapy protocol.

Methods

Our retrospective investigation included 115 patients with COVID-19, with a median age of 49.1-66.3 years old, at King Hussein Medical Center, Amman, Jordan, during the period April 2020-April 2021. Patients were assigned into one of two groups based on the disease course: group I (n=63) included patients with moderate disease and group II (n=52) included patients with severe disease. Ethical approval was granted by the ethics and research board review committee of the Jordanian Royal Medical Services. CT scores of pulmonary insult were determined. Independent factors affecting the course of moderate disease were evaluated using binary logistic regression. Multivariate logistic regression was used to assess the independent factors and to predict the CT score of pulmonary insult in COVID-19.

COVID-19 was graded into four grades (1): mild (no signs of pneumonia); moderate (fever and respiratory signs with pneumonia); severe (respiratory distress, such as high respiratory rate, reduced oxygen saturation or arterial partial pressure of oxygen/fraction of inspired oxygen<300 mmHg); critical (respiratory failure and shock).

The CT findings showed the presence of ground-glass opacity, consolidation, crazy-paving pattern and reticular shadow. The scores of chest CT were recorded as in (3); each region was scored on a five-point scale as follows: 0: normal lung; 1: lesion less than 25%; 2: lesion 25% - 50%; 3: lesion 50% - 75%; 4: lesion more than 75%. CT scores were the baseline score and the score of maximal pulmonary insult. Neutrophil, lymphocyte and C-Reactive Protein (CRP) levels were recorded.

Statistics

Data were analysed using chi-square tests for comparisons between groups. The CT score of maximal pulmonary insult was the dependent variable and the baseline data was the independent variable. Multivariate regression was used; a P-value less than 0.05 was considered statistically significant.

Results

The patients in the moderate group had a median age of 49.1 years. In total, 52 subjects (45.2%), 33 men and 19 women with a median age of 66.3 years, were in group II. Sixty-three patients (54.8%) had no worsening (28 men and 35 women). Around a quarter of the patients' condition (31; 26.96%) developed into the severe form of the disease and 21 (18.3%) into the critical condition.

Age, sex, lymphocyte, neutrophil and CRP levels, consolidation, crazy-paving aspect, reticular shadow and baseline CT score were statistically significant ($P < 0.05$; Table 1). Multivariate logistic regression was performed with moderate and severe groups as the dependent factors. Independent factors influencing clinical picture were CRP ($P < 0.05$) and baseline CT ($P < 0.05$) (Table 2).

The disease duration lasted from 12 to 35 days, and subjects were assigned to three CT investigations. Age, CRP, CT score, neutrophil and lymphocyte levels were statistically significantly related to the CT score of maximal pulmonary insult ($P< 0.05$), with B coefficients of 0.060, 0.108 and 0.387, respectively, of the first three factors. Lymphocyte and neutrophil levels were negatively associated with B coefficients of -0.104 and -0.103, respectively (Table III). The cut-off value for CRP was 19.0 and the cut-off for baseline CT score was 9.0 (Table 3).

Table 1: Characteristics of all COVID-19 patients

	Moderate group (I)	Severe group (II)	P-value
n=	63	52	>0.05
Median age (yrs.)	49.1	66.3	<0.05
Gender (no.) M F	27 36	34 18	<0.05
Lymphocyte percentage % (median)	29.3	20.6	<0.05
Neutrophil percentage % (median)	61.4	72.2	<0.05
CRP(mg/L) median	13.4	25.5	<0.05
Baseline CT score	4(2,7)	10(5,16)	<0.05
Ground-glass opacity (no.)	52	45	>0.05
Consolidation (no.)	28	34	<0.05
Reticular shadow (no.)	20	27	<0.05
Crazy-paving aspect (no.)	16	23	<0.05

Table 2: Moderate COVID-19 patients

	B coefficient	
	Moderate COVID-19 patients	Maximal pulmonary insult
Baseline CT score	0.101	0.387
CRP mg/L	0.054	0.108
Age	0.021	0.060
Lymphocyte percentage	-0.046	-0.104
Neutrophil percentage, %	-0.065	-0.103

Table 3: Severe COVID-19 patients

	Sensitivity (%)	Specificity (%)
Baseline CT score	40.1	87.2
CRP mg/L	65.2	55.6

Discussion

The disease course of COVID-19 goes through the early, progressive, peak and absorption stages, based on the chest CT (3). Localized ground-glass opacities are seen in the early stage and new ground-glass lesions are seen progressively. Dispersed consolidations with white lung are seen in the peak stage and fibrosis is seen in the absorption stage. For the severe and critical forms of the disease, the tissue insult in pulmonary CT can be seen more at primary confirmation with interstitial lesions more common than in the disease's moderate form (4). Most patients have pathognomonic imaging features necessary for therapy (5). In the severe and critical forms, reduced lymphocytes are seen (6); in mild and moderate cases, CBC and chemistry are normal.

Predictors of maximal pulmonary insult were investigated. Age, baseline CT score, CRP, neutrophil and lymphocyte levels were all important. Age was positively associated with maximal pulmonary insult; older age is correlated with mortality. CRP was positively associated with maximal pulmonary insult and CT score was positively associated with CRP (7). The baseline CRP level might predict the CT score of maximal pulmonary insult. The baseline CT score was positively associated with the CT score of maximal pulmonary insult. An increased baseline CT score is correlated with a rapid progression of pneumonia and pulmonary insult lung injury. Baseline neutrophil and lymphocyte levels were negatively associated with the maximal pulmonary insult (8). Lymphocyte and neutrophil levels were associated with Murray score values. A CRP level of 19.0 and a baseline CT score of 9 predicted patients developing the severe form of the disease. The CT scores of COVID-19 pneumonia in the severe group were higher than the scores in the moderate group (9). The volume percentage of pneumonia showed increased sensitivity and specificity among those in the severe or critical groups (10). High CRP was a predictor of COVID-19 severity (11).

Conclusion

The maximal pulmonary insult in patients with COVID-19 was associated with baseline CT score, CRP, age and neutrophil levels. A CRP value of 19 and a baseline CT score of 9 were factors for the severe and critical forms of the disease. Maximal pulmonary insult and scoring might be predicted by CT and laboratory analysis.

References

1. National Health Commission of the People's Republic of China. Diagnosis and treatment of novel coronavirus. 2020.
2. Rodrigo C, Julio AR. Influenza and Viral Pneumonia. Clin Chest Med. 2018;39:703–21.
3. Pengfei C, Na F, Yi L, et al. Analysis of Predictive Factors for Moderate-Stage COVID-19 Outcome and Maximal Extent of Lung Injury. Iran J Radiol. 2021 January; 18(1): e106351.
4. Hyun JK, Sang-HC, Heungsup S, et al. Radiographic and CT Features of Viral Pneumonia. Radio Graphics. 2020; 40:E8–E15.
5. Li B, Li X, Wang Y, et al. Diagnostic value and key features of computed tomography in Coronavirus Disease 2019. Emerg Microbes Infect. 2020;9(1):787–93.
6. Zhang X, Cai H, Hu J, et al. Epidemiological, clinical characteristics of cases of SARS-CoV-2 infection with abnormal imaging findings. Int J Infect Dis. 2020;94:81–7.
7. Sun D, Li X, Guo D, et al. CT Quantitative Analysis and Its Relationship with Clinical Features for Assessing the Severity of Patients with COVID-19. Korean J Radiol. 2020;21(7):859– 68.
8. Liu Y, Yang Y, Zhang C, et al. Clinical and biochemical indexes from 2019-nCoV infected patients linked to viral loads and lung injury. Sci China Life Sci. 2020;63(3):364–74.
9. Michael C, Adam B, Xueyan M, et al. CT Imaging Features of 2019 Novel Coronavirus (2019-nCoV). Radiology. 2020;295:202–7
10. Raquel SO, Julio TN, Gloria MS. Radiological findings for diagnosis of SARS-CoV-2pneumonia (COVID-19). Med Clin (Barc). 2020;155(1):36–40.
11. Villard O, Morquin D, Molinari N, et al. The Plasmatic Aldosterone and C-Reactive Protein Levels, and the Severity of Covid-19. J Clin Med. 2020;9(7):2315.

An outbreak investigation of extensively drug-resistant Acinetobacter baumannii cases in the intensive care unit of Al-Qatif Central Hospital, Saudi Arabia

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Abstract

Background: *Acinetobacter baumannii* has emerged as an extremely disturbing pathogen for several institutions worldwide. It is common in hospital environments, and outbreaks of Acinetobacter infections classically arise in intensive care units (ICUs). This investigation aimed to describe the extensively drug-resistant *Acinetobacter baumannii* (XDRAB) outbreak, which occurred in the intensive care unit (ICU) of Al-Qatif central hospital, Saudi Arabia.

Methodology: This is a cross-sectional study for all positive (XDRAB) reported cases in the ICU of Al-Qatif Central Hospital, Eastern region during August and September 2019. Investigation of cases was based on the patient's files, charts, lab records, interviewing the infection prevention and control team of the hospital, and the directorate. Microbiological and environmental samples were collected and tested for XDRAB.

Results: A total of nine patients tested positive. Eight of the cases were male, and only three of them were Non-Saudi. The age ranged from 21 to 82 years, the mean age was 48.6 ± 21.14 years, and the mean length of ICU stay was eight ± 5.75 days. The environmental samples and the swabs from the health care workers (HCW) hand results were negative for XDRAB. Eight of the nine affected patients were on a mechanical ventilator (OR 9.2, 95% CI:1.09-77.9, P = 0.029), and according to the control chart, there was a previous outbreak attack in early 2019.

Conclusion: The ICU of Al-Qatif hospital experienced an XDRAB outbreak in August, and it continued till September 2019. There was a previous outbreak with the same organism early in the same year, which required a strong adherence to the control and prevention measures and further analytical studies to find out the reasons behind the recurrent XDRAB outbreak.

Key Words: *Acinetobacter baumannii,* outbreak investigation, drug-resistance, Saudi Arabia.

Introduction

Acinetobacter baumannii organism is a gram-negative coccobacillus bacteria. It has become known now as a main cause of hospital- and community-acquired illnesses, and was, in the past, considered as a low type pathogen (1). *A. baumannii* can survive under a wide range of environmental conditions and persist for prolonged periods on surfaces, walls, and medical devices, which makes it a frequent cause of outbreaks and endemics, especially in health care settings (2). *A. baumannii* is widely distributed in various environments, including soil, water, vegetables, wastewater, and skin (animal and human). Besides, it has been isolated from different parts of the healthy human body, including the nose, throat, ear, trachea, conjunctiva, axillae, hands, groin, and toe webs. In the health facilities environment, *A. baumannii* inhabits beds, curtains, roofs, walls, medical machines, and equipment, tap water sinks, phones, doorknobs, hand disinfectants, as well as on the medical staff's belongings (3).

A. baumannii has the capability to infect not just admitted patients but also the general community. In hospital settings, 26% up to 43% of the mortality rate in the intensive care units (ICUs) is caused by *A. baumannii. A. baumannii* is the main-agent of ventilator-associated pneumonia and is responsible for almost 15% of the whole hospital-acquired infections and high morbidity and mortality rates, especially in the ICU. It accounts for nearly 50% of the overall use of antibiotics in the ICUs (4). *A. baumannii* has also been associated with community-acquired pneumonia, which is associated with mortality rates between 40% to 60% and often related to underlying host factors such as smoking, alcohol use, diabetes mellitus, and chronic obstructive pulmonary disease (COPD) (5).

ICU-acquired bloodstream infection caused by Acinetobacter was more than in other wards or departments (1.6% vs. 0.9%, respectively, in those locations), as a result of invasive techniques, either intravascular or respiratory (catheters, tubes, or cannulas). Furthermore, the mortality rate from Acinetobacter bloodstream infection was 34.0% up to 43.4% in the ICU compared to 16.3% outside the ICU (6).

Acinetobacter is accountable for 4% of all meningitis; the majority of cases occurred in post-neurosurgical procedures. Clinical symptoms are similar to bacterial meningitis caused by other organisms, (e.g., *Streptococcus pneumonia, Neisseria meningitides,* or *Haemophilus influenza*), and include fever, decreased level of consciousness, headache, and convulsion. The mortality rate is not easy to estimate, but it may be as high as 70% (6). Acinetobacter is a known pathogen of burns units, and it is incredibly challenging for clinicians to treat due to multi-resistant strains, and it might require a debridement procedure. Wound healing delay leads to failure of the skin graft, and colonization of the wound site can progress to infection of the underlying tissue and subsequent systemic spread of the organism (5). Soft-tissue infections caused by *A. baumannii* have emerged as a significant problem in military personnel; its prevalence is more noticeable (32%).

A. baumannii is not a frequent organism of urinary tract infections (UTIs); however, it can cause infection in old aged patients, especially those with a prolonged indwelling catheter in the ICU; it contributes 1.6% of the overall UTIs. Furthermore, it may cause endocarditis, and ophthalmitis following surgery, or using contact lenses (7).

