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Primary Health Care in Pandemics: Barriers, Challenges and Opportunities

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Editorial

Tawfik A M Khoja et al., looked at Primary Health Care in Pandemics: discussing the major barriers, challenges and opportunities. They stressed that COVID-19 has become a major global public health threat. It started from Wuhan the province of China in December 2019 and has spread in every country of the globe with over 100 million people currently infected and over three million deaths as of May 2021. Nearly a year on, with much town and cities are in lockdown and with all public health measures to minimize transmission of the virus SARS-COV-2 and the scientific achievements with many vaccines development at a record time, the transmission in the second wave is still strong with new variants of the virus that are emerging. The pandemic has caused a serious impact on the economic, social, political, and cultural dynamics of people, globally. The majority of people with mild and moderate symptoms of COVID-19 seek primary care (PC) service as the entry point for getting medical intervention, reducing flow to hospital care. Currently, primary care settings are facing major challenges including lack of funds, poor infrastructure in some countries, shortage of health care workers and equipment. Most, if not all primary care centers are not designed to separate people with the virus. The pandemic so far shows that strengthening primary care as the first point of contact with the health system is vital. The health systems of the future cannot be resilient without strong primary care for all, capable of meeting population health needs and aspiration for good health and well-being.

Almadhi et al., did a cross-sectional study aimed at IMSIU medical students in Riyadh. A questionnaire was distributed in April 2021 through WhatsApp to randomly selected medical students from all years except preparatory-year students. They collected 301 responses. 41.9% reported not starting any clinical rotations, and 38.5% indicated finishing some clinical rotations. Of the total students surveyed, 49.5% indicated that the COVID-19 pandemic influenced their choice of specialty; 48.6% felt that they had discovered new interests, which affected their consideration. In comparison, 40.5 % believed that COVID -19 had limited their ability to explore their considered specialty. The authors concluded that most of the students did not complete their clinical rotations or electives. Moreover, we found that the COVID-19 pandemic influenced students' perceptions about their specialty choices after graduation. Most of the students surveyed said their intentions had changed from pursuing specialties that required direct contact with patients to those that did not.

Alamri et al., assessed public willingness and preparedness with their attitude to receive COVID-19 vaccine in Saudi Arabia. They did a descriptive cross-sectional study was conducted targeting all available population in Saudi Arabia. The study included 2227 participants whose ages ranged from 18 to 62 years old with mean age of 31.7 ± 11.3 years old. In conclusion, the study revealed that acceptance of the COVID-19 vaccine in Saudi Arabia somewhat good but not sufficient to have the recommended herd immunity. It is affected by the effectiveness of the vaccine, safety of the vaccine, being taken by others, and history of getting infection or experienced death due to covid-19.

Dr. Basheikh, M.A., did a a descriptive, cross-sectional study conducted from March 2018 to October 2019. He was looking at burnout and depression symptoms are extremely common among internal medicine physicians including program directors There are more than 60 training centers offering internal medicine programs all around the Kingdom of Saudi Arabia. This study was approved by the Quality Committee, which follows the Scientific Council for Internal Medicine at Saudi Commission of Health Specialties. All participants were informed about the study objectives and confidentiality of survey responses, and they provided informed consents. Among 40 program directors who participated in this survey, (85%) were stressed out. Moreover, 27.5% expressed lack of support from the hospital's administration, 23.1% claimed that the department head interfered with the training process, 30% were frustrated with their uncooperative colleagues, and 82.5% denied receiving any financial benefit other than training allowance. Finally, 95% were satisfied with their performance as program directors. The authors concluded that Similar to other physician groups, program directors experience burnout. Nevertheless, more studies should be conducted to better understand stress and its possible causes. Further, such investigations can help identify the reasons behind the lack of support, in addition to protection of program director's encouragement.

AL Shehri et al., did a cross sectional study, data was collected from the purposely constructed questionnaire, the questionnaire was composed of demographical and questions related to the tracheostomy, ethical approval was obtained, consent from the respondents was taken , questionnaire was anonymous, questionnaire was constructed from the panel of experts including subject specialist , researchers and language specialist. Out of total 70 patients 33% have no pain while 26% have mild pain , 20% moderate pain , 11 and 10 % have severe pain controlled by narcotics and medication respectively.29% have not noticed any change in their appearances. The authors concluded that tracheotomy may be successfully conducted in this group of patients and that it provides significant practical and psychological benefits over other options.

Aljuaid , et al., assessed the level of awareness regarding first-aid management and control of epistaxis among teachers inside schools in Taif region, Saudi Arabia. The study revealed that teachers have fair knowledge about epistaxis control. Most of them were aware of changing the head position, Aalmost (80.1%) of the teachers will try to stop bleeding by applying pressure on the nose and about one third of them will do it on the lower part of the nose,17% of the teachers reported that they will use other methods where most of them reported that they will Seek health care or call the emergency. The authors concluded that Sixty-three percent of the teachers have fair knowledge regarding the control of epistaxis, especially those who have previous experience about it. However, more attention should be paid to improve the awareness regarding epistaxis management in the area through health training and educational sessions.

Dr. Nazish Jaffar et al., looked at barriers to premarital thalassemia screening and to observe the current thalassemia practices in Asian countries. This study was conducted on six countries of Asia based on economic status according to World Bank criteria. In Saudi Arabia, major obstacles for premarital thalassemia screening included planned weddings (43%), fear of social disgrace (21%), pressure from family (17%), and religious factors (14%). While in Oman, 4% of the people feared positive results and also considered it as an insult. Amongst Iranian population, financial burden on couples, disease phobia, fear of positive results, difficulty in accessibility, tribal variances and sociodemographic factors were frequent hindrances to screening program. Religious factors, financial constraint and lack of awareness cause reluctance in Pakistan and Bangladesh. Moreover, in Sri Lanka, factors like cancellation of marriage and sociocultural norms were identified as negative outcome of the screening. The authors concluded that, a negative attitude and reluctant response to premarital thalassemia screening was

observed in people belonging to all the countries included. Major contributing factors were religious misconceptions, social stigma, varying ethnicities, low financial status and poor accessibility to screening programs.

Majrashi et al., assessed prevalence of immunization against seasonal flu and to explore the knowledge related to influenza virus and flu immunization among elderly population in Abha sector. A descriptive cross-sectional approach was used targeting all accessible elderly population in Aseer region, Southern of Saudi Arabia. A total of 386 elderly aged 60-89 years old with mean age of 72.3 ± 5.8 years completed the study questionnaire. Totally, 56.2% of the elderly had good awareness regarding seasonal influenza. About 91% of the participants heard about it, 73.8% reported that it is safe, 60.9% know that influenza vaccine can prevent serious complication for elderly, and 50.8% know that influenza vaccine promotes immunity against the virus. The study revealed that one third of the elderly received the seasonal influenza vaccine regularly during the last years and nearly two thirds of them received it last year. Higher coverage rate was higher among highly educated male elderly with sufficient income and at rural residence and those who were asthmatic and previously hospitalized dur to flu.

Al Ghamdi, et al., attempt to measure the magnitude of the problem of diabetic foot in the special area of Albaha in Saudi Arabia. They included 53 patients presented to the diabetic foot center in Al Baha, Saudi Arabia over 1 year. The included patients were assessed by meticulous clinical examination including eye examination and foot assessment for ulcer, neuropathy, skin manifestations like abscesses, and foot deformities. Investigations included fasting blood glucose, hemoglobin A1C (HbA1C), lipid profile, and Doppler Ultrasonography of the lower limbs. Interestingly, diabetic foot ulcers were found to be significantly higher (p 0.038) in patients aged <66 years (24 (88.9%)) in comparison to those aged >66 years (20 (76.9%). In conclusion; diabetic foot ulcers and complications are a major health problem contributing to devastating morbidities up-to amputations. Poor glycemic control is a major contributing factor for diabetic foot problems. Good glycemic control, diabetic foot meticulous care, and early interventions are recommended health practice strategies.