Risk factors for developing hospital-acquired *A. baumannii* infection include extended hospital stays, old age, chronic diseases, immunity suppression diseases, massive trauma or burns, previous antibiotic usage, invasive procedure, mechanical ventilator, and urinary catheter. On the other hand, community-acquired Acinetobacter infection occurred in individuals with underlying health problems, such as diabetes mellitus, COPD, heavy smokers, or alcohol abusers. Despite that, it is not clear as to whether the host or the bacteria factors are responsible for the difference in disease presentation between the hospital or community-acquired infection (8).

The World Health Organization (WHO) has lately recognized antimicrobial resistance as one of the three most significant problems facing human health (9). In the USA, a report from the Centers for Disease Control and Prevention (Antimicrobial Resistance Threats in the United States), highlighted multidrug-resistant Acinetobacter as a serious risk that leads to almost 7,000 infections and around 500 deaths every year in the US (10). The presence of multidrug-resistant *A. baumannii* in Saudi Arabia has become a critical healthcare and economic problem and also a big challenge in several tertiary referral health hospitals. The findings of many studies conducted in different regions in Saudi Arabia confirmed that *A. baumannii* was becoming increasingly resistant to different categories of antimicrobial drugs (11).

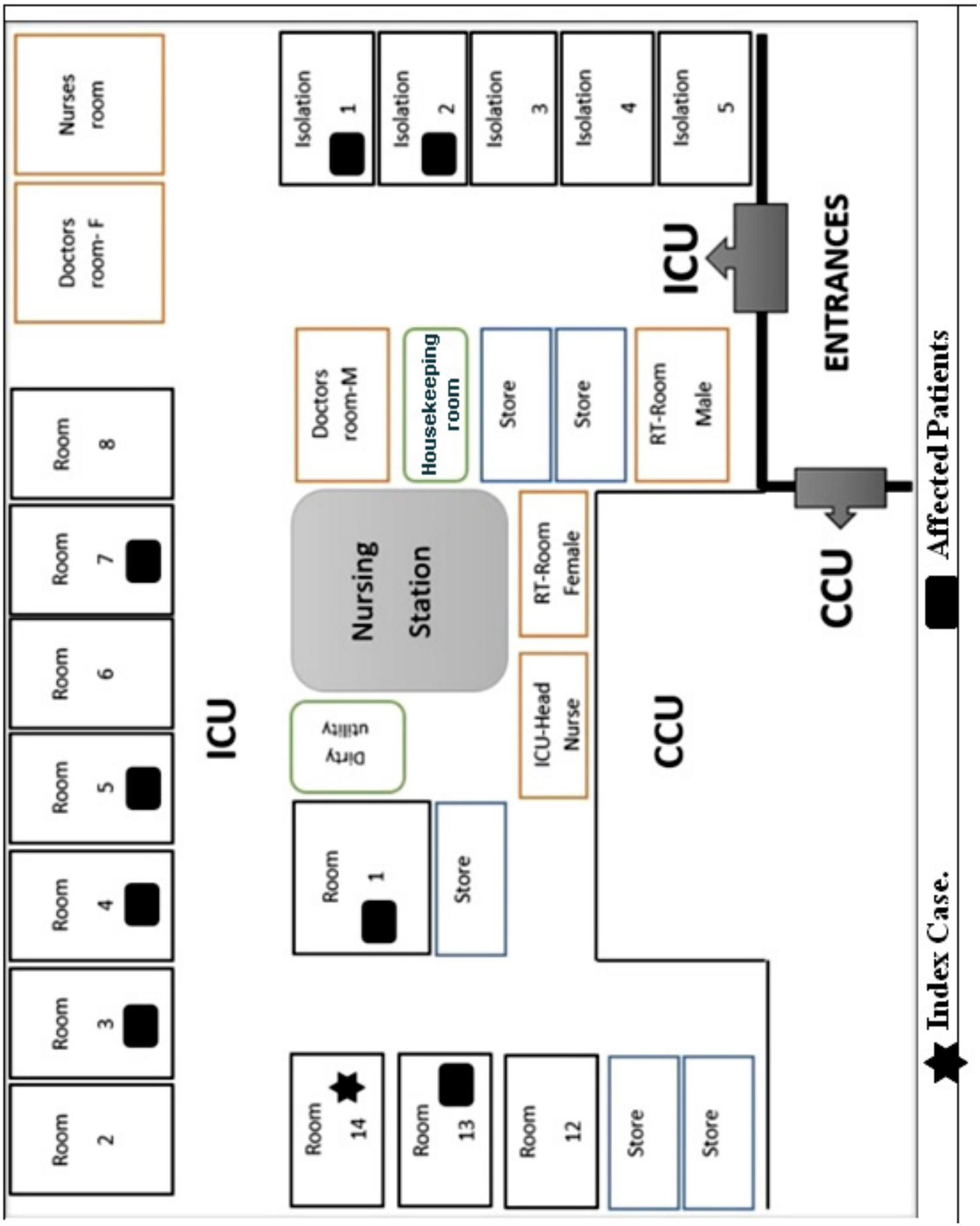
The aim of this investigation is to describe the outbreak of XDR *A. baumannii* in the ICU of Al-Qatif central hospital during August and September 2019, and to assess the control measures implemented to control the spread of this organism.

Methodology

Setting:
Al-Qatif Central Hospital in Al-Qatif governorate, on Dhahran-Jubail Highway, Eastern region. The 15-bed ICU is on the first floor of the hospital, arranged as single patient bed per room; five of them are negative pressure rooms used for airborne infected cases (Figure 1).

Study design:
This is a cross-sectional study including all inpatients of the Al-Qatif Central Hospital ICU, Eastern region during August and September 2019.

Figure 1: Map of the ICU of Al-Qatif Central Hospital



Data collection and field investigation:
A team from the Field Epidemiology Training Program (FETP) was constituted, composed of one resident and one supervisor (FETP staff). On September 30th, 2019, the team went to the Al-Qatif central hospital to investigate this outbreak. After arrival at the hospital, a meeting was conducted with coordinators from the directorate to obtain an overview of the current situation. Then we went to the infection control and prevention department of the hospital; we met the head of the department and the staff to get more details about the outbreak, including the number of cases, onset, and progression of the outbreak, control, and preventive measures. Then we visited the ICU (the place of the outbreak) as well as the laboratory department.

Confirmed cases were defined as an adult patient admitted to the ICU of Al-Qatif Hospital between August and September 2019 with a healthcare-associated infection caused by an XDRAB isolate identified as non-susceptible to all major classes of antimicrobial but 1 or 2 drugs (Colistin or Tigecycline).

For each case, demographic data, ICU admission date and causes, comorbidities and diseases, length of stay in ICU, surgery or intervention (including devices like central lines, ventilators, and urinary catheter) history, presence of colonization or infection, and the outcome were documented. Investigation of cases was based on the patient's files, charts, data from the departments, records, and results from the laboratory.

Microbiological investigation:
Samples and swaps (sputum, blood, urine and skin) were ordered for all ICU patients and health care workers to determine infection or colonization. Further, they were tested for the antimicrobial susceptibility by using the Phoenix and Vitek 2 automated systems. The antibiotics tested were Amikacin, Gentamicin, Imipenem, Meropenem, Cephalexin, Cefuroxime, Cefoxitin, Ceftazidime, Cefepime, Aztreonam, Ampicillin, Amoxicillin and Clavulanate Potassium, Piperacillin-tazobactam, Sulfaprim, Nitrofurantoin, Ciprofloxacin, Levofloxacin, Tobramycin, Ceftriaxone, Ticarcillin, Colistin, Ticarcillin-clavulanic acid, Tigecycline, Minocycline, and Ertapenem.

Environmental investigation:
This was carried out through taking swabs from the respiratory equipment, physiotherapy machine, medication trolley, glucometers, intubation boxes, room tables, ABG machine, storeroom boxes, ECG machine, U/S machine, and doorknobs. Environmental samples were also collected from the reception, including its surfaces, keyboards and telephones.

Infection control measures:
The following were investigated: Notification system of panic values; Documented Training of the ICU personnel; Monitoring IPC records; Hand hygiene compliance records; Committee meetings minutes; and Infection control bundles compliance.

Data analysis
Analysis of data was done by the Statistical Package for Social Sciences (SPSS version 23.0) in addition to Microsoft Excel 360.

Results

Outbreak description and patient characteristics:
During August and September 2019, the ICU of Al-Qatif central hospital admitted 78 patients. 61 (78.2%) of them were on medical devices, including a central venous catheter (CVC), endotracheal tube (ETT), mechanical ventilator (MV), and urethral catheter (UC). More specifically, 40 (51.2%) ICU patients were connected to a mechanical ventilator.

A total of nine patients among the ICU patients were positive with XDRAB (11.5%). The patients were defined as XDRAB based on microbiological features. Seven of them were Saudi (77.7%), and three were Non-Saudi, (Indian, Sudanese, and Pakistani) (33.3%). Eight out of nine were male, and only one patient was a female (8/9, 88.8%). Age of the affected patients ranged from 21 to 82 years old, where the mean age was 48.6 ± 21.14 years. The mean length of ICU stay was eight ± 5.75 days (Figure 2, and Table 1).

The control chart for the XDRAB from Jan-2019 to Oct-2019 shows that the number of cases in August and September exceeded the expected level; therefore, this was considered an outbreak. Also, the control chart detected a previously unreported outbreak of the same organism early in the same year (Figure 3). Eight of the nine affected patients were on a mechanical ventilator before they got infected with XDRAB (OR=9.25; 95%CI: 1.09 - 77.9; P= 0.029 - Fisher's Exact Test).

The index case was a 21-year-old, Saudi male, admitted to the ICU on August 2, 2019, as a case of SLE with a flare-up, Pulmonary edema, Metabolic acidosis, Ascites, and acute kidney injury. He was on a mechanical ventilator, Tracheostomy, connected to the central venous line, and a Foley catheter before being *A. baumannii* positive. XDRAB was isolated from a tracheal aspirate sample obtained on August 10, 2019, 8 days after hospitalization. On August 24, he developed a fever, and another sample was taken from the urine, and it was positive for XDRAB. The infection was treated with antibiotics (i.e., Tazocin, Amoxicillin, Meropenem, or Colistin). The patient improved, but he remained in the ICU.

The second case was a 40-year-old Indian male, known case of Diabetes mellitus (DM) admitted to the ICU on August 14, 2019, as a case of community-acquired pneumonia, Sepsis. He was on a mechanical ventilator, connected to the central venous line and Foley catheter. On August 19, XDRAB was isolated from a tracheal aspirate sample, nine days after XDRAB isolation in the index case. The infection was treated with Vancomycin, Tazocin, and Colistin. The patient improved and was transferred to the medical ward.

The third case was a 31-year-old Sudanese male, admitted through ER on August 16 with polytrauma as a result of a road traffic accident. XDRAB was isolated from the sputum (Tracheal Aspirate) on August 25. He underwent various surgical procedures, and he was on a mechanical ventilator. He developed a fever, and a blood sample was taken on August 28; the result was positive for XDRAB. The patient was treated with Tazocin, Meropenem, Vancomycin, Fluconazole for the infection, but unfortunately, he died because of his poor condition.

The fourth case was a 60-year-old, Saudi male, known case of DM, hypertension, transferred from the CCU to the ICU on August 21, as a case of Viral encephalitis, seizure. A positive XDRAB culture from the sputum was detected on August 25. This patient was on a mechanical ventilator, connected to a central venous line and Foley catheter. The infection was treated with Vancomycin, colistin, and the patient was transferred to King Fahad Specialist Hospital.

After that, the infection spread throughout the ICU, involving three more patients (patients 5-7) who were hospitalized in the ICU in the same period. All of them had serious medical conditions, such as Ogilvie syndrome, ischemic heart disease and stroke. Except for the sixth case, who was still in the ICU, the Fifth and seventh cases improved after appropriate therapy, and one of them was discharged from the ICU.

Twelve days after the XDRAB detection from the seventh case, A. baumannii infection appeared again in the ICU. The eighth case, who suffered from perforated sigmoid, perforated gastric ulcer, perforated viscus, was admitted to the ICU on September 7, 2019. This case underwent gastric surgery and remained in the ICU. The ninth case was a 52-year-old, Saudi male, a known case of diabetes, hypertension. He was admitted because of lower limb ischemia. A blood sample and rectal swap were taken, and; they were positive for XDRAB. Several surgical procedures were done, but he arrested in the recovery room after the operation and died there.

Microbiological investigation

All isolates obtained from the nine patients during this outbreak were determined as A. baumannii. Antibiotic-resistant profiles showed that they were extensively drug-resistant strains. All of them were susceptible to Colistin and Tigecycline. Furthermore, the lab results for the ICU patients during August and September revealed the following organisms: Klebsiella pneumoniae (16.6%), Escherichia coli (7.7%), Pseudomonas aeruginosa (5.1%), and Staphylococcus aureus (5.1%).

Environmental investigation:

A total of 29 samples were collected from the ICU environment, and all of them were negative for XDRAB. Also, the swaps from the health workers hand and the housekeeper were negative for XDRAB.

Infection control measures:

After the confirmation of the outbreak, a series of plans were applied to control the infection as follows:

(1) Notifying the hospital infection prevention and control committee.
(2) Giving optimized antimicrobial therapy.
(3) Perform Proper and adequate cleaning of the equipment and environmental surface.
(4) Perform terminal cleaning and fumigation to the room after the patient's discharge.
(5) Hand hygiene campaign done, strictly executing hand hygiene protocols by all medical staff. (6) Maintain contact precaution for all positive patients.
(7) Changing the open suction system to the closed system for every patient.

Table 1: Clinical characteristics of patients with an extensively drug-resistant *Acinetobacter baumannii* infection, ICU of Al-Qatif central hospital during August and September 2019.

No.	Sex	Age (Y)	Reason for admission	ICU stay prior to infection (days)	XDRAB isolate date	Invasive procedures	Outcome
1	M	21	SLE, Pulmonary edema, Metabolic acidosis, Ascites, Acute kidney injury.	8	10-Aug-19	MV, CVC, UC, TRACH, ETT	Improved, still in ICU
2	M	40	CAP, Sepsis	5	19-Aug-19	MV, CVC, UC, ETT	Improved, transferred
3	M	31	Polytrauma, Road Traffic Accident	9	25-Aug-91	MV, CVC, UC, ETT	Death
4	M	60	Viral encephalitis, seizure	4	25-Aug-19	MV, CVC, UC, ETT	Transferred to KFSH
5	M	82	Ogilvie syndrome, septic shock	7	1-Sep-19	MV, CVC, UC, ETT	Improved
6	M	67	Ischemic Heart Disease, stroke	17	5-Sep-19	MV, CVC, UC, ETT	Still in ICU
7	M	23	Hypoglycemia, Seizure	6	15-Sep-19	MV, CVC, UC, ETT	Improved
8	F	62	Perforated sigmoid, perforated gastric ulcer, perforated viscus	20	27-Sep-19	MV, CVC, UC, ETT	Still in ICU
9	M	52	Chronic right lower limb ischemic, disturbance of consciousness	4	30-Sep-19	CVC, UC, ETT	Death

CVC: central venous catheter; ETT: endotracheal tube; F: female; ICU: intensive care unit; M: male; MV: mechanical ventilation; TRACH: tracheostomy tube; UC: urethral catheter

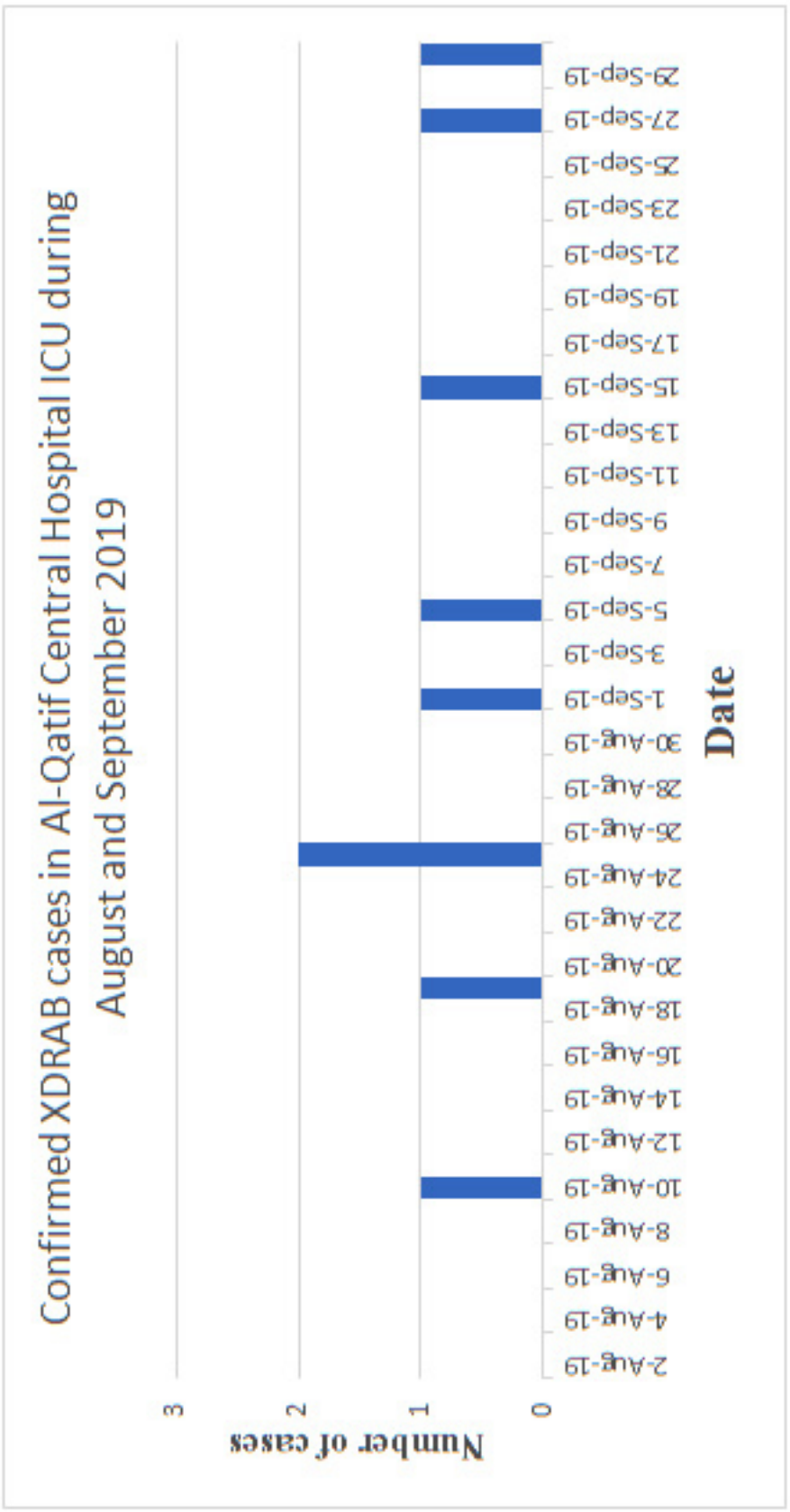
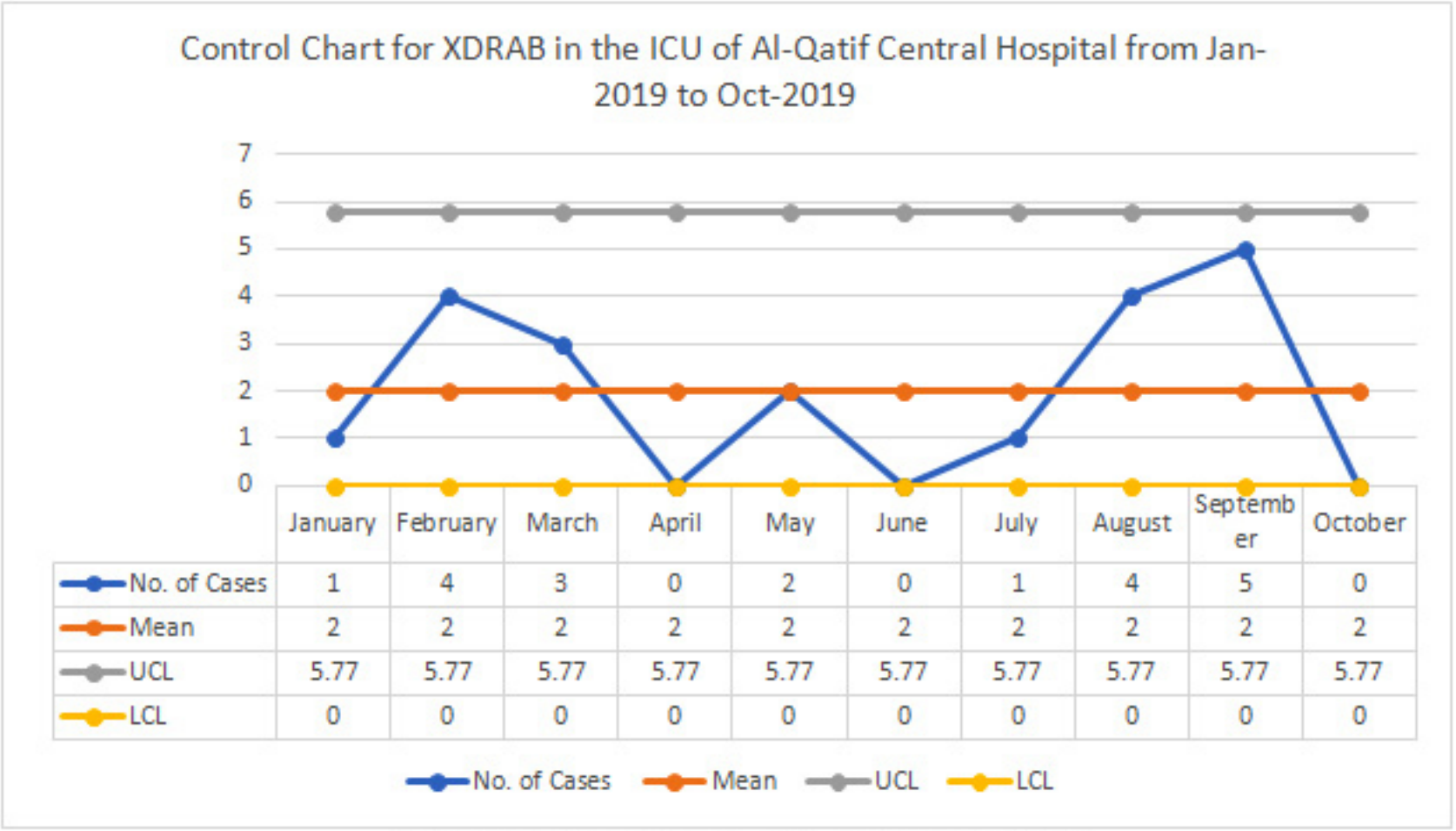


Figure 2: Epidemic curve of confirmed XDRAB cases in the ICU of Al-Qatif Central Hospital during August and September 2019.



UCL: Upper control level. LCL: Lower control level

Figure 3: Control Chart for XDRAB in the ICU of Al-Qatif Central Hospital from Jan-2019 to Oct-2019.

Discussion

Acinetobacter baumannii has emerged as a leading hospital-acquired infection pathogen, particularly in critically ill patients presenting multiple risk factors for colonization or infection (12). The reported incidence of institutional outbreaks has significantly increased throughout the past years, mainly in ICUs (13). The management of *A. baumannii* outbreaks can be difficult because of its ability to acquire multi-drug resistance and to spread epidemically between patients (14); also, the effective eradication from the environment might need numerous interventions and organizational actions (15).

Nine patients were positive for XDRAB in the ICU of Al-Qatif hospital between August 10 until September 30, 2019. Eight of them were male, and the age ranged from 21 to 82 years. Most of the involved patients in this outbreak were on a mechanical ventilator, which is a major predisposing risk factor for *A. baumannii*. In a study conducted by El-Saed in Saudi Arabia, *A. baumannii* is the most responsible bacteria for ventilator-associated pneumonia in the ICU (26.5%). Also, as ICU patients with so many morbidities, they were exposed to more prolonged ventilation times, which increases the opportunity for the *A. baumannii* outbreaks (16). Before this outbreak, the open suctioning system was applied, and the environmental contamination may be facilitated by the droplets spread through the opening of the respiratory circuit of ventilators (17). After that, it has been changed to a closed system and used for every patient in the ICU.

Prior antibiotic treatment within the last 90 days before admission is a significant risk factor for *A. baumannii* outbreaks, with almost seven times more risk in drug resistance to *A. baumannii* compared to non-drug resistance isolates (18). Other risk factors, including underlying comorbidities such as diabetes mellitus, renal insufficiency, COPD, malignancy, and surgical interventions, were also found to be a risk for developing an *A. baumannii* infection (19).

A. baumannii outbreaks could be a result of contaminated hands of the health care workers (HCW) after contact with positive cases or environmental sites (19). To prevent this situation, extensive educational sessions regarding infection control measures, hand hygiene, and personal protective equipment (PPE) required for outbreak control should be going on, especially for the new staff members who have just been hired and assigned to the ICU. In this outbreak, swaps of the physicians' and nurses' hands who were involved in patient care were not colonized with XDRAB. The visitors, the trainer residents, and interns from other departments of the hospital who had contact with the patients were not also screened for *A. baumannii.* So, a weak commitment to hand hygiene guidelines may enhance the spread of the outbreak (20).

Environmental contaminated sources include gloves of the staff, respiratory equipment, contact objects of infected patients, as well as other items like trolleys, doorknobs, telephones, table surfaces, and floor, are verified as vital risk factors for *A. baumannii* outbreaks (22). Hospital conditions, include the humidity in the ICU. It was at a high level and almost reached 70 %. This hot and moist climate forced the nurses to place portable fans inside patient's rooms. *A. baumannii* can survive in such conditions for an average of 20 days (21). Enhanced environmental cleaning and decontamination with hypochlorite solutions must be done to eliminate the organism from the ICU environment (23,21).

This investigation has some limitations. There were no records for other HCWs outside the ICU who contacted the affected patients and no swabs were taken from them. Also, this investigation was carried out in a descriptive manner; further analytical studies are recommended to discover the reasons and risks for XDRAB acquisition.