Malibari , et al., applied a validated questionnaire of six parts was distributed online to include all diabetes patients in Saudi Arabia. After applying the criteria, 400 diabetes responses were included. The aims of this study were:1) to assess the awareness of diabetes and its systemic and oral complications among adults with diabetes in Saudi Arabia, 2) to evaluate their behaviors toward maintaining proper oral hygiene and factors associated with adequate oral health knowledge, and 3) to identify what recommendations and improvements are needed in diabetic clinics in KSA. The authors concluded that their study revealed comparatively better results of awareness than previous studies reported in Saudi Arabia, however not to the desired standard. Therefore, both dentists and all healthcare providers should be encouraged to take the responsibility to promote proper oral hygiene practices among their diabetic patients in order to reduce the risk of having periodontal diseases. Further research is required to identify obstacles preventing those patients from having regular dentist visits.

Al-Muhannadi, et al., assessed the prevalence and co-occurrence of major depression disorder and generalized anxiety disorder in adolescent in Qatar. They followed a cross-sectional study. An online questionnaire including Demographic data, PHQ-9 and GAD-7 will be sent to parents or legal guardians to take online consent, then to be filled by their children in the age of 12-18 years old. Chi-square test will be used to test the significance of association between variables. The significant level for all statistical analysis was set at 0.05. According to previous local study in Qatar we expect the prevalence of both disorders in this age group to be around 30% if not more and as per worldwide studies result 25-50% of depressed patient have anxiety also and 10-15% who have anxiety found to have depression as comorbidity, so we expect to have co-occurrences in this range.

Al-Karbi, et al., did a meta-analysis of randomized controlled trials (RCT) to evaluate the efficacy of curcumin on inflammatory pain in different disorders, in comparison to placebo and traditional pain treatments (NSAIDs and glucosamine plus chondroitin). In the all the 15 studies included 1475 subjects involved. Curcumin was found to be superior in controlling pain against placebo. Moreover, curcumin demonstrated a superior effect in controlling osteoarthritic pain when compared to Glucosamine and Chondroitin combination. However, Curcumin was found to be similarly effective to NSAIDs in controlling pain. The authors concluded that curcumin was found superior in pain relief against placebo and combination of glucosamine and chondroitin, in addition, it demonstrated equal efficacy in relieving osteoarthritic pain, when compared to NSAIDs.

Ibrahim et al., explored the relationship between the SES and the parental feeding practices will identify target groups who may benefit of interventions aimed at modifying unhelpful parental feeding practices. They followed a cross-sectional study done over 1 year. Participants were recruited from Clinical Nutrition Clinics at AbouElrish children hospital, Cairo University. A total of 712 eligible parent of children aged 3-5 years were asked to fill El-Gilany socio-economic status (SES) scale and the Arabic version of the child feeding practices questionnaire (CFPQ), then the individual domains and the total scores were calculated. The most common feeding practice adopted by the parents was encourage balance and variety (Mean ± SD 17.63 ± 2.88) while the least used feeding practice was emotional regulation (Mean ± SD 5.26 ± 3.36). There was statistical significance between the three levels of social classes and the following feeding practices: child control (P=0.002), encourage balance and variety (P= 0.004), restriction for weight (P= 0.005) and teaching nutrition (P <0.001). The authors concluded that The parental feeding practices are changing according to the SES. These practices can be promoted to improve dietary choices and prevent nutritional problems in children.

ALjohani , et al., aimed to assess knowledge of standard precautions (SPs) and infection control by healthcare workers (HCWs) at the primary healthcare level in Buraidah City, Qassim Region, Saudi Arabia. A cross section study enrolled HCWs (doctors, nurses, lab workers) from 20 primary healthcare (PHC) centers in Buraidah. Two-hundred participants were selected randomly to participate in this study. the study finding revealed inadequate of knowledge and a substandard adherence of SPs among the study participants. This is highlighted the necessity of the provision of a comprehensive training program to ensure the compliance to the infection control measures by the HCWs.

Alfaifi, et al., did a a cross-sectional study to assess prevalence, determinants and impact of migraine on health-related quality of life (HRQOL) among healthcare workers in Abha primary healthcare centers. The present study was conducted on 212 healthcare workers at primary healthcare centers belonging to the Ministry of Health 51.9% were males and 38.2% were residents. The mean±SD of MIDAS score was 12±10.6, and the mean±SD score of HRQOL was 54.9±7.4. the authors concluded that Prevalence of migraine varies according to several factors. The attacks of migraine affected grades of migraine disability and health-related quality of life of healthcare workers.

Bahhary, et al., did a cross-sectional study to assess the level of awareness regarding diabetic peripheral neuropathy (DPN) and its risk factors among diabetics in Muhayil City, Aseer Region, Saudi Arabia. This study included 367 diabetic patients. Regarding participants' awareness grades about diabetes and its risk factors, 4.1%, 18.5%, and 77.4% had excellent, acceptable, and poor awareness levels, respectively. The authors concluded that Type 2 diabetic patients in Muhayil City have poor awareness about DPN and its risk factors. However, prevalence of DPN among them is relatively low.

Primary Health Care in Pandemics: Barriers, Challenges and Opportunities

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Abstract

COVID-19 has become a major global public health threat. It started from Wuhan a province of China in December 2019 and has spread in every country of the globe with over 100 million people currently infected and over three million deaths as of May 2021. Nearly a year on, with many town and cities are in lockdown and with all public health measures to minimize transmission of the virus SARS-COV-2 and the scientific achievements with many vaccines developed in record time, the transmission in the second wave is still strong with new variants of the virus emerging. The pandemic has caused a serious impact on the economic, social, political, and cultural dynamics of people, globally. The majority of people with mild and moderate symptoms of COVID-19 seek primary care (PC) service as the entry point for getting medical intervention, reducing flow to hospital care. Currently, primary care settings are facing major challenges including lack of funds, poor infrastructure in some countries, and shortage of health care workers and equipment. Most, if not all primary care centers are not designed to separate people with the virus. The pandemic so far shows that strengthening primary care as the first point of contact with the health system is vital. The health systems of the future cannot be resilient without strong primary care for all, capable of meeting population health needs and aspiration for good health and well-being.

Key words:
COVID-19,
Pandemics,
Epidemic,
Primary Health Care,
Primary Care Services

Introduction

Cases of a novel coronavirus (2019-nCoV), caused by Severe Acute Respiratory Distress Syndrome Coronavirus 2 (SARS-CoV-2), first appeared in Wuhan, Hubei province, China, in December 2019, and since then, it has spread to every country around the globe (1). Deeply concerned by the alarming levels of spread and severity of COVID-19, World Health Organization (WHO) on 11th March 2020 declared COVID-19 as a pandemic. Public health experts recommend that personal hygiene and social distancing are necessary to curb the spread of coronavirus (1-3). Apart from the health issues, the pandemic has caused a serious impact on the economic, social, political, and cultural dynamics (4).

Globally, as of 22nd May 2021, there have been 166,840,355 confirmed cases of COVID-19 and 3,464,312 deaths (5). There are over 8,588,626 confirmed cases across the MENA region and fatalities are 168,140 (10th May 2021) (5). Approximately one-third (33%) of the total confirmed cases from the MENA region are from Iran 2,823,887 and the death toll is amongst the highest i.e. 78,381(6). Among Arab countries, Saudi Arabia has the most confirmed cases 439,847, followed by Qatar (215,160) and United Arab Emirates (554,516). Countries that account for over 80% of all deaths in the region include Iran (78,381 deaths), Morocco (9,115), Egypt (14,611deaths), Iraq (16,158), Lebanon (7,670), and Saudi Arabia (7237 deaths) (6).

Due to the surge in the number of COVID-19 cases and fatalities, the public health sector is also put to test thereby, forcing governments to make quick decisions, manage crises and implement drastic measures such as lockdown strategies and restrictions in travel, to protect communities at risk. Some countries had invested in the preparedness of pandemics that had benefited them during the crisis situations such as, the Republic of Korea, Singapore, and Taiwan (7, 8).

Governments from the MENA region had also taken measures to slow the transmission of COVID-19 by limiting the movements of millions of people (9, 10). Borders were closed and travel was restricted from affected nations. Countries such as Bahrain, Lebanon, and the United Arab Emirates (UAE) took early measures to contain the outbreak, enforcing school closures, and other forms of social distancing. Authorities in Saudi Arabia canceled Umrah, pilgrimage, and access to Mecca to non-residents to contain the rapidly spreading virus (11). Social media platforms and mobile operators were used to spread awareness and promote physical distancing.

After nearly a year, with many towns and cities in lockdown and with all public health measures to minimize transmission of the virus SARS-COV-2 and the scientific achievements with many vaccines developed in record time, the transmission in the second wave is still strong with new variants of the virus are emerging and weighing upon the health care delivery system.

The pandemic so far confirms that strengthening primary care as the first point of contact with the health system is essential. The health systems of the future cannot be resilient without strong primary care for all, capable of meeting population health needs and achieving good health and well-being.

This paper through exploring countries' experiences during the COVID-19 pandemic, addresses how primary care of the future should be shaped to meet people's health needs in all circumstances including acute events such as pandemics.

Strengthening of Primary Care

Strengthening of PC is imperative as it is the first point of contact with the health care delivery system and meets the needs of people of every age and at every stage of life and can truly fulfill the notion of 'health for all' as emphasized in the declaration of Astana 2018 (12). In addition, to being both accessible and affordable services, the distinguishing feature of the PC system is that it provides an infrastructure to decrease the burden from tertiary care hospitals and also provide essential preventive and curative services.
COVID-19 is affecting all countries, whether developed or developing, alike. However, the Low-Income Countries (LICs) and Lower Middle-Income Countries (LMICs) are more overwhelmed due to the fragile health care system. Hence, any acute events such as epidemics can paralyze the whole system (13).

Role of PC during pandemics:
During the pandemic, PC is challenged to a maximum extent, being in the frontline and community-based. It is a threat that enforcement of prevention strategies fall on PC and its failure due to reasons beyond control, questions its functioning and usefulness (14,15).

Being in the frontline during pandemics, maximum exposure to Covid-19 is experienced by PC practitioners. In addition, the primary care settings are overloaded due to the additional inflow of complicated patients (13-15). Moreover, the lack of evidence-based approaches makes it difficult to manage the pandemic situation.

Role of PC in implementing HiAP approach:
A Health in All Policies (HiAP) approach emphasizes that public policies and decisions made concerning areas other than health (e.g. transport, agriculture, education, employment, etc.) have the most impact on citizens' health, on health determinants, and on the capacity of health systems to respond to health needs (16).

PC cuts across and interacts with other areas of human activity and development and is, therefore, best suited to help implement the HiAP approach to counter the challenges of a pandemic (16).

PC leadership role in pandemics
It is crucial that for the success of the health system in general and PC in particular during pandemics, effective leadership demonstrates its leadership role. Effective leadership helps organize relief efforts to combat the pandemic. It includes situational analysis, resource mobilization, effective communication, and coordination among all stakeholders. PC is known to have a favorable impact on health-related outcomes despite the availability of limited resources. It is at times of pandemics that leadership gets an opportunity to demonstrate its maximum potential.

During the current Covid-19 pandemic, lack of effective leadership from health care providers and policymakers led to politicians making decisions that were against the available evidence base, and that led to the spread of the pandemic in several countries.

Role of PC at each stage of Pandemic:
Initial Stage:
During the initial phase, the patients and the community should be informed regarding the disease. Moreover, the HCWs should be trained and infrastructure changes should be made to help accommodate the number of patients vising PC centers.

Moderate to Severe Surge/Lockdown:
The HCWs should be trained to refer patients to appropriate hospitals/clinics. PCs should regularly inform people regarding early signs and symptoms of the disease and preventive measures.

The PC settings should have enough supplies of PPEs and medications; moreover, the staff should be trained about infection control strategies, use of PPEs, surveillance system, and management of COVID-19 cases in primary health care settings.

A plethora of unverified information is available on the social media platforms regarding COVID-19 (17); therefore, the HCWs should also be informed about the authentic sources to keep them updated with the current scenario.

The PC settings should reduce the inflow of patients with common ailments, instead, tele-clinics may be used during this phase. Besides that, medications can be delivered to the patient's home to avoid overcrowding.

The PC center's role during the pandemic is also to arrange counseling facilities for patients and their family members, to reduce patients' and families' anxiety.

Exit Phase:
The PC health care facilities would return to their normal routine and the prior appointments of the patients should be rescheduled. Debriefing sessions should be organized for the staff and they should be given some time off to spend time with their families. Moreover, updated information regarding the epidemic should be shared with the staff and the patients.

In the last stage of the pandemic, primary care centers should collect and analyze the data collected during the incident to prepare and improve the PC system for any future pandemics.

Role of technology as a Public Health Initiative:
Innovations in technology are the need of the time, be it tele-clinics or providing key health messages to the community at large; technology has played its part well (18). Many countries have used technology to manage the COVID-19 pandemic effectively. In Bahrain, an application 'BeAware Bahrain' was launched to alert users about nearby active cases of COVID-19 or locations visited by positive cases of COVID-19 (19). Oman also launched a COVID-19

interactive map on the 'Tarassud application' (19). UAE has successfully adopted tele-clinics to help patients avoid the risk of infection and minimize the burden on the health care system. Greenhalgh et al. suggested that tele-clinics can be important tools in dealing with mild or moderate COVID-19 patients (20). The Ministry of Health in Saudi Arabia has also established an e-Health strategy for the use of telemedicine.

Role of PC as Triage in pandemics:
During pandemics, PC facilities play a vital role in providing information about the disease. They also act as gate-keeper by differentiating patients with other symptoms from those with COVID-19, making an early diagnosis, helping the vulnerable population to cope with their anxieties, and in turn reducing the overflow on other tertiary care hospitals and emergency departments (20). Studies suggest that around 80% of COVID-19 cases are mild and the majority of these cases seek PC services for treatment (14, 15). In addition to this, the PC centers also try to sustain their routine care regimens (21,22).

Role of PC in Surveillance:
Effective surveillance is critical to containing infectious disease outbreaks such as COVID-19. Electronic surveillance tools should be implemented on PCs to transmit information to a central station that can be accessed in real-time by the decision-makers (23,15).

Integration of PC and Public Health during pandemics:
A primary health care system and Public Health system in the context of dealing with pandemics such as COVID-19 serves the same ultimate objective that is improving the health of individuals. While the public health approaches take this challenge from the macro-level i.e. moving from the national level down to the community level, primary care approaches the challenge of providing individual clinical care to the patients, at the local community level (24,25).

It is important to have an integrated health care delivery system as without the support of a strong public health system there would be a lack of ability to monitor epidemiological disease patterns and the system will be unable to plan and mobilize the scale of response required to contain an outbreak. A public health system is necessary as without strong primary care capabilities it will lack both the "radar screen" to pick up the initial cases of an outbreak and also the delivery system to execute an effective and efficient response strategy (25).

Safety of PC team during pandemics:
There has been an exceptional threat to the HCWs as they are the front liners in caring for the patients and protecting them, which is amongst the most important interventions for successfully managing the COVID-19 pandemic. WHO and other international public health authorities have recommended the implementation of safety protocols for HCWs. However, basic PPEs are not always available in many medical institutions dealing with COVID-19 patients (26). A study from India reported, that there were only a few medical colleges that were providing N95 to FPs/GPs in OPD clinics (21).

Challenges in PC activities

Delay in Routine Care:
The maintenance of essential health care services during the COVID-19 pandemic is a big challenge. This can impose a double burden on the already exhausted health care system (21,22). UNICEF estimates that approximately 117 million children from 37 countries are at risk of missing out on the life-saving measles vaccine (27). A study reported that disruptions in health services during the 2014-2016 Ebola outbreak in West Africa resulted in approximately over 10,000 additional preventable deaths due to malaria, HIV/AIDS, and tuberculosis (29).