Conclusions

The ICU of Al-Qatif Central Hospital experienced an XDRAB outbreak in August and it continued till September 2019, with a total of nine cases. Eight of them were on medical devices, especially the mechanical ventilator, and most of the isolates were from the tracheal aspirates. Therefore, the open suction system has been changed to the closed system to prevent the droplets spreading through the opening of the respiratory circuit of ventilators. There was a previous outbreak with the same organism early in the same year, which required a strong adherence to the control and prevention measures and further analytical studies to find out the reasons behind the recurrent XDRAB outbreak. All cases were treated with the proper antibiotics, and two died because of their preexisting conditions.

Recommendations

Based on findings of the present study, continued educational sessions about hand hygiene and PPE, with competency test are recommended, especially for the new staff from the private hospital. Furthermore, close observation regarding their practice, and screening of any new patient entering the ICU for A. baumanii is required, moreover, to intensify the terminal cleaning using hydrogen peroxide in all units that have patients with positive XDRAB. Daily review of medical supply stock in the ICU should be undertaken to avoid zero stock. Daily recording for the humidity and temperature should be undertaken in addition, to restricting the ICU visitors to first degree relatives only and emphasizing to the security not to allow anyone (workers or visitors) to enter ICU before performing hand hygiene.

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References

1. Pourhajibagher M, Hashemi FB, Pourakbari B, Aziemzadeh M Bahador A. Antimicrobial resistance of Acinetobacter baumannii to imipenem in Iran: a systematic review and meta-analysis. Open Microbiol J. 2016; 10:32–42.
2. Fournier PE, Richet H. The epidemiology and control of Acinetobacter baumannii in health care facilities. Clin Infect Dis 2006; 42:692–9.
3. Al Atrouni A, Joly-Guillou M-L, Hamze M, Kempf M. Reservoirs of non-baumannii acinetobacter species. Front Microbiol. 2016; 7:49.
4. Demirdal T, Sari US, Nemli SA. Is inhaled colistin beneficial in ventilator associated pneumonia or nosocomial pneumonia caused by Acinetobacter baumannii? Ann Clin Microbiol Antimicrob. 2016;15(1):1–6.
5. McConnell MJ, Actis L, Pachón J. Acinetobacter baumannii: Human infections, factors contributing to pathogenesis and animal models. FEMS Microbiology Reviews. 2013;37(2):130–55.
6. Howard A, O'Donoghue M, Feeney A, Sleator RD. Acinetobacter baumannii. Virulence [Internet]. 2012 May 27;3(3):243–50. Available from: http://www.tandfonline.com/doi/abs/10.4161/viru.19700.
7. Bulens SN, Yi SH, Walters MS, Jacob JT, Bower C, Reno J, et al. Acinetobacter baumannii, Insight into Acinetobacter baumannii: pathogenesis, global resistance, mechanisms of resistance, treatment options, and alternative modalities. 2018;24(4):2012–5.
8. Morris FC, Dexter C, Kostoulias X, Uddin MI, Peleg AY. The Mechanisms of Disease Caused by Acinetobacter baumannii. Frontiers in Microbiology. 2019;10(JULY).
9. WHO. New treatment options against gram-negative organisms. Critical Care [Internet]. 2011; Available from: https://ccforum.biomedcentral.com/articles/10.1186/cc9997
10. Bulens SN. Carbapenem-Nonsusceptible Acinetobacter baumannii, 8 US Metropolitan Areas, 2012–2015. CDC [Internet]. 2018;Volume 24. Available from: https://wwwnc.cdc.gov/eid/article/24/4/17-1461_article
11. Ibrahim ME. Prevalence of Acinetobacter baumannii in Saudi Arabia: Risk factors, antimicrobial resistance patterns and mechanisms of carbapenem resistance. Vol. 18, Annals of Clinical Microbiology and Antimicrobials. BioMed Central Ltd.; 2019.
12. Romanelli RM de C, de Jesus LA, Clemente WT, Lima SSS, Rezende EM, Coutinho RL, et al. Outbreak of resistant Acinetobacter baumannii - Measures and proposal for prevention and control. Brazilian Journal of Infectious Diseases. 2009;13(5):341–7.
13. Weinstein RA, Gaynes R, Edwards JR. Overview of Nosocomial Infections Caused by Gram-Negative Bacilli. Clinical Infectious Diseases. 2005;41(6):848–54.
14. Amaya-Villar; JG-M. Multiresistant Acinetobacter baumannii infections: epidemiology and management. Current Opinion in Infectious Diseases [Internet]. 2010; Available from: https://journals.lww.com/coinfectiousdiseases/Abstract/2010/08000/Multiresistant_Acinetobacter_baumannii_infections_.8.aspx.
15. Markogiannakis A, Fildisis G, Tsiplakou S, Ikonomidis A, Koutsoukou A, Pournaras S, et al. Cross-Transmission of Multidrug-Resistant Acinetobacter baumannii Clonal Strains Causing Episodes of Sepsis in a Trauma Intensive Care Unit. Infection Control & Hospital Epidemiology. 2008;29(5):410–7.
16. El-Saed A, Balkhy HH, Al-Dorzi HM, Khan R, Rishu AH, Arabi YM. Acinetobacter is the most common pathogen associated with late-onset and recurrent ventilator-associated pneumonia in an adult intensive care unit in Saudi Arabia. International Journal of Infectious Diseases [Internet]. 2013;17(9):e696–701. Available from: http://dx.doi.org/10.1016/j.ijid.2013.02.004
17. Consales G, Gramigni E, Zamidei L, Bettocchi D, de Gaudio AR. A multidrug-resistant Acinetobacter baumannii outbreak in intensive care unit: Antimicrobial and organizational strategies. Journal of Critical Care [Internet]. 2011;26(5):453–9. Available from: http://dx.doi.org/10.1016/j.jcrc.2010.12.016
18. Ramanathan S, Suda KJ, Fitzpatrick MA, Poggensee L, LaVela SL, Burns SP, et al. Multidrug-resistant Acinetobacter: Risk factors and outcomes in veterans with spinal cord injuries and disorders. American Journal of Infection Control. 2017 Nov 1;45(11):1183–9.
19. Kanafani ZA, Zahreddine N, Tayyar R, Sfeir J, Araj GF, Matar GM, et al. Multi-drug resistant Acinetobacter species: A seven-year experience from a tertiary care center in Lebanon. Antimicrobial Resistance and Infection Control. 2018 Jan 22;7(1).
20. Wang CH, Li JF, Huang LY, Lin FM, Yang YS, Siu LK, et al. Outbreak of imipenem-resistant Acinetobacter baumannii in different wards at a regional hospital related to untrained bedside caregivers. American Journal of Infection Control. 2017 Oct 1;45(10):1086–90.
21. Fournier PE, Richet H. The Epidemiology and Control of Acinetobacter baumannii in Health Care Facilities [Internet]. Vol. 42, Clinical Infectious Diseases. 2006. Available from: https://academic.oup.com/cid/article-abstract/42/5/692/2052763.
22. Lei J, Han S, Wu W, Wang X, Xu J, Han L. Extensively drug-resistant Acinetobacter baumannii outbreak cross-transmitted in an intensive care unit and respiratory intensive care unit. American Journal of Infection Control. 2016 Nov 1;44(11):1280–4.
23. Peleg AY, Seifert H, Paterson DL. Acinetobacter baumannii: Emergence of a successful pathogen. Vol. 21, Clinical Microbiology Reviews. 2008. p. 538–82.

Vaccination against Influenza among Health Care Workers in Al Mashaer during Hajj 2019 (1440 H); Uptake and Barriers

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Abstract

Background: Hajj (i.e., pilgrimage) is one of the largest mass gatherings in the globe. It brings people from around the world into small confined areas, which facilitates the transmission of droplet infections, like influenza. Saudi Arabia requires all healthcare workers (HCWs) receive the influenza vaccine since they can transmit influenza among infected patients to un-infected patients, including high-risk groups. We sought to assess the commitment of the HCWs toward vaccination as well as the reasons for vaccine refusal.

Methodology: A cross-sectional study was performed during Hajj season 2019 among HCWs in Al Mashaer, Makkah, Saudi Arabia. Anonymous, self-administered questionnaires were distributed to collect the information on demographic characteristics, vaccine uptake, and their attitudes and concerns towards receiving the vaccine.

Results: A total of 760 completed questionnaires were received, with a response rate of 95%. Males represented (58%), and the average age (Mean±SD) was 36.7±7.65 years. More than half of participants (56%) were working in the primary Health Centers (PHCs), while (44%) were working in the hospitals. (93%) of the participants have received the vaccine before in their life. For the 2019 Hajj season, (76%) of them received the vaccine. Following the authority's recommendation (74%) was the main reason for vaccination, 24% were not vaccinated before attending this Hajj, and 25% did not intend to take the vaccine in the future. Concerns about the vaccine side effects (46%) and misconceptions regarding its efficacy (44%) were the main barriers for vaccination refusal. Logistic regression analysis showed that the other health cadres, pharmacists, and working in hospitals were independently associated with vaccine avoidance in the 2019 Hajj. While for the future intention to take the vaccine, working in the hospitals, HCWs from the northern region, other health cadres, nurses, and pharmacists were independently associated with vaccine rejection.

Conclusion: Despite the good uptake of the vaccine, there are still misconceptions about the efficacy of the vaccine and concerns about its side effects. Awareness programs are required to address those concerns, especially for younger staff, pharmacists, and other cadres. Higher vaccine uptake among healthcare workers will impact the vaccination of the general population.

Key Words: Pilgrimage, Seasonal influenza vaccine, healthcare workers, Saudi Arabia.

Introduction

Seasonal influenza is a contagious respiratory infection caused by negative-stranded RNA viruses of the Orthomyxoviridae family that circulate worldwide (1-2). Influenza viruses are classified into four different types (A, B, C, and D). Influenza A and B viruses spread and lead to seasonal epidemics of illness. Type A viruses are also categorized into subtypes based on the proteins located on the surfaces of the viruses called hemagglutinin (HA) and the neuraminidase (NA). Currently, the subtypes of influenza A viruses that circulate in human beings are A(H1N1) and A(H3N2). Influenza B viruses are classified into two lineages, identified as B/Yamagata and B/Victoria. Influenza C viruses usually cause mild illness and do not lead to human epidemics, while influenza D viruses mainly affect cattle and are not known to cause disease in humans (1).

Influenza viruses are constantly mutating. The strains can change in two different ways, Antigenic drift and Antigenic shift. Antigenic drift is minor changes in the influenza viruses' genes that also can lead to changes in the surface proteins (HA) and (NA) of the viruses. The HA and NA surface proteins are antigens, triggering the immune response of the body's immune system to produce the antibodies that can fight the infection. The mutations associated with antigenic drift constantly occur as the virus replicates. Therefore, a person becomes vulnerable to influenza illness again. Antigenic drift is the most important reason why people can get influenza more than one time, and it is also a crucial reason why the influenza vaccine structure needs to be evaluated and updated annually. Antigenic shift is a huge, significant change in an influenza A virus, resulting in new HA and/or new HA and NA proteins in influenza viruses that infect humans. The shift can result in a new influenza A subtype in humans, such as in Spring 2009, when an H1N1 virus with genes from North American swine, Eurasian swine, humans, and birds emerged to infect people and rapidly spread, resulting in a pandemic (2-3).

Persons infected with the influenza virus mostly show symptoms such as fever, fatigue, headache, chills, muscle pain, coughing, and rhinitis. Furthermore, the infection may lead to more serious complications like bronchitis, pneumonia, secondary bacterial infections, respiratory distress, and cardiovascular problems, which all may lead to death if left untreated (2). Both the common cold and influenza are respiratory illnesses with symptoms similar to each other, but they are caused by different viruses. It can be challenging to differentiate between them based on symptoms only. Generally, influenza is worse than the common cold and more severe and results in significant health problems (3).

People at any age can be affected, but some groups are more at risk than others, including children aged under five years (especially younger than two years), adults aged more than 65 years, pregnant and post-delivery women, people with chronic medical morbidities, immunocompromised people, severely obese people, and residents of nursing homes. Among the high-risk groups, immunocompromised individuals are considered to be at a very high risk of complications from influenza (4). Health care workers also are at high risk of getting an influenza infection because of the exposure to the patients, as well as enhancing the spread of the disease to vulnerable individuals (1).

People infected with the influenza virus can spread it to others up to about one meter away, commonly by droplet mode when people with the influenza cough, sneeze, or talk (3). Also, it can be spread by hands contaminated with the influenza virus, through touching a surface or item that has the virus on it and then touching their mouth, nose, or maybe their eyes. The period from when an individual is exposed and infected with influenza to when symptoms begin (incubation period) is around two days, ranging from one to four days (1). Infected persons with influenza are most contagious in the first three or four days after their illness. Some otherwise healthy adults can infect others one day before the development of symptoms and up to one week after becoming sick. Others, especially young children and immunocompromised individuals, may possibly be able to infect others for an even more extended period (3).

The diagnosis of influenza is usually based on clinical symptoms. However, in a low activity period, the diagnosis should be considered in individuals with acute febrile respiratory symptoms who have lately spent time in settings related to an influenza outbreak. These may include organized tour groups, any mass gatherings, summer camps, cruise, and military ships, as well as their contacts (4). Laboratory tests used to confirm the presence of the influenza virus are antigen detection test, virus isolation, or detection of influenza-specific RNA by reverse transcriptase-polymerase chain reaction (RT-PCR) (1).