Case Definition and Treatment:
In the early days of the pandemic, it is difficult to identify the cases and the possible treatment modalities (30). The case definition and treatment are constantly evolving based on evidence-based research and the primary care practitioners have to keep themselves abreast of the latest developments.

Infrastructural Capacity:
It is a major challenge since not all PC settings have such an infrastructure to deal with pandemics. For instance, in airborne pandemics such as COVID-19, there is a need for ventilation and spacious clinic space to maintain physical distancing. Separate spaces for COVID patients are needed for screening and testing (26). The primary care providers working in LICs and LMICs are already working in resource constraint settings. Studies have reported the unavailability of proper personal protective equipment (PPE) in some PC centers (26, 31).
The health data website reported that in terms of absolute numbers 95% of mask use can avert the (25,194), deaths in Pakistan, Egypt (20,930 deaths), and Bangladesh (20,344 deaths) (32). Therefore, the availability of PPEs is vital for the proper functioning of PC centers.

Shortage of Staff:
Healthcare systems across developed and developing countries are being put to test to limit the spread of the virus and the majority of this responsibility is being shouldered by frontline HCWs (33,34). Endless hours, draining shifts, staff shortages and lack of resources all take a toll on the physical and mental health of the personnel, and in due course, some HCWs may become sick and even die (33,34). This havoc has created a shortage of staff and simultaneously, the upsurge in the number of COVID-19 patients poses a double burden on the primary care delivery system.

Lessons learned:
Primary Care is one of the main pillars of a health care delivery system that runs on the notion of universal health care and provides comprehensive, accessible, and socially and culturally oriented health care to the people.

The lessons learned from this review are suggestive of the need for a strong primary health care system. It is imperative to maintain effective channels of communication between various stakeholders and PC personnel for ensuring continuity of health care services during any future waves of the COVID-19 and to achieve health for all. As a way forward, the government of the countries should substantially invest in infrastructure, capacity building, and the strengthening of primary health care services to ensure their effective functioning during any public health crisis.

Way Forward

- The current situation entails the implementation of palliative care in the community particularly psychosocial care for patients who were at risk of feeling isolated, mainly the elderly. WHO has also identified that palliative care is an essential aspect of the primary health care system (35).

- There is a need for collective planning, communication, and coordination between the policymakers, managers, epidemiologists, and the primary health care team, to ensure the preparedness for any impending epidemics.

- There is a need for a culturally diverse workforce of health care professionals at PC centers. The staff should be able to provide culturally sensitive and appropriate services to vulnerable populations in the pandemic.

- Innovative technology measures should be used to effectively manage the pandemic with applications and other social media platforms.

- Disease surveillance systems should be strengthened to benefit the response to future epidemics.

- International funding agencies should collaborate with the Government to strengthen PCs, their infrastructure, and the health care delivery system to decrease the impact of the public health crisis and improve vaccination coverage.

Conclusion

The primary care system has an important role to accomplish in response to any public health crisis. They are accessible health care facilities and the first point of contact for the people. PC centers are key to effectively diagnosing and reporting cases thus, helping to slow the spread of the outbreak across and within countries. Currently, primary care settings are facing major challenges including lack of funds, poor infrastructure in some countries, shortage of health care workers, and types of equipment. In this regard, it is essential for the donors' agencies, Government, and stakeholders to join hands and work towards strengthening PC.

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Effect of the COVID-19 pandemic on career perceptions among medical students in (IMSIU)

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Abstract

Background and aim: COVID-19 pandemic has impacted daily activities due to restrictions regarding social distancing. We aim to investigate the effect of withholding clinical rotations and elective rotations caused by the COVID-19 pandemic on career perceptions among medical students in Imam Mohammad Ibn Saud Islamic University (IMSIU).

Design: A cross-sectional study aimed at IMSIU medical students in Riyadh. A questionnaire was distributed in April 2021 through WhatsApp to randomly select medical students from all years except preparatory-year students.

Results: We collected 301 responses. 41.9% reported not starting any clinical rotations, and 38.5% indicated finishing some clinical rotations. Of the total students surveyed, 49.5% indicated that the COVID-19 pandemic influenced their choice of specialty; 48.6% felt that they had discovered new interests, which affected their consideration. In comparison, 40.5 % believed that COVID -19 had limited their ability to explore their considered specialty. A total of 63.1% students were concerned about fulfilling their graduation requirements in a timely manner, and 15.9% thought that they would need an additional year in medical school before applying to residency because of COVID-19.

Conclusion: It was found that most of the students did not complete their clinical rotations or electives. Moreover, we found that the COVID-19 pandemic influenced students' perceptions about their specialty choices after graduation. Most of the students surveyed said their intentions had changed from pursuing specialties that required direct contact with patients to those that did not.

Key words: Medical students, COVID 19, career choice, Residency programs

Introduction

The COVID-19 pandemic had a significant impact on daily activities due to restrictions in terms of social distancing because of the elevated rate of contagion and mortality. Many sectors have been affected, particularly educational sectors, worldwide. In Saudi Arabia, all medical educational institutions had abandoned on-campus teaching as well as hospital clinical rotations for online teaching methods. Online lectures may be able to convey theoretical principles to students. Nevertheless, these online lectures cannot replace clinical and in-field hospital exposure, which may affect students' choices concerning their residency program specialties [1].

The suspension of clinical electives had multiple adverse effects on medical students, either in terms of inadequate clinical exposure or the inability to demonstrate commitment to their specialty of choice in the hospital [2]. Medical student's career choices can be significantly influenced by several factors, such as a student's medical school, ethnic background, and the different learning experiences of first- and last-year medical students [3].

The restrictions imposed by the COVID-19 pandemic had some advantages. Students had more time to participate in other academic activities such as clinical research or organizing online educational activities, thus giving them more opportunities to be more creative in a particular scholarly activity to distinguish themselves among their colleagues [1].

In Saudi Arabia, there is no scholarly work that deals with the effect of COVID-19 on the career choice of medical students. However, one study in the USA demonstrated that a fifth of the average student's residency program choices were affected by the absence of clinical rotations and in-campus teaching [4].

In this study, we aim to investigate the impact of withholding clinical rotations and elective rotations due to the COVID-19 pandemic on career perceptions among medical students in Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia.

Methods

Our study design is a cross-sectional one, and the target population is medical students at Imam Mohammad Ibn Saud Islamic University. The medical education system at IMSIU requires seven years of study. The first year is called the preparatory year and it prepares students for entry into medical college or other health specialties, followed by five years of medical education that consists of three years of basic medical sciences and two years of clinical training followed by an internship year. This study targeted medical students in their fifth year and college interns (40), first-year medical students (50), second-year medical students (54), third-year medical students (61), fourth-year medical students (54), fifth-year medical students, and (42) interns.

A questionnaire previously used in another study [4] was modified and used in this study. The online questionnaire was piloted on 20 students to assess the clarity of the questions and the length of the questionnaire from 15/4/2021 to 17/4/2021 in Riyadh using online means (WhatsApp application). Subsequently the questionnaire was fully distributed through WhatsApp application groups from 18/4/2021 to 30/4/2021 to randomly selected medical students from all years except the preparatory year in Imam Mohammad Ibn Saud Islamic University students. Participants in the study were asked about academic year, GPA, completed rotations, completed electives or sub-internships, and were asked to select one or two specialties of interest before and after the COVID-19 pandemic.

Imam Mohammad Ibn Saud Islamic University (IMSIU) has an enrolment of approximately 900 medical students. The calculated minimal sample size with a confidence interval of 95% and a margin of error of 5%, and a response rate of 50% is 284 students. We collected 301 responses that were statistically analyzed using SPSS (Statistical Package for Social Sciences). Continuous variables are presented as mean, standard deviation, and median. Categorical data are presented as numbers and percentages. P-values were considered statistically significant at $p < 0.05$.