Rapid influenza diagnostic tests (RIDTs) can detect influenza A and B viral nucleoprotein antigens in respiratory samples and quickly (less than 15 minutes) provide results, and are mostly suitable for bedside and office use. RIDTs are significantly less sensitive compared to other types of tests like RT-PCR (false-negative results are not uncommon) (4).

The best available and effective preventive measure for influenza viruses is the vaccine, especially for the high-risk groups, and due to the changes and mutations of the antigen of the virus (Antigenic drift), it is necessary to update the vaccine on an annual basis (5). Besides that, personal protective measures and good health behaviors like hand hygiene, respiratory hygiene by wearing the mask and covering the mouth and nose when coughing and sneezing, and avoiding close contact with ill individuals can stop the spread of the viruses and prevent the influenza disease (1).

Acute respiratory tract infection is a significant health challenge during the annual Hajj season. The Saudi Arabian government has successfully controlled the spread of other diseases like meningitis and cholera during Hajj (6). Approximately 5% to 15% of the global population contract influenza and cause an average of 650,000 respiratory deaths a year (8). Influenza virus rapidly spreads in seasonal epidemics and creates a considerable economic burden associated with high health care costs and lost productivity.

More than two million Muslims from different countries gather in Makkah for Hajj each year, and according to WHO, mass gatherings expose a large number of people to infectious diseases (6-9). Al-Tawfiq et al. (10) indicate that the intense crowding that is created by limited space facilitates the transmission of airborne infections. Therefore, the Hajj, which is the largest gathering of humans in a limited area, increases vulnerability to infectious diseases and creates an optimal environment for the spread of the influenza virus (6). Literature suggests that there is a high incidence of influenza infections during the annual Muslim Hajj pilgrimage in Mecca (6-7); approximately 4-15% of pilgrims contract seasonal influenza during Hajj (11).

Therefore, the Saudi government mandates the meningococcal vaccine for all visitors during Hajj to prevent the spread of infectious diseases (12). Also, the authority strongly recommends other vaccines, including yellow fever, tetanus, diphtheria, measles, and influenza vaccines (13). In contrast, many pilgrims lack awareness about the importance of the influenza vaccine, which exposes health care workers at a higher risk for acquiring the virus from their patients during Hajj. However, there are misconceptions about the benefits of the influenza vaccine among health workers in Saudi Arabia, which acts as a barrier for fear of side effects and vaccine costs (14).

Health care workers are at high risk for contracting influenza compared to adults working in non-health settings. They acquire influenza from patients because the virus spreads through close contact with the ill person (15-16). Therefore, influenza vaccination reduces the spread of the virus and decreases absenteeism in health care settings (17).

Health care workers may also transit influenza viruses and other respiratory infections to their patients (18). Thus, influenza vaccination for health workers improves indirect protection for patients. Also, the influenza vaccine among health care workers reduces the transmission of the virus to their family members (19). The rate of vaccination acceptance among the medical personnel is low despite the interventions that have been put in place, and has remained low at 42%. The non-acceptance of the influenza vaccines by medical personnel is due to a wide range of misconceptions and lack of knowledge about influenza infection and its risks for patients, and about the vaccine's effectiveness and safety. The non-recipients may not know their risk of getting influenza (20).

Besides, according to Alshammari et al. (21), there are cases in which some medical personnel believe that vaccines increase the chances of a person getting influenza. The lower awareness about the importance of immunization is responsible for the poor uptake rates of vaccines among healthcare workers.

Petek et al. (22) explain that the primary motivators for vaccination coverage were: awareness of the high risk of infection at the workplace, self-protection, and protection of family members and co-workers. Notably, a definite link was found between the vaccination, advanced age, and belief in the effectiveness of influenza, while a negative association was found between the nurses' profession and vaccination.

Lee et al. (23) noted that achieving a high vaccine uptake in the early stages of a medical career might, therefore, improve subsequent influenza vaccine uptake. Alenazi et al. (18) indicate that medical personnel reject vaccines because they are wary of the adverse effects of the vaccine. However, the medical personnel who accept to be immunized do so to enhance their protection and that of patients.

According to Kuster et al. (15), the rates of infection are low among medical practitioners who have been vaccinated. The prevention of influenza among healthcare workers can only happen if they follow the guidelines that govern the immunization process. Sočan et al. agreed with Alenazi, that providing education on the efficacy and safety of vaccines should be one of the priority public health measures taken to improve knowledge and eliminate misconceptions and attitudinal barriers regarding immunization in health care workers (18-19).

Influenza vaccine hesitancy among health care workers increases the prevalence of seasonal flu during the Hajj. Anti-vaccine campaigns, and lack of motivation to receive the vaccine hinder the uptake of the influenza vaccine (23-24). Many health workers during Hajj do not have correct information concerning the influenza vaccines. According to Badahdah et al. (7), the lack of awareness limits the knowledge that people have towards the immunization program. Also, the shortage of vaccines or non-availability is one of the reasons for poor uptake among health professionals (25).

This study was conducted during the Hajj season in 2019 / 1440 H in Al Mashaer, Holy Makkah, Saudi Arabia, aiming to assess the uptake rates of influenza vaccine among healthcare workers, their commitment toward the vaccine before attending the Hajj, and to determine the barriers behind not receiving the vaccine.

Methodology

This is a cross-sectional study that was carried out during the period between August 1st and 15th, 2019, among HCWs in Al Mashaer, Makkah, Saudi Arabia. The study was conducted in all primary health centers of Mena and Arafat, as well as all hospitals of Al Mashaer (4 in Mena and 4 in Arafat).

The eligible participants were HCWs (including all physicians, nurses, pharmacists, and other staff who served pilgrims) who were employed in Saudi Arabia and working in Al Mashaer during the Hajj 2019 and who agreed to participate and provide information.

We constructed and used an anonymous self-administered questionnaire in both Arabic and English languages based on thorough review of relevant literature and previous research findings (7, 18, 20, 21, 26). The questionnaire included participants' demographics (age, gender, nationality, region, profession, chronic comorbidities if any, working experience, and Hajj participating times), knowledge about the frequency of vaccination and the perceived effectiveness, whether the participants received the influenza vaccine in the past and also for this Hajj season particularly, motivations for getting vaccinated and the barriers behind not getting the vaccine, and willingness to take the vaccine in the future.

The questionnaire was pilot-tested on a convenience sample of HCWs with research experience to ensure clarity and simplicity of administration. The main investigator and well-trained team were in charge of distributing the questionnaires throughout visits to the participating hospitals and PHCs.

The Institutional Review Board (IRB) of King Fahad Medical City reviewed and approved the study protocol and the questionnaire, with approval number 19-358E.

Data entry and analysis was performed using Statistical Package for Social Sciences (IBM, SPSS, version 23) and Microsoft Excel 360. Descriptive statistics were performed using counts and percentages for categorical variables and using mean ± standard deviation for continuous variable. Chi-square test or Fisher's exact test were applied to compare categorical variables, and a binary logistic regression was used to examine associations between vaccination practice and other independent variables. A p-value of ≤0.05 was considered statistically significant.

Results

Out of 800 questionnaires that were distributed, 760 were returned for a response rate of 95%. Males represented 57.7% (n = 432), and the average age of the included participants was 36.7±7.65 years, ranging from 22 to 67 (median 35) years. Participants were categorized based on age into five main groups: under 25 (2.91%), 26 – 35 (49.4%), 36 – 45 (33.7%), 46 – 55 (11.5%) and 56 years or higher (2.51%). 55.8% (n=424) of the participants were working in the PHCs while the remaining 44.2% (n=336) were working in the hospitals. Participants from Central and Western regions of Saudi Arabia represented 30.9% and 34.1%, respectively. Participants from the Southern region represented 6.33%. Approximately three quarters of the included participants were Saudis (73.8%). Nurses represented 48.6% while physicians and pharmacists represented 29.8% and 12.5%, respectively. Half of the participants had more than 10 years of experience (53.6%). Results showed that 63.2% of the included HCWs previously worked as HCWs during the Hajj. Hajj participating times were categorized into four main groups: less than 5 times (66.5%), 6 - 10 (24.3%), 11 – 15 (6.7%), more than 15 times (2.5%) (Table 1).

Only 6.22% of the included HCW had medical conditions that required treatment. Medical conditions included diabetes (2.77), asthma (0.66%), hypertension (3.3%) and heart problems (0.13%) (Table 2).

Most of the included HCWs received influenza vaccine at least one time before (93.3%,). Being a physician and non-Saudi HCW, are significantly increased in vaccination compliance (P< 0.001, P = 0.006) respectively. There was no significant difference in vaccination rate among age groups. Then, the age regrouped into Two main groups: less than 35 years (52.3%) and older than 35 years (47.3%). With respect to those groups, vaccination compliance was more in the participants older than 35 years (P = 0.034).

Three quarters (76%) of the included HCW were vaccinated for this specific Hajj season. Older than 35 years, being a physician and Non-Saudi HCWs, are significantly increased in vaccination compliance (P = 0.008, P < 0.001, P < 0.001) respectively. On the other hand, 31.5% of the participants who were working in the hospitals did not receive the vaccine for this Hajj season (P <0.001) (Table 3).

The majority of the included HCWs strongly agreed (35.9%) or agreed (45%) that influenza vaccine is effective. However, 23.7% of the participants aged less than 35 years, 22.9% of the Saudi participants, and 30.4% of the other HCWs were either unsure or disagreed (P<0.001). In addition, 95.5% of the physicians (P<0.001), 94.9% of the Non-Saudi HCWs (P<0.001), 87.8% of the participants aged older than 35 (P= 0.001) and 89.4% of the HCWs who have chronic morbidities (P<0.001) significantly agreed or strongly agreed that all HCWs should get influenza vaccine. 75.3% of the participants responded with "Yes" when asked whether they would have an influenza vaccine in the future. (Table 4).

The most common reason for ever receiving influenza vaccine was the recommendations of Saudi MOH (73.9%). Other reasons included self-protection (64.6%) and avoiding sickness during Hajj (60.7%). The least common reason was to avoid taking sick leave (22.3%) (Figure 1).

The most common reason for not receiving influenza vaccine was the concerns regarding side effects (46.2%). Other reasons included wrong perception regarding the effectiveness of the vaccine (44.2%) and the risk of getting flu through the vaccine (32.7%) (Figure 2).

Regarding the frequency of influenza vaccine, the correct answer (every year) was selected by 75% (n = 546) of the HCWs who participated in the study. Physicians comprised the highest percentage (85.9%) followed by nurses and pharmacists (74.3% and 73.3%, respectively). On the other hand, 55% of other HCWs did not answer this question correctly (P <0.001). Furthermore, one-third of the participants from the hospitals answered incorrectly (P <0.001).

The correct effective duration for the vaccine (one year) was chosen by 77.1% (n = 549) of the participating HCWs. Female gender (82.7% P = 0.017), Non-Saudi HCWs (91.5% P <0.001) and physician (90.2% P <0.001) represent the highest percentage among all participants (Table 5).

Table 6 shows the results of the predicted probability of the binary logistic regression analysis for those who did not receive the vaccine. Refuse to take the vaccine at all was significantly higher among the pharmacists compared to other HCWs (OR=11.07; 95%CI: 2.47- 49.4; P= 0.002). Regarding the vaccination status for the current Hajj season, working in a hospital (OR=1.9;95%CI:1.3-2.8, P=0.001) was a significant factor for not taking the vaccine. Furthermore, other HCWs (OR=4.3;95%CI:1.9-9.4, P<0.001), Pharmacists (OR=2.7;95%CI:1.3-5.8, P=0.008) were more likely not to take the vaccine for this Hajj compared to other HCWs (physician and nurses). On the other hand, Non-Saudi participants (OR=0.48;95%CI:0.24-0.96, P=0.038) were significantly more compliant to receive the vaccine for the current Hajj season. For the future intention to take the vaccine, the participants who were working in the hospitals (OR=1.5;95%CI:1.09-2.3, P=0.015) and the HCWs from the northern region (OR=1.8;95%CI:1.2-3.4;P=0.042) significantly rejected the thought of taking the vaccine in the future. Among the professions, other HCWs (OR=4.9;95%CI:2.1-11, P<0.001), pharmacists (OR=2.7;95%CI:1.2-6;P=0.011) and nurses (OR=2.4;95%CI:1.2-4.6;P=0.010) were also more likely to refuse the vaccine in the future compared to the physicians.

Table 1: Demographic and occupational characteristics of the included participants during Hajj season 2019 (1440 H), Makkah, Saudi Arabia.

Characteristics	No. (%)
Working place	
• PHC	424 (55.8)
• Hospital	336 (44.2)
Gender:	
• Male	432 (57.1)
• Female	325 (42.9)
Age Groups:	
• Under 25	22 (2.91)
• 26 – 35	374 (49.4)
• 36 – 45	255 (33.7)
• 46 – 55	87 (11.5)
• 56 and older	19 (2.51)
• Mean±SD	36.7±7.65
Nationality:	
• Saudi	558 (73.8)
• Non-Saudi	198 (26.2)
Region:	
• Central	225 (30.9)
• Northern	96 (13.2)
• Southern	46 (6.33)
• Eastern	112 (15.4)
• Western	248 (34.1)
Profession:	
• Physician	226 (29.8)
• Nurse	369 (48.6)
• Pharmacist	95 (12.5)
• Others	69 (9.09)
Experience:	
• < 10 years	350 (46.4)
• ≥ 10 years	405 (53.6)
First time working as a health care worker during Hajj	
• Yes	279 (36.8)
• No	480 (63.2)
Number of times (categorical)	
• Less than 5 times	298 (66.5)
• 6 - 10 times	109 (24.3)
• 11 - 15 times	30 (6.70)
• More than 15 times	11 (2.46)

Table 2: Medical comorbidities reported by the included HCW during Hajj season 2019 (1440 H), Makkah, Saudi Arabia

Characteristics	No. (%)
Ongoing medical condition that requires treatment	
• Yes	47 (6.22)
• No	709 (93.8)
Associated comorbidity	21 (2.77)
• Diabetes	21 (2.77)
• Asthma	5 (0.66)
• Hypertension	25 (3.30)
• Heart problems	1 (0.13)

Table 3a: Vaccination status among the participants according to their demographic characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia.

		Have you ever had influenza vaccine?					Are you vaccinated for this specific Hajj season?				
		Yes		No		P	Yes		No		P
		No.	%	No.	%	Value	No.	%	No.	%	Value
Age group (years)	≤35	362	91.4	34	8.6	0.034*	286	72.2	110	27.8	0.008*
	>35	343	95.3	17	4.7		288	80.4	70	19.6	
Gender	Male	402	93.3	29	6.7	0.980	329	76.3	102	23.7	0.800
	Female	303	93.2	22	6.8		244	75.5	79	24.5	
Chronic diseases	Yes	46	97.9	1	2.1	0.200	36	76.6	11	23.4	0.930
	No	659	93.1	49	6.9		537	76.1	169	23.9	
Nationality	Saudi	512	91.8	46	8.2	0.006*	396	71.1	161	28.9	<0.001*
	Non-Saudi	192	97.5	5	2.5		176	89.8	20	10.2	
Region	Central	212	94.2	13	5.8	0.940	178	79.1	47	20.9	0.190
	Northern	87	91.6	8	8.4		75	78.1	21	21.9	
	Southern	43	93.5	3	6.5		30	68.2	14	31.8	
	Eastern	105	93.8	7	6.3		90	81.1	21	18.9	
	Western	232	93.5	16	6.5		180	72.6	68	27.4	

* Statistically Significant

Table 3b: Vaccination status among the participants according to their occupational characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia

		Have you ever had influenza vaccine?					Are you vaccinated for this specific Hajj season?				
		Yes		No		P	Yes		No		P
		No.	%	No.	%	value	No.	%	No.	%	value
Working place	PHCs	396	93.6	27	6.4	0.67	345	81.9	76	18.1	<0.001*
	Hospitals	312	92.9	24	7.1		230	68.5	106	31.5	
Profession	Physician	219	97.3	6	2.7	<0.001*	196	87.5	28	12.5	<0.001*
	Nurse	344	93.2	25	6.8		281	76.4	87	23.6	
	Pharmacist	80	84.2	15	15.8		63	66.3	32	33.7	
	Others	64	92.8	5	7.2		34	49.3	35	50.7	
Experience (years)	< 10	323	92.3	27	7.7	0.20	265	75.7	85	24.3	0.83
	> 10	382	94.6	22	5.4		307	76.4	95	23.6	
First time in Hajj	Yes	259	92.8	20	7.2	0.71	210	75.3	69	24.7	0.69
	No	448	93.5	31	6.5		365	76.5	112	23.5	

* Statistically Significant

Table 4a: Attitudes of health care workers towards influenza vaccination according to their demographic characteristics during Hajj season 2019 Makkah, Saudi Arabia

		The influenza vaccine is effective										
		Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		
		No.	%	No.	%	No.	%	No.	%	No.	%	P value
Age groups (years)	≤35	118	29.8	184	46.5	69	17.4	17	4.3	8	2.0	<0.001*
	>35	153	42.4	157	43.5	38	10.5	12	3.3	1	0.3	
Chronic morbidities	Yes	24	51.1	16	34.0	3	6.4	3	6.4	1	2.1	0.09
	No	247	34.8	325	45.8	103	14.5	26	3.7	8	1.1	
Gender	Male	174	40.3	176	40.7	61	14.1	16	3.7	5	1.2	0.055
	Female	98	30.2	164	50.5	46	14.2	13	4.0	4	1.2	
Nationality	Saudi	176	31.5	254	45.5	96	17.2	23	4.1	9	1.6	<0.001*
	Non-Saudi	96	48.5	87	43.9	9	4.5	6	3.0	0	0.0	
Region	Central	83	36.9	104	46.2	31	13.8	5	2.2	2	0.9	0.43
	Northern	32	33.3	44	45.8	18	18.8	2	2.1	0	0.0	
	Southern	23	50.0	14	30.4	5	10.9	3	6.5	1	2.2	
	Eastern	37	33.0	49	43.8	22	19.6	3	2.7	1	0.9	
	Western	89	35.9	112	45.2	31	12.5	12	4.8	4	1.6	

Table 4a: Attitudes of health care workers towards influenza vaccination according to their demographic characteristics during Hajj season 2019 Makkah, Saudi Arabia (continued)

		All health care workers should get influenza vaccine:										
		Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		
		No.	%	No.	%	No.	%	No.	%	No.	%	P value
Age Groups (years)	≤35	145	36.6	182	46.0	46	11.6	15	3.8	8	2.0	0.001*
	>35	177	49.0	140	38.8	29	8.0	15	4.2	0	0.0	
Gender	Male	200	46.3	171	39.6	38	8.8	19	4.4	4	0.9	0.120
	Female	122	37.5	151	46.5	37	11.4	11	3.4	4	1.2	
Chronic morbidities	Yes	29	61.7	13	27.7	2	4.3	3	6.4	0	0.0	0.040*
	No	292	41.2	310	43.7	72	10.2	27	3.8	8	1.1	
Nationality	Saudi	200	35.8	255	45.7	70	12.5	25	4.5	8	1.4	<0.001*
	Non-Saudi	122	61.6	66	33.3	5	2.5	5	2.5	0	0.0	
Region	Central	100	44.4	92	40.9	24	10.7	7	3.1	2	0.9	0.070
	Northern	42	43.8	35	36.5	18	18.8	1	1.0	0	0.0	
	Southern	23	50.0	16	34.8	4	8.7	3	6.5	0	0.0	
	Eastern	46	41.1	48	42.9	13	11.6	4	3.6	1	0.9	
	Western	101	40.7	117	47.2	13	5.2	12	4.8	5	2.0	

* Statistically Significant

Table 4a: Attitudes of health care workers towards influenza vaccination according to their demographic characteristics during Hajj season 2019 Makkah, Saudi Arabia (continued)

		Would you have an influenza vaccine in the future?				
		Yes		No		
		No.	%	No.	%	P value
Working place	PHCs	335	79.0%	89	21.0%	0.007*
	Hospitals	237	70.5%	99	29.5%	
Profession	Physician	201	88.9%	25	11.1%	<0.001*
	Nurse	264	71.5%	105	28.5%	
	Pharmacist	68	71.6%	27	28.4%	
	Others	38	55.1%	31	44.9%	
Experience (years)	<10	251	71.7%	99	28.3%	0.025*
	>10	319	78.8%	86	21.2%	
First time in Hajj	Yes	208	74.6%	71	25.4%	0.740
	No	363	75.6%	117	24.4%	

* Statistically Significant

Table 4b: Attitudes of health care workers towards influenza vaccination according to their occupational characteristics during Hajj season 2019, Makkah, Saudi Arabia

		The influenza vaccine is effective										
		Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		
		No.	%	No.	%	No.	%	No.	%	No.	%	P value
Working place	PHCs	177	41.7	176	41.5	48	11.3	16	3.8	7	1.7	0.001*
	Hospitals	96	28.6	166	49.4	59	17.6	13	3.9	2	0.6	
Profession	Physician	118	52.2	93	41.2	9	4.0	5	2.2	1	0.4	<0.001*
	Nurse	107	29.0	175	47.4	65	17.6	16	4.3	6	1.6	
	Pharmacist	30	31.6	43	45.3	19	20.0	2	2.1	1	1.1	
	Others	17	24.6	31	44.9	14	20.3	6	8.7	1	1.4	
Experience (years)	≤10	120	34.3	159	45.4	51	14.6	14	4.0	6	1.7	0.72
	>10	150	37.0	182	44.9	55	13.6	15	3.7	3	0.7	
First time in Hajj	Yes	99	35.5	135	48.4	35	12.5	7	2.5	3	1.1	0.40
	No	174	36.3	206	42.9	72	15.0	22	4.6	6	1.3	

* Statistically Significant

Table 4b continued

		All health care workers should get influenza vaccine:										
		Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		
		No.	%	No.	%	No.	%	No.	%	No.	%	P value
Working place	PHCs	213	50.2	161	38.0	26	6.1	19	4.5	5	1.2	<0.001*
	Hospitals	110	32.7	163	48.5	49	14.6	11	3.3	3	0.9	
Profession	Physician	149	65.9	67	29.6	5	2.2	5	2.2	0	0.0	<0.001*
	Nurse	117	31.7	183	49.6	47	12.7	17	4.6	5	1.4	
	Pharmacist	38	40.0	41	43.2	13	13.7	2	2.1	1	1.1	
	Others	18	26.1	33	47.8	10	14.5	6	8.7	2	2.9	
Experience (years)	≤10	143	40.9	150	42.9	38	10.9	14	4.0	5	1.4	0.75
	>10	176	43.5	174	43.0	36	8.9	16	4.0	3	0.7	
First time in Hajj	Yes	124	44.4	112	40.1	33	11.8	8	2.9	2	0.7	0.31
	No	199	41.5	212	44.2	41	8.5	22	4.6	6	1.3	

* Statistically Significant

Table 4b continued

		Would you have an influenza vaccine in the future?				
		Yes		No		
		No.	%	No.	%	P value
Working place	PHCs	335	79.0%	89	21.0%	0.007*
	Hospitals	237	70.5%	99	29.5%	
Profession	Physician	201	88.9%	25	11.1%	<0.001*
	Nurse	264	71.5%	105	28.5%	
	Pharmacist	68	71.6%	27	28.4%	
	Others	38	55.1%	31	44.9%	
Experience (years)	<10	251	71.7%	99	28.3%	0.025*
	>10	319	78.8%	86	21.2%	
First time in Hajj	Yes	208	74.6%	71	25.4%	0.740
	No	363	75.6%	117	24.4%	

* Statistically Significant

Table 5a: Knowledge of participants regarding the Influenza vaccine according to their demographic characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia.

		How often do you think you need a flu vaccine?								
		Every six months		Every year		Once in a lifetime		When it is mandatory		
		No.	%	No.	%	No.	%	No.	%	P value
Age Groups (years)	≤35	22	5.9	273	73.0	10	2.7	69	18.4	0.170
	>35	27	7.7	271	77.2	7	2.0	46	13.1	
Gender	Male	35	8.4	303	73.0	12	2.9	65	15.7	0.160
	Female	15	4.8	240	77.4	5	1.6	50	16.1	
Chronic morbidities	Yes	1	2.2	39	84.8	1	2.2	5	10.9	0.410
	No	47	6.9	506	74.5	16	2.4	110	16.2	
Nationality	Saudi	37	7.0	376	70.9	15	2.8	102	19.2	<0.001*
	Non-Saudi	12	6.2	168	86.6	2	1.0	12	6.2	
Region	Central	16	7.3	164	75.2	5	2.3	33	15.1	0.830
	Northern	6	6.6	70	76.9	1	1.1	14	15.4	
	Southern	1	2.3	30	69.8	1	2.3	11	25.6	
	Eastern	9	8.5	78	73.6	1	0.9	18	17.0	
	Western	16	6.7	178	74.8	8	3.4	36	15.1	

* Statistically Significant

Table (5b): Knowledge of participants regarding the Influenza vaccine according to their occupational characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia

		How long do you think the vaccine is effective?								
		For life		For 1 year		For 2 years		For 5 years		
		No.	%	No.	%	No.	%	No.	%	P value
Age Groups (years)	≤35	21	5.8	267	73.8	54	14.9	20	5.5	0.170
	>35	16	4.6	279	80.4	41	11.8	11	3.2	
Gender	Male	24	6.0	293	72.7	66	16.4	20	5.0	0.010*
	Female	13	4.2	253	82.7	29	9.5	11	3.6	
Chronic morbidities	Yes	4	9.1	36	81.8	4	9.1	0	0.0	0.250
	No	33	5.0	512	77.0	91	13.7	29	4.4	
Nationality	Saudi	34	6.6	375	72.3	82	15.8	28	5.4	<0.001*
	Non-Saudi	2	1.1	173	91.5	12	6.3	2	1.1	
Region	Central	8	3.8	173	81.2	25	11.7	7	3.3	0.070
	Northern	6	6.7	66	73.3	14	15.6	4	4.4	
	Southern	2	4.8	27	64.3	8	19.0	5	11.9	
	Eastern	7	6.7	73	70.2	22	21.2	2	1.9	
	Western	13	5.6	185	79.4	24	10.3	11	4.7	