Our inclusion criteria are Imam Mohammad Ibn Saud Islamic University medical students, and our exclusion criteria are incomplete questionnaires, preparatory-year students, and medical students in different universities. Students who agreed to participate were asked to sign a written consent form before filling in the questionnaire. The participating student could cease the survey any time they wished. All questionnaires were kept private; no names or other data were recorded.

Results

In this study, we collected 301 responses to our questionnaire where 20.3% of students were in the fourth year while 17.9% were in the third and fifth year, and 16.6% were in the second year. In addition, 42.2% of participants reported having a GPA of 3.75-4.5 and 32.2% had 4.5-5. Furthermore, 41.9% of students indicated not starting any clinical rotations, while 38.5 % indicated finishing some of the clinical rotations (Table 1). Students' most frequent medical rotations were pediatrics (72.1%) and 70.5% of students were in internal medicine, followed by ophthalmology, surgery, and orthopedic rotations (Table 2). Moreover, 40.2% of participants indicated that they had completed electives or internships; while 30.1% of participants had not completed any elective. The most popular electives or sub-internships chosen were general surgery (19.7%), emergency medicine (16.4%), and internal medicine (18.0%). See Figure 1.

Table 1: General characters of participants			
		Count	Column N %
Academic year	First-year	40	13.3%
	Second-year	50	16.6%
	Third-year	54	17.9%
	Fourth-year	61	20.3%
	Fifth-year	54	17.9%
	Intern	42	14.0%
GPA	<2.75	9	3.0%
	2.75-3.75	68	22.6%
	3.75-4.5	127	42.2%
	4.5-5	97	32.2%
Status of completing clinical rotation	I have not started my clinical rotations.	126	41.9%
	I have completed some of my clinical rotations but not all of them.	116	38.5%
	I have completed all of my clinical rotations.	59	19.6%
Have you completed any electives or sub-internships?	Yes	121	40.2
	No	180	59.8

Table 2: The frequency of students taking rotations		
Medical rotations	Frequency	Percent
Surgery	118	64.5%
Internal medicine	129	70.5%
OB/Gyn	71	38.8%
Pediatrics	132	72.1%
Family Medicine	90	49.2%
Emergency Medicine	76	41.5%
Dermatology	71	38.8%
Ophthalmology	120	65.6%
ENT	71	38.8%
Orthopedic	103	56.3%
Psychiatry	68	37.2%
Radiology	5	2.7%

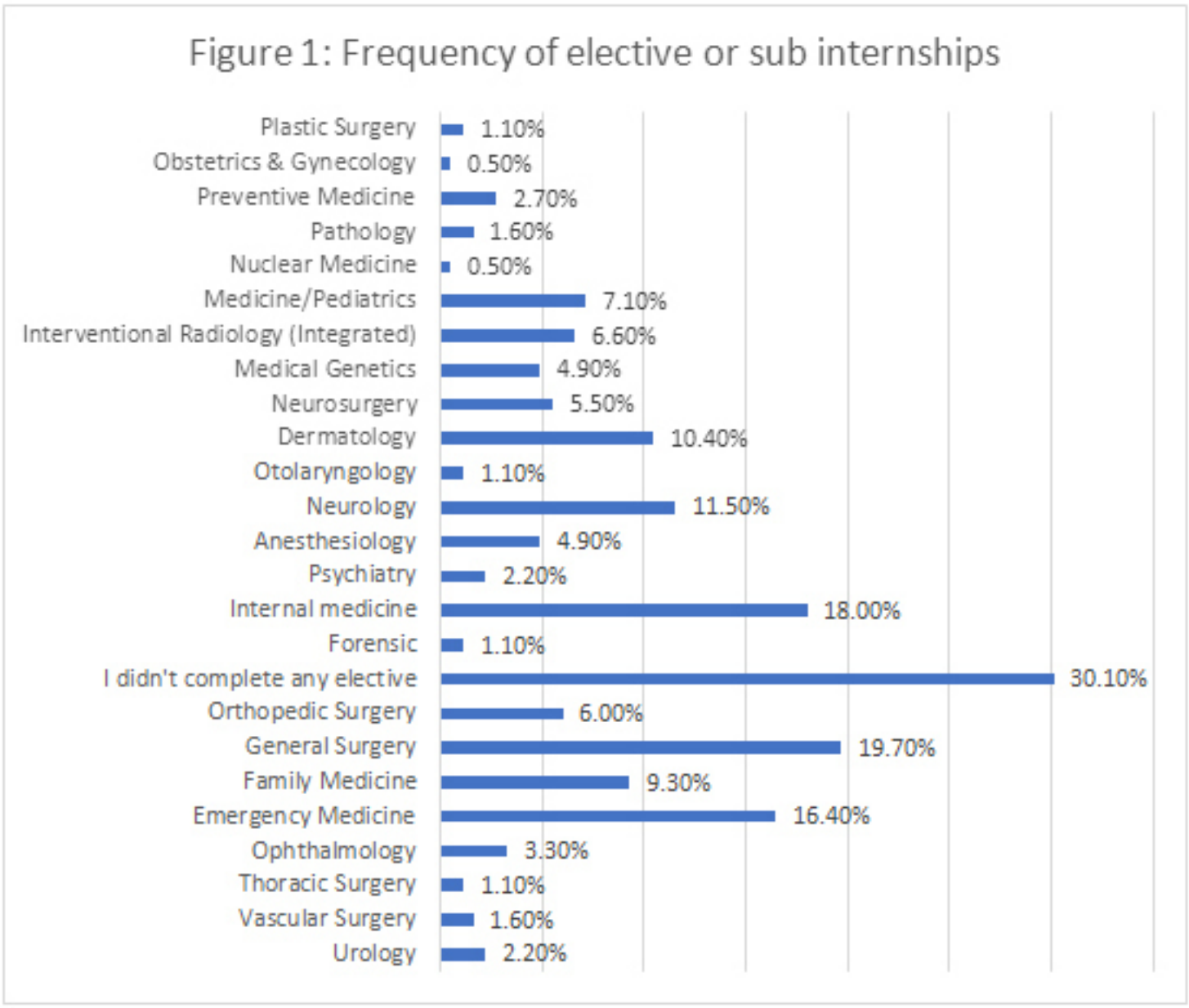


Figure 1: Frequency of elective or sub internships
Plastic Surgery 1.10%
Obstetrics & Gynecology 0.50%
Preventive Medicine 2.70%
Pathology 1.60%
Nuclear Medicine 0.50%
Medicine/Pediatrics 7.10%
Interventional Radiology (Integrated) 6.60%
Medical Genetics 4.90%
Neurosurgery 5.50%
Dermatology 10.40%
Otolaryngology 1.10%
Neurology 11.50%
Anesthesiology 4.90%
Psychiatry 2.20%
Internal medicine 18.00%
Forensic 1.10%
I didn't complete any elective 30.10%
Orthopedic Surgery 6.00%
General Surgery 19.70%
Family Medicine 9.30%
Emergency Medicine 16.40%
Ophthalmology 3.30%
Thoracic Surgery 1.10%
Vascular Surgery 1.60%
Urology 2.20%

Moreover, the leading specialties considered by participants before the pandemic were internal medicine (26.2%), pediatrics (18.4%), general surgery (16.7%) and dermatology (16.7%). On the other hand, the most popular specialties considered by participants after the pandemic were orthopedic surgery (26.2%), interventional radiology (24.5%), psychiatry (19.6%) and family medicine (15.7%). Furthermore, we found a lower percentage of students whose choice of specialty was the same before and after the pandemic including internal medicine (From 26.2% to 5.9%, P=0.000), neurology (from 16 % to 0.7 %, P=0.000), general surgery (from 16.7% to 5.9%, P=0.000) and dermatology (16.7% to 2.1%, P=0.000). On the other hand, orthopedic surgery, which was a specialty considered by 26.2% after the pandemic compared to 9.9% before the pandemic (P=0.000) as well as plastic surgery (increased from 4.8% to 15.4%, P=0.000), interventional radiology (from 5.4% to 24.5%, P=0.000), urology (from 6.1% to 15.4%, P=0.000) and psychiatry (from 10.5% to 19.6%, P=0.003). See Table 3.

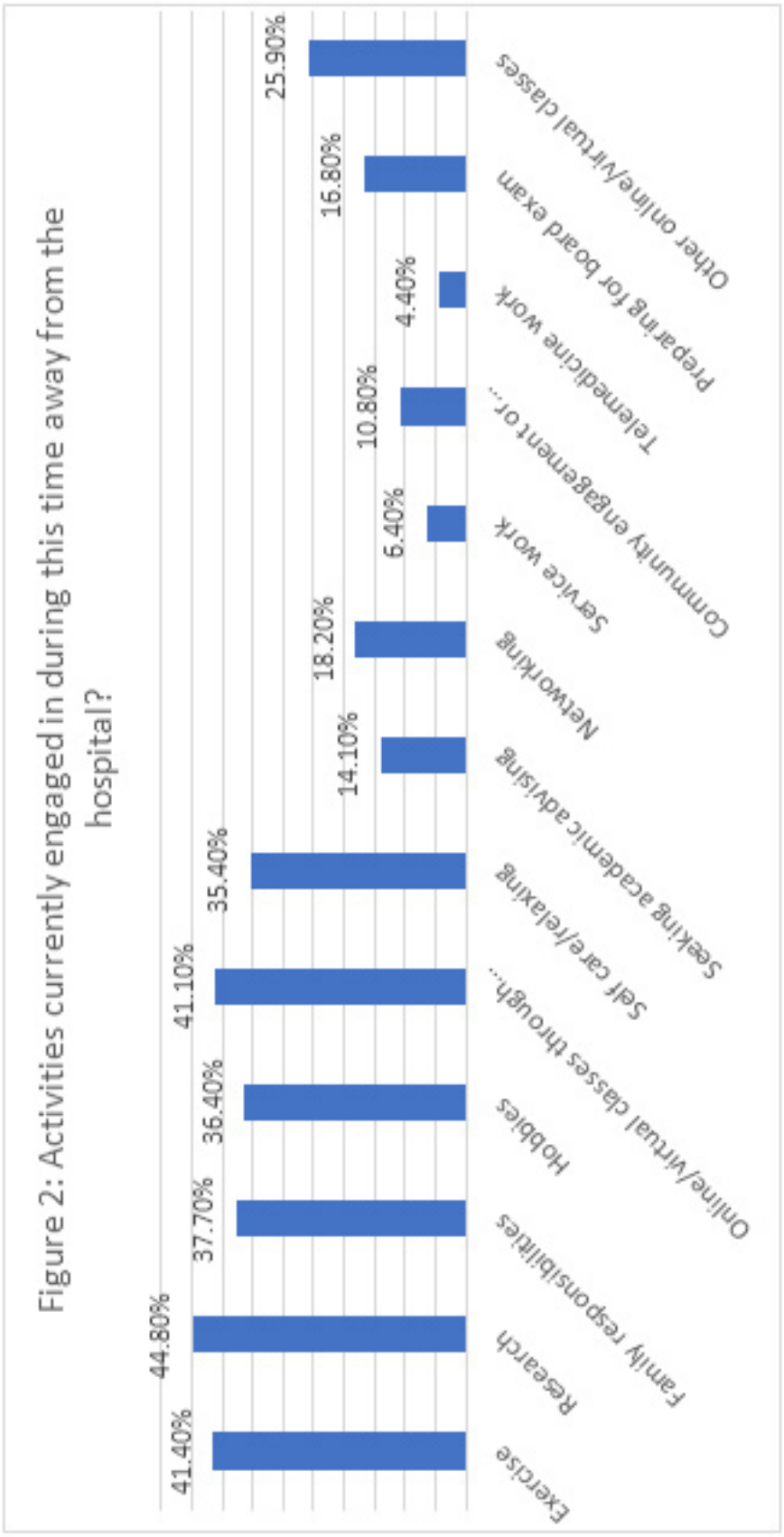
Table 3: The difference between students' perception of specialty before and after the COVID-19 pandemic

	Paired Differences					t	P-value
	Before Pandemic	After pandemic	Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Preventive Medicine	2.40%	3.10%	-.006	-.032	.019	-.499	.618
Anesthesiology	6.50%	0.00%	.063	.035	.090	4.496	.000
General Surgery	16.70%	5.90%	.106	.056	.156	4.173	.000
Neurosurgery	11.0 %	0.0 %	.109	.074	.145	6.078	.000
Vascular Surgery	2.0 %	0.0 %	.019	.004	.035	2.470	.014
Dermatology	16.70%	2.10%	.142	.097	.188	6.142	.000
Plastic Surgery	4.80%	15.40%	-.099	-.146	-.052	-4.193	.000
Otolaryngology	10.90%	2.40%	.083	.044	.121	4.223	.000
Physical Medicine & Rehabilitation	1%	5.90%	-.046	-.075	-.017	-3.177	.002
Pathology	8.20%	1.00%	.069	.036	.102	4.14	.000
Thoracic Surgery	3.40%	8.00%	-.043	-.080	-.005	-2.279	.023
Cardiovascular surgery	0.70%	2.10%	-.013	-.031	.005	-1.41	.158
Obstetrics & Gynecology	0.0 %	0.0 %	.059	.032	.086	4.36	.000
Internal medicine	26.20%	5.90%	.199	.146	.252	7.37	.000
Orthopedic Surgery	9.90%	26.20%	-.152	-.212	-.093	-5.04	.000
Medical Genetics	6.80%	8.00%	-.009	-.051	.031	-.468	.640
Ophthalmology	16.30%	4.90%	.112	.064	.161	4.61	.000
Urology	6.10%	15.40%	-.086	-.134	-.038	-3.54	.000
Emergency Medicine	10.20%	3.10%	.069	.029	.109	3.42	.001
Pediatrics	18.40%	15.40%	.033	-.028	.094	1.06	.287
Psychiatry	10.50%	19.60%	-.083	-.138	-.027	-2.96	.003
Forensic medicine	0.70%	8.40%	-.073	-.104	-.042	-4.64	.000
Neurology	16%	0.70%	.149	.106	.192	6.91	.000
Family medicine	13.30%	15.70%	-.019	-.076	.037	-.68	.492
Interventional Radiology (Integrated)	5.40%	24.50%	-.179	-.233	-.125	-6.52	.000
Radiology (Diagnostic)	4.80%	4.90%	.000	-.033	.033	.00	1.000
Radiation Oncology	2.00%	7.00%	-.046	-.078	-.014	-2.89	.004

Moreover, we found that 49.5% of students indicated that the COVID-19 pandemic affected their choice of specialty; 48.6% of these students thought they had discovered new interests or priorities during the pandemic, which affected their considerations. In comparison, 40.5% believed that COVID-19 had discouraged students from exploring their considered specialty. Moreover, 46.5% of students indicated their mentor had influenced their specialty choice, and 63.1% of students were concerned about fulfilling their graduation requirements on time: 15.9 % of these students thought they would need an extra year in medical school before applying to residency because of COVID-19. The main reason for needing an additional year was that it would increase the likelihood that they would be satisfied with their choice of specialty (Table 4).

Table 4: Factors affecting choice of specialties

		N	N %
Do you think the COVID-19 pandemic will affect your choice of specialty?	Yes	149	49.5 %
	No	152	50.5 %
If you answered "yes" to the above question, how did it affect your choice of specialty?	I may not have the opportunity to explore my specialty or specialties of interest	70	40.5 %
	I have discovered new interests or priorities	84	48.6 %
	I no longer have the ability to bolster my application	19	11.0 %
Did your mentor influence your choice of specialty?	True	140	46.5
	No	161	53.5
Are you concerned about fulfilling your graduation requirements on time?	True	190	63.1
	No	111	36.9
Has the COVID-19 pandemic made you more likely to take an extra year in medical school before applying for residency?	Yes	48	15.9
	No	253	84.1
If you answered "yes," why?	I may not be able to meet my graduation requirements otherwise	9	3.0
	It would make me more likely to be satisfied with my choice	26	8.6
	It would give me more time to explore different specialties	22	7.3
	I want to use the extra year to explore new interests that developed during the pandemic	12	4.0



Furthermore, we found that 58.7% of students were concerned about research, 48% were concerned about taking board exams, and 45.6% of letters of recommendation.