* Statistically Significant

Table 5b: Knowledge of participants regarding the Influenza vaccine according to their occupational characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia

		How often do you think you need a flu vaccine?								
		Every six months		Every year		Once in a lifetime		When it is mandatory		
		No.	%	No.	%	No.	%	No.	%	P value
Working place	PHCs	26	6.4	332	81.4	10	2.5	40	9.8	<0.001*
	Hospitals	24	7.5	214	66.9	7	2.2	75	23.4	
Profession	Physician	17	7.7	189	85.9	0	0.0	14	6.4	<0.001*
	Nurse	20	5.7	260	74.3	11	3.1	59	16.9	
	Pharmacist	6	6.7	66	73.3	1	1.1	17	18.9	
	Others	7	10.4	30	44.8	5	7.5	25	37.3	
Experience (years)	≤10	23	6.9	241	72.6	8	2.4	60	18.1	0.51
	>10	27	6.9	301	76.8	9	2.3	55	14.0	
First time in Hajj	Yes	22	8.4	199	75.7	6	2.3	36	13.7	0.49
	No	28	6.0	347	74.8	11	2.4	78	16.8	

* Statistically Significant

Table 5b continued

		How long do you think the vaccine is effective?								
		For life		For a year		For 2 years		For 5 years		
		No.	%	No.	%	No.	%	No.	%	P value
Working place	PHCs	16	4.0	318	79.7	54	13.5	11	2.8	0.030*
	Hospitals	21	6.7	231	73.8	41	13.1	20	6.4	
Profession	Physician	3	1.4	194	90.2	16	7.4	2	0.9	<0.001*
	Nurse	14	4.0	268	77.5	50	14.5	14	4.0	
	Pharmacist	10	11.5	57	65.5	14	16.1	6	6.9	
	Others	10	15.9	29	46.0	15	23.8	9	14.3	
Experience (years)	≤10	18	5.5	252	77.1	44	13.5	13	4.0	0.950
	>10	19	5.0	293	76.9	51	13.4	18	4.7	
First time in Hajj	Yes	14	5.4	204	78.8	35	13.5	6	2.3	0.240
	No	22	4.9	345	76.3	60	13.3	25	5.5	

* Statistically Significant

Table 6a: Logistic regression analysis for the participants who did not receive the vaccine according to their demographic characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia.

	Vaccinated before		Vaccinated for this Hajj		Future intention to get the vaccine	
Variable	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Age Groups						
≤35 years	Ref	0.58	Ref	0.46	Ref	0.73
>35 years	0.81(0.38-1.7)		0.84(0.53-1.3)		0.92 (0.59-1.4)	
Gender		0.81				
Male	Ref		Ref	0.37	Ref	0.62
Female	0.916(0.44-1.8)		1.2(0.79-1.8)		1.1(0.73-1.6)	
Chronic morbidities		0.48				
Yes	Ref		Ref	0.51	Ref	0.88
No	2.09(0.26-16.6)		0.75(0.32-1.7)		1.07(0.43-2.6)	
Nationality						
Saudi	Ref	0.77	Ref	0.038*	Ref	0.16
Non-Saudi	1.20(0.33-4.4)		0.48 (0.24-0.96)*		0.61(0.30-1.2)	
Region		0.71				
Central	Ref		Ref	0.16	Ref	
Northern	1.84(0.70-4.8)		1.3(0.70-2.4)		1.8(1.02-3.4)*	0.042*
Southern	1.4(0.27-3.9)		1.8(0.84-3.8)		1.2(0.85-2.8)	
Eastern	0.85(0.30-2.3)		0.72(0.38-1.3)		1.01(0.56-1.8)	
Western	1.05(0.47-2.3)		1.3(0.84-2.1)		1.1(0.70-1.7)	

OR, Odd ratio; 95%CI, Confidence interval; *Significant P-value.

Table 6b: Logistic regression analysis for the participants who did not receive the vaccine according to their occupational characteristics during Hajj season 2019 (1440 H), Makkah, Saudi Arabia

	Vaccinated before		Vaccinated for this Hajj		Future intention to get the vaccine	
Variable	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Work Place						
PHCs	Ref	0.38	Ref	0.001*	Ref	0.015*
Hospitals	1.33(0.69-2.5)		1.94(1.3-2.8)*		1.5(1.09-2.3)*	
Profession	Ref		Ref		Ref	
Physician	3.85(0.94-15.8)		1.5(0.79-2.8)		2.4(1.2-4.6)*	0.010*
Nurses	11.07(2.47-49.4)*	0.002*	2.7(1.3-5.8)*	0.008*	2.7(1.2-6)*	0.011*
Pharmacist	3.6(0.64-20.4)		4.3(1.9-9.4)*	<0.001*	4.9(2.1-11)*	<0.001*
Others						
Experience					Ref	
≤ 10 years	Ref	0.66	Ref	0.69	0.77(0.51-1.7)	0.23
> 10 years	0.85(0.41-1.7)		1.08(0.71-1.6)			
First Hajj						0.37
Yes	Ref	0.57	Ref	0.88	Ref	
No	0.82(0.41-1.6)		0.96(0.46-1.6)		1.2(0.80-1.8)	

OR, Odd ratio; 95%CI, Confidence interval; *Significant P-value.

Figure 1: Reasons for ever receiving influenza vaccine

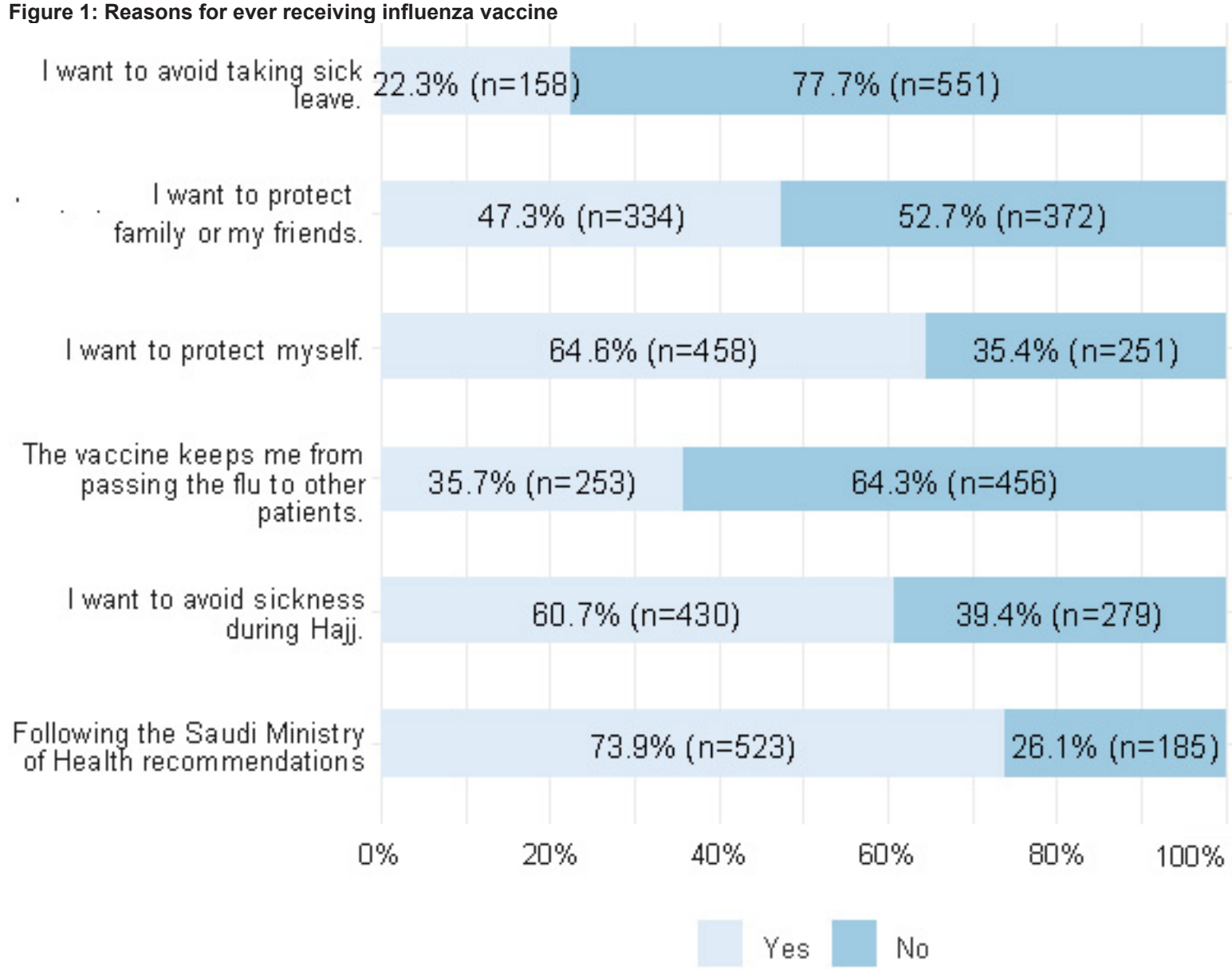

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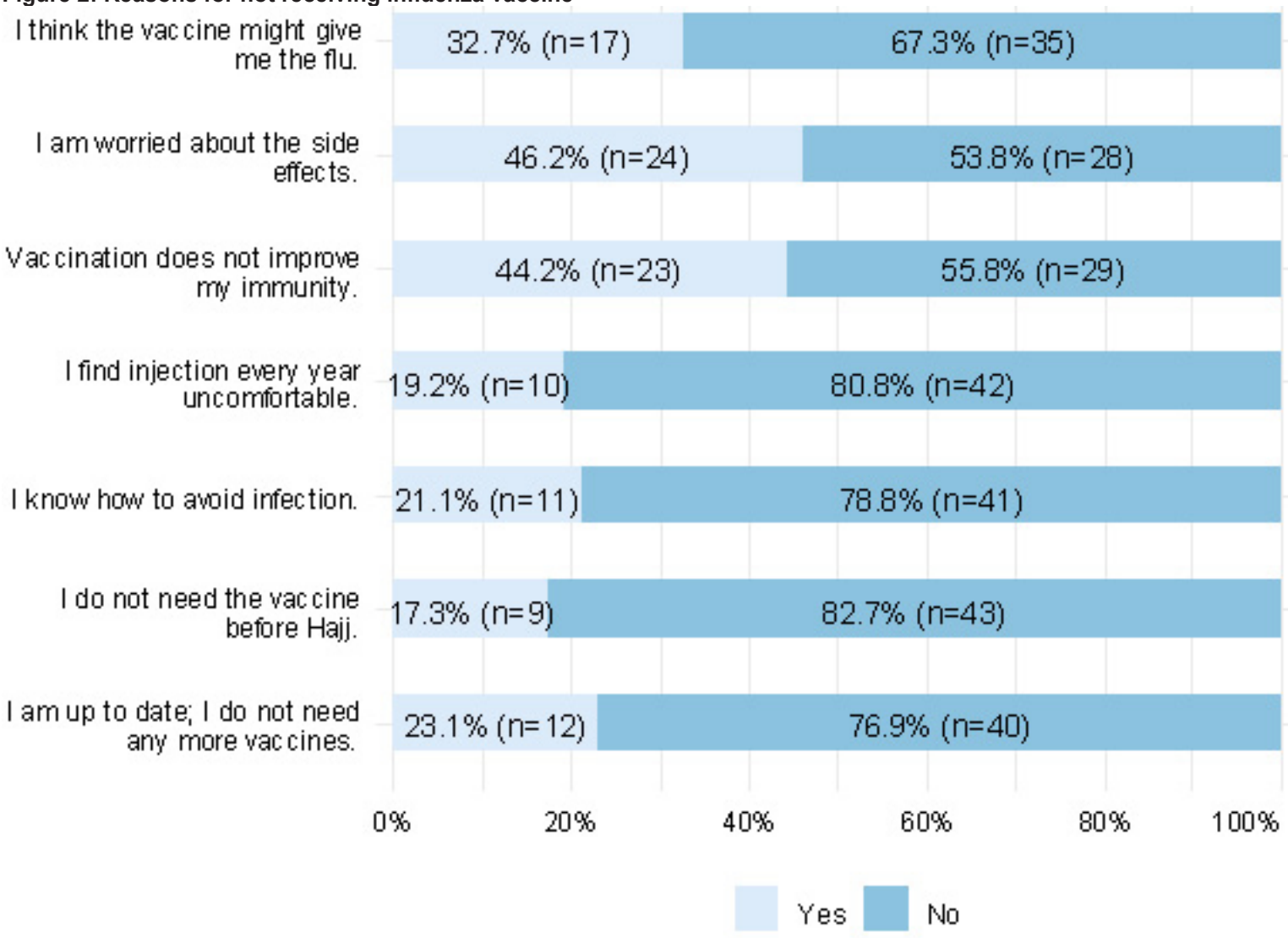
Figure 2: Reasons for not receiving influenza vaccine



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Discussion

This study was conducted among the healthcare workers in Almashaer Primary Health Centers and Hospitals in Holy Makkah, Saudi Arabia, during the Hajj season 2019, which holds the biggest annual mass gatherings of people around the globe.

Our study shows that three-quarters of the participants have received the vaccine for this Hajj season. This vaccination rate is a little higher than the previous study (69%), which was conducted by Badadah et al. in Hajj season 2017 (7). In particular, the physicians represented the highest vaccination rate at 87.5% among the HCW. Furthermore, physicians were more committed to the vaccine; we found that 97.5% of them were vaccinated before in their life. In contrast to other study results conducted by Heradi et al. among the healthcare workers in a tertiary care hospital in Saudi Arabia, 2017 which revealed that the nurses were more willing to receive the vaccine compared to other HCWs (26).

Despite the importance of the influenza vaccine, especially for this occupational group, who are expected to be vaccinated even when not serving at Hajj one quarter of participants in this study reported not receiving the vaccine before attending Hajj. Half of the other healthcare cadres, including the administrative officers and one-third of the pharmacists, were among this quarter. Also, we found that one-third of the HCWs who were working in hospitals were also not vaccinated for the current Hajj season. The lower uptake of the vaccine among them is a big concern. A cross-sectional study was conducted by Alabbad et al. in a tertiary hospital in Riyadh, Saudi Arabia, to determine the reasons for influenza vaccine hesitancy during the 2015–2016 winter season. The prevalence of vaccine hesitancy was 18% among the participants, lower than what we found in our study results (27).

Age is a significant factor influencing the uptake of vaccination among healthcare workers. As shown in the results, vaccination compliance improved with the age of the healthcare personnel. 95% of those aged more than 35 years were vaccinated before in their life. Furthermore, 80% of them were vaccinated before attending this Hajj compared to those aged less than 35 years. These results are (much) the same to the findings of Asma et al., who also found a positive relevance between rising age of healthcare workers and the likelihood of vaccination uptake (39). The relationship between uptake of the vaccine and the age of healthcare workers implies that the older staff have a better awareness of the benefits of the vaccine (18). Moreover, old age could be a risk factor for the complications of influenza disease, another possible explanation (26).

One of the main reasons among the participants for getting the vaccine was to follow the Ministry of Health recommendations (74%). The health authorities in Saudi Arabia adopted a mandatory vaccination policy for all healthcare workers in all settings. Besides, a consequence was unvaccinated staff were not permitted to participate in the Hajj as well as not receiving the incentives (26). Yet, relying on mandatory immunization policy to reach a sufficient level of the vaccine uptake among healthcare workers does not revoke the need to understand and deal with other reasons that improve voluntary vaccine uptake. Another reason for receiving the vaccine was to protect themselves and avoid sickness during Hajj (more than 60%). The same reason was demonstrated by Mytton et al., who found that protecting healthcare workers from the disease was an important factor in receiving the vaccine (40). Other cited reasons to receive the vaccine were:

- prevent passing the infection to others,
- protect my friends and family';

these reasons were also explained by other studies (20, 26).

The majority of the HCWs in this study agreed that the influenza vaccine is effective, and all HCW should be vaccinated. Likewise, this is similar to what Alshammari et al. found regarding the positive attitude regarding the influenza vaccine (28). However, 25% of the participants in our study responded with "No" when asked whether they would have an influenza vaccine in the future. Also , Rehmani et al. found that two-thirds of the participants did not intend to take the vaccine for the following year (20). This attitude is alarming and needs more action to be avoided. The non-receipt of the influenza vaccine by HCWs discloses a wide range of misconceptions and lack of knowledge about the vaccine. 70% of those vaccine rejecters in our study did not know that the vaccine is given annually. Furthermore, they had some concerns regarding vaccine efficacy, and 46% of them were afraid of the side effects of the vaccine.

Cobos Muñoz et al. (27) conducted a systematic review in some low and middle-income countries located in Asia, Africa, South America, and Oceania regarding the concerns of vaccination. It revealed that the idea of possible harm caused by the vaccine and the belief that the vaccine can cause severe side effects were the most frequently reported barriers, like the reasons mentioned in our study.

Good knowledge regarding vaccination against influenza is not only necessary for sustaining good vaccine uptake, but it is also important for the commitment of the healthcare workers to recommend the vaccine to the susceptible target high-risk groups. Vaccination of healthcare workers, together with their belief in the effectiveness of the vaccine, was associated with good coverage in their patients (26). Healthcare workers have often been considered as the main supporters for vaccination and the most significant source of information regarding the vaccine for the general population (29).

This study has several strengths. It was conducted in all Al Mashaer primary health centers and hospitals, with different professionals from several professions. Therefore, this study clarifies the vaccination coverage among different occupations. Also, the large sample size

and the high response rate are considerable strengths of our study. On the other hand, the use of self-reporting for data gathering from the participants could be a limitation. The correctness of the responses, therefore, depends on each participant's willingness, and were not subject to independent verification due to anonymity.

Conclusion

There was a good uptake of the influenza vaccine during the last Hajj season in 2019 before the COVID-19 pandemic. The main reason for getting the vaccine was following the authority's guidelines, which meant adopting mandatory vaccination policy. However, there are still misconceptions about the efficacy of the vaccine and concerns about its side effects, which were the main barriers for not receiving the vaccine. Awareness programs are required to address the concerns for those who are less compliant to receive it, especially younger staff, pharmacists, other cadres, and encourage them to get vaccinated. Ultimately, higher vaccine uptake among healthcare workers will impact vaccination of the general population as well.

Recommendation:
Based on findings of the present study, it is recommended to continue the educational programs and campaigns for all healthcare workers that emphasize the benefits of the influenza vaccine, and reduce fears and misconceptions. It is important to ensure the availability of the vaccine, on all work shifts, and also on the weekend, and to enhance access to the vaccine by going to the staff departments, meeting rooms, and provide the vaccine at convenient times and places where the staff gathers. Measuring the vaccination coverage regularly, and making vaccination of HCWs a standard medical practice is essential.

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References

(1) WHO. Influenza (Seasonal) Fact sheets [Internet]. 2018. Available from: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)
(2) Soema PC, Kompier R, Amorij JP, Kersten GFA. Current and next generation influenza vaccines: Formulation and production strategies. European Journal of Pharmaceutics and Biopharmaceutics [Internet]. 2015;94:251–63. Available from: http://dx.doi.org/10.1016/j.ejpb.2015.05.023
(3) Centers for Disease Control and Prevention NC for I and RD (NCIRD). Seasonal Influenza (Flu) [Internet]. 2019. Available from: https://www.cdc.gov/flu/about/index.html
(4) Division I, Diseases R, Genetic SH, Foundation G, Foundation MG, Seika M, et al. Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment. 2019;68(6):1–99.
(5) Dakkak W TAR. HHS Public Access. Physiology & behavior. 2017;176(5):139–48.
(6) Saeed Al-Asmary, Abdul-Salam Al-Shehri, Alaa Abou-Zeid, Moataz Abdel-Fattah, Tamer Hifnawy, & Tarek El-Said. "Acute respiratory tract infections among Hajj medical mission personnel, Saudi Arabia." International Journal of Infectious Diseases 11 (2007): 268—272.
(7) Alfelali M, Barasheed O, Badahdah A-L, & Bokhary H, et al., "Mandatory meningococcal vaccine, and other recommended immunisations: Uptake, barriers, and facilitators among health care workers and trainees at Hajj." World Journal of Clinical Cases 6.16 (2018): 1128-1135.
(8) Abubakar A, Melhem N, Malik M, Dbaibo G, Mehmood KG, Zaraket H. "Seasonal influenza vaccination policies in the Eastern Mediterranean Region: Current status and the way forward." Vaccine 37 (2019): 1601-1607.
(9) Luliano AD, Roguski KM, Chang HH, Muscatello DJ, Palekar R, Tempia S, & Cohen C. "Estimates of global seasonal influenza-associated respiratory mortality: a modelling study." Lancent 391 (2018): 1285-3000.
(10) Al-Tawfiq JA, Memish ZA. Mass gatherings and infectious diseases: prevention, detection, and control. Infectious Disease Clinics. 2012 Sep 1;26(3):725-37.
(11) Alfelali M, Barasheed O, Badahdah A-L, & Bokhary H. "Influenza vaccination among Saudi Hajj pilgrims: Revealing the uptake and vaccination barriers." Vacine 36 (2018): 2112-2118.
(12) Balkhy HH, Memish ZA, Bafaqeer S, & Almuneef MA, "Influenza a Common Viral Infection among Hajj Pilgrims: Time for Routine Surveillance and Vaccination." J Travel Med 11 (2004): 81-86.
(13) Tashani M,Alfelai M. Azeem MI, Fatema FN, Barasheeda O, & Alqahtania AS, et al. "Barriers of vaccinations against serious bacterial infections among Australian Hajj pilgrims." Postgraduate Medicine 128.6 (2016): 541-547.
(14) Zaraket H, Melhem N, Malik M, Khan WM, Ddaibo H, & Abubakar A."Review of seasonal influenza vaccination in the Eastern Mediterranean Region: Policies, use and barriers." Journal of infection and Puiblic Health 951 (2018): 1-7.
(15) Kuster SP, Shah PS, Coleman BL, Lam, P-P, Tong A, & Wormsbecker A. "Incidence of Influenza in Healthy Adults and Healthcare Workers: A Systematic Review and Meta-Analysis." PLoS One 6.10 (2010): 1-9.
(16) Dolan GP, Harris RC, Mlarkson M, Sokal R, Morgan G, & Mukaigawara M. "Vaccination of healthcare workers to protect patients at increased risk of acute respiratory disease: summary of a systematic review." Influenza and Other Respiratory Viruses 7.Suppl. 2 (2013): 93-96.
(17) Tuckerman JL, Shrestha L, Collins JE, & Marshall HS "Understanding motivators and barriers of hospital-based obstetric and pediatric health care worker influenza vaccination programs in Australia." 12.7 (2016): 1749-1756.

(18) Alenazi BR, Hammad SM, & Mohamed AE, "Prevalence of seasonal influenza vaccination among primary healthcare workers in Arar city, Saudi." Electronic Physician 10.8 (2018): 7217-7223.
(19) Socˇan M, Ercˇulj V, & Lajovic J. "Knowledge and attitudes on pandemic and seasonal influenza vaccination among Slovenian physicians and dentists." European Journal of Public Health 23.1 (2012): 92-97.
(20) Rehmani R, Memon JI. Knowledge, attitudes and beliefs regarding influenza vaccination among healthcare workers in a Saudi hospital. Vaccine. 2010 Jun 11;28(26):4283-7.
(21) Alshammari TM, AlFehaid LS, AlFraih JK, Aljadhey HS. Health care professionals' awareness of, knowledge about and attitude to influenza vaccination. Vaccine. 2014 Oct 14;32(45):5957-61.
(22) Petek D, Kamnik-Jug K. Motivators and barriers to vaccination of health professionals against seasonal influenza in primary healthcare. BMC health services research. 2018 Dec;18(1):853.
(23) Muruganathan, A. et al. Recommendations for Vaccination Against Seasonal Influenza in Adult High Risk Groups: South Asian Recommendations." Journal of The Association of Physicians of India (2016): 3-11. <http://www.japi.org/july_2016_special_issue_recommendations_for_various/01_recommendations_for_vaccination.pdf>.
(24) Lee SI, Aung E, Chin I, Hing JW, Mummadi S, Palaniandy GD, & Jordan R. "Factors Affecting Medical Students' Uptake of the 2009 PandemicInfluenzaA(H1N1)Vaccine." Influenza Research and Treatment (2012): 1-10.
(25) Zeitouni MO, Al Barrak AM, Al-Moamary MS, Alharbi NS, Idrees MM, Al Shimemeri AA, Al-Hajjaj MS. The Saudi Thoracic Society guidelines for influenza vaccinations. Annals of thoracic medicine. 2015 Oct;10(4):223.
(26) Haridi HK, Salman KA, Basaif EA, & Al-Skaibi DK. "Influenza vaccine uptake, determinants, motivators, and barriers of the vaccine receipt among healthcare workers in a tertiary care hospital in Saudi Arabia." Journal of Hospital Infection 96.3 (2017): 268-275. https://www.sciencedirect.com/science/article/pii/S0195670117300919
(27) Cobos Muˇnoz D, Monzón Llamas L, Bosch-Capblanch X. Exposing concerns about vaccination in low- and middle-income countries: a systematic review. Int J Public Health 2015;60:767–80.
(28) Alshammari TM, Yusuff KB, Aziz MM, Subaie GM. Healthcare professionals' knowledge, attitude and acceptance of influenza vaccination in Saudi Arabia: a multicenter cross-sectional study. BMC health services research. 2019 Dec;19(1):229.
(29) Alabbad AA, Alsaad AK, al Shaalan MA, Alola S, Albanyan EA. Prevalence of influenza vaccine hesitancy at a tertiary care hospital in Riyadh, Saudi Arabia. Journal of Infection and Public Health [Internet]. 2018;11(4):491–9. Available from: http://dx.doi.org/10.1016/j.jiph.2017.09.002