The main activity engaged by students away from the hospital was research (44.8 %), exercise (41.4 %), online classes (41.1 %), and family responsibilities (37.7 %) (See Figure 2).

Discussion

The COVID-19 pandemic has transformed education at all levels, from kindergarten to college. Although preschool and secondary education changes have been well documented [5], very few studies to date have addressed the impact of COVID-19 on university medical education [6]. This study is an early snapshot of medical student qualifications and careers while the COVID-19 pandemic was in full swing and clinical courses were being canceled. Our study found that only 19.6% of students had finished their clinical rotations, while 38.5% had not finished them, and 41.9% had not started clinical rotations. A study conducted by Byrnes Y et al. in USA found that 27.1% of medical students had completed the clinical rotation, 36.3% had partially completed some of the clinical rotation, and 36.6% had not started any clinical rotations [4]. Moreover, in our study, we found that 59.8% of medical students did not complete any electives or sub-internships during the pandemic, which shows the significant impact of COVID-19 on the educational progress of medical students. Interrupted electives or sub-internships reduced the available opportunities for residents to learn about their chosen departments [7,8].

The most frequent medical rotations taken by students were pediatrics and internal medicine (72.1% and 70.5% of students, respectively), followed by ophthalmology, surgery, and orthopedic rotations. Meanwhile, the most completed electives or sub-internships were general surgery (19.7%), emergency medicine (16.4%), and internal medicine (18.0%). Rana T et al.'s study found that 38% of medical students were in internal medicine residency programs, followed by those in surgery (19%) and neurology (16%) [9].

Through the literature review we have found that choosing a medical specialty as a medical student is subject to constant change during their time at medical college and hospital rotations. In a study conducted by Manuel R, the authors found that there was a significant variation between the early preference of medical students for specialties that were person oriented or technique oriented and the later preference of specialty they chose for their residency training [10]. Furthermore, in a study conducted by Jones et al., the authors found that there is an increase in the positive predictive value of top specialty choices of medical students from the end of the first years through to the end of the third year (from 17% to 60% in the first year and 79% to 95% at the end of the third year). The authors of the same study thought that if medical students were exposed to fields of interest during their medical education, then their predictions about specialty fields would be more accurate [11]. However, in most cases, this kind of change takes a long time and extensive experience. Some students may change their opinion about their perceived specialty based on experience gleaned from electives or clinical rotations. [11–13]. Therefore, it was surprising that there was a change in students' opinions about the required specialty (in this short period of less than one and a half years) and that most students reported not completing their clinical rotation or electives. In our study, the main specialties considered by participants before the pandemic were internal medicine (26.2 %) and pediatrics (18.4%).

Yet the most popular specialties considered by participants after the pandemic were orthopedic surgery (26.2%) and interventional radiology (24.5%). The results of our study showed that students' perceptions of their specialty changed from specialties that require direct clinical contact with patients such as internal medicine and pediatrics to specialties where contacts with patients were not as frequent, such as in orthopedic surgery and radiology. This change could be due to the reduced self-confidence among students, especially after canceling many clinical rotations and electives. The impact of COVID-19 on OSCEs, written examinations, and student assistantships significantly affected student preparedness [6]. Other reasons for this change would be the lack of opportunities to explore specialties of interest, no longer having the ability to bolster applications, and the free time which allows them to discover new interests or priorities. In our study, 48.6% of these students thought they had found new interests or preferences during the pandemic, which affected their consideration. In comparison, 40.5% believed that COVID -19 might limit students' opportunities to explore their considered specialty.

Moreover, our results showed that half the students thought the COVID-19 pandemic had a significant impact on their choice of specialty, which is exceedingly more than one in five students, as shown in the results of Byrnes Y et al [4]. Furthermore, we found that 46.5% of students indicated that they had been affected by their mentor, 63.1% of the students were concerned about fulfilling their graduation requirements in time, and 15.9% of them thought that they needed an extra year in medical school before applying for residency because of COVID-19. The concern about not fulfilling their graduation requirements on time is reported in a previous study [10], while no previous research had investigated whether students would extend their education.

Finally, we found that the main activity engaged in by students away from the hospital was research (44.8%), exercise (41.4%), online classes (41.1%), and family responsibilities (37.7%). In the study of Byrnes Y, the authors found that online classes, self-care, exercise, hobbies, and research were the main activities engaged by students away from hospitals [4].

This study had both limitations and strengths. Our study included some unavoidable limitations that included depending on a self-reported questionnaire. Although this could be a useful tool in collecting large samples, the self-reported questionnaire could lead to some personal bias in which some participants may not be very honest while completing the questionnaire. Moreover, the study was distributed online, which may cause some bias toward students who regularly engage with these groups on social media and may have different traits and perceptions. Conversely, this study is, to our knowledge, the first study to assess the impact of COVID-19 on students' perception of chosen specialty in Saudi Arabia.

Conclusion

We found that most of the medical students did not complete their clinical rotations or electives. Moreover, we found that the COVID-19 pandemic has a significant impact on student perceptions of their specialty choices after graduation. Most of the participants changed their opinion from specialties requiring direct contact to those that did not require direct contact. More investigations should be conducted to understand the effect of clerkship on student choices about their specialties.

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Public willingness to receive COVID-19 vaccine in Saudi Arabia

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Abstract

Background: The coronavirus disease 2019 (COVID-19) pandemic has scattered globally across the world leaving millions infected and hundreds of thousands of dead. Immunization programs appeared to be the only effective strategy to end the pandemic which is achieved when there are high rates of acceptance and coverage. To achieve that, it is important to realize Saudis' concept and risk perceptions about COVID-19, and acceptance of a COVID-19 vaccine.

Aim: to assess public willingness and preparedness with their attitude to receive COVID-19 vaccine in Saudi Arabia.

Methodology: A descriptive cross-sectional study was conducted targeting all available population in Saudi Arabia. Data were collected from participants using pre-structured electronic questionnaire. The questionnaire included the following data: participants socio-demographic data information regarding covid-19 experience and infection among participants. The last section covered items of participants' intention to receive a COVID-19 vaccine.

Results: The study included 2,227 participants whose ages ranged from 18 to 62 years old with mean age of 31.7 ± 11.3 years old. Exactly 70.2% of the participants were females and 48.4% were single. Exactly 26.2% had chronic health problems. About 60% of the participants reported their agreement to have the covid-19 vaccine if available. The most reported causes for refusing taking the vaccine for those who refused, were fear of side effects (66.7%), followed by fear of safety issue (49.4%), and fear of efficacy issue (32.4%). More than half (57.3%) of the respondents agreed that Vaccination is a good idea because it makes them feel less anxious about getting COVID-19 infection. Also, 60.4% agreed that vaccination reduces my chances of catching COVID-19 or its complications.

Conclusions: In conclusion, the study revealed that acceptance of the COVID-19 vaccine in Saudi Arabia is somewhat good but not sufficient to have the recommended herd immunity. It is affected by the effectiveness of the vaccine, safety of the vaccine, being taken by others, and history of getting infection or experienced death due to covid-19.

Key words:
Covid-19, corona virus, vaccine, willing, acceptance, attitude, population, barriers, determinants

Introduction

At the end of 2019, a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) started in Wuhan, Hubei province in China. Then the SARS-CoV-2 started to spread worldwide to more than 213 countries, leaving hundreds of thousands of victims (1, 2). By January 2021, the number of persons infected by the virus in the KSA has reached 363,155 and Saudi authorities have reported 6,256 deaths from the virus (3). With no available vaccine or effective treatment, health care providers globally are struggling to suppress the spread of the COVID-19 with the implementation of quarantine and lockdowns, social distancing measures, community-use of facemasks, and travel restrictions. All these actions resulted in the enormous physical and psychosocial effects on people and have led to a huge decline in the global economy (4-6).

Researchers are competing with time to have a confirmed treatment. Beyond the current outbreak, in the longer term, the development of vaccines against SARS-CoV-2 and their global access are a main concern for the pandemic to come to an end (7, 8). Many studies have focused on recognising the possible barriers to vaccine acceptance; one of these studies, surveyed a broad sample of Italian citizens, and reported that there is some public hesitancy towards the future vaccine against COVID-19, and that it seems to be higher among younger participants (9). Another study was a nationwide online survey in China, where more than 80% reported vaccination intent, of which only 28.7% stated a definite intent (10). Concerns of side-effects and efficacy were perception of barriers that negatively influence on vaccination intention. Another study was conducted by regions and stratified for health care personnel at academic medical centres across Israel. Surprisingly, healthcare providers appear to trust a COVID-19 vaccine less than the general population, with nurses more vaccine-hesitant than physicians (11). To the best of the authors' knowledge, no similar studies in Saudi Arabia have explored the general worries for the safety and effectiveness of the future vaccine, which can lead to vaccine hesitancy. However, intention to be vaccinated against an infectious disease is recognized as a foremost issue affecting the success of vaccination programs. This study aimed at surveying adult citizens in Saudi Arabia, to get insights into how general attitudes towards vaccines affect their willingness to vaccinate against COVID-19 and whether these variables play different roles across gender and age groups.

Methodology

A descriptive cross-sectional study was conducted targeting all available population in Saudi Arabia. Persons with ages of 18 years or more living in Saudi Arabia were invited to participate in the survey. A total of 3,000 eligible persons received the study survey. Exactly 2,227 persons completed the study questionnaire with a response rate of 74.2%. Data were collected from participants using pre-structured electronic questionnaire. The researchers constructed the questionnaire after intensive literature review and expert's consultation. Tool was reviewed using a panel of 3 experts from the College of Medicine at King Khalid University to check the clarity and its content validity. Tool reliability was assessed using a pilot study of 25 participants with reliability coefficient (α-Cronbach's) of 0.71. The questionnaire included the following data: participants socio-demographic data like age, gender, education, marital status, job nature (medical vs. non-medical), and medical history. The second section included information regarding covid-19 experience and infection among participants. The last section covered items of participants' intention to receive a COVID-19 vaccine. A questionnaire was uploaded online using social media platforms by researchers and their friends and all eligible parents were invited to fill it in after explaining the purpose and confirming their data confidentiality.

Data analysis

After data was collected, it was modified, coded and entered into Statistical Software IBM SPSS version 22(SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was considered to be statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, covid related infection history, vaccination preparedness and attitude. Cross tabulation was used to test for the distribution of covid-19 vaccination preparedness according to respondent's personal data, covid infection and death history, and attitude towards the vaccine. Pearson chi-square test was used to test for relations significance.

Results

The study included 2,227 participants whose ages ranged from 18 to 62 years old with mean age of 31.7 ± 11.3 years old. Exactly 70.2 % of the participants were females and 48.4% were single while 46.4% were married. As for education, 68% were university graduated and 80.2% were working as 16% of them are health care providers. Exactly 26.2% had chronic health problems, as DM was reported by 3.7% while 3.8% had respiratory disease (Table 1).

Table 1. Personal characteristics of study participants, Saudi Arabia

Personal data	No	%
Age in years		
18-29	1239	55.6%
30-39	344	15.4%
40-49	345	15.5%
50+	299	13.4%
Gender		
Male	663	29.8%
Female	1564	70.2%
Marital status		
Single	1078	48.4%
Married	1033	46.4%
Divorced / widow	116	5.2%
Educational level		
Basic	90	4.0%
Secondary	622	27.9%
University/above	1515	68.0%
Job		
Not working	442	19.8%
Working	1785	80.2%
Job nature		
Non health care provider	1499	84.0%
Health care provider	286	16.0%
Diseases		
None	*1643*	*73.8%*
DM	*83*	*3.7%*
HTN	*85*	*3.8%*
Chronic respiratory disease	*84*	*3.8%*
Hypothyroidism	*2*	*.1%*
Obesity	*65*	*2.9%*
Others	*265*	*11.9%*

Table 2 shows covid infection history and perception among study participants. Exactly 72.1% of the participants had a family member, or someone infected with covid-19 and 44.1% know someone who died with covid-19. Exactly 19.2% of the participants agreed on that probability of my infection with Corona (COVID- 19) in the coming months is very high and 53.7% rated their fear of COVID-19 by 2-3 out of 5 points. Also, 57.1% of the participants agreed that complications from COVID-19 are serious.

Table 2. Covid infection history and perception among study participants, Saudi Arabia

Covid-19 related data	No	%
You or family member, or someone you know infected with covid-19		
Yes	1606	72.1%
May be	118	5.3%
No	503	22.6%
Know someone who died with covid-19		
Yes	981	44.1%
May be	122	5.5%
No	1124	50.5%
The probability my infection with Corona (COVID- 19) in the coming months is very high		
SD	228	10.2%
Disagree	742	33.3%
Neutral	830	37.3%
Agree	258	11.6%
SA	169	7.6%
How would you rate your fear of COVID-19 as (1) low, 5 high		
1	589	26.4%
2-3	1196	53.7%
4-5	442	19.8%
Complications from COVID-19 are serious		
SD	48	2.2%
Disagree	154	6.9%
Neutral	754	33.9%
Agree	703	31.6%
SA	568	25.5%

Table 3 demonstrates covid-19 vaccination preparedness among study participants in Saudi Arabia. Exactly 60.1% of the participants reported their agreement to have the covid-19 vaccine if available. The most reported causes of refusing to take the vaccine for those who refused were fear of side effects (66.7%), followed by fear of safety issue (49.4%), fear of efficacy issue (32.4%), and distrust of pharmaceutical companies (24.3%). Also, 54.1% of the respondents reported that they heard of conspiracy theories about the COVID-19 vaccine.

Table 3. Covid-19 vaccination preparedness among study participants, Saudi Arabia

Covid-19 vaccination preparedness	No	%
If the government provides you with the COVID-19 vaccine, will you take it for yourself and your family members		
Disagree	486	21.8%
Neutral	403	18.1%
Agree	1338	60.1%
If refused, why?		
Fear of side effects	486	66.7%
Fear of safety	360	49.4%
Fear of efficacy	236	32.4%
Distrust of pharmaceutical companies	177	24.3%
Religious barriers	76	10.4%
Have you heard of conspiracy theories about the COVID-19 vaccine?		
Yes	1205	54.1%
Maybe	352	15.8%
No	670	30.1%

As for participants' attitudes towards covid-19 vaccine (Table 4), exactly 57.3% of the respondents agreed that Vaccination is a good idea because it makes them feel less anxious about getting COVID-19 infection. Also, 60.4% agreed that vaccination reduces my chances of catching COVID-19 or its complications while 40.4% of them agreed that they will only receive the COVID-19 vaccine if it is taken by many in the public. On the other hand, 73.7% of the respondents agreed on their need to receive more information about the COVID-19 vaccine and only 28.4% may change their opinion about the COVID-19 vaccine, whether by acceptance or rejection.

Table 4. Attitude towards covid-19 vaccine reported among study participants, Saudi Arabia.

Attitude items	No	%
Would you like to receive more information about the COVID-19 vaccine?		
SD	81	3.6%
Disagree	237	10.6%
Neutral	268	12.0%
Agree	806	36.2%
SA	835	37.5%
Vaccination is a good idea because it makes me feel less anxious about getting COVID-19?		
SD	126	5.7%
Disagree	255	11.5%
Neutral	570	25.6%
Agree	664	29.8%
SA	612	27.5%
Vaccination reduces my chances of catching COVID-19 or its complications?		
SD	101	4.5%
Disagree	222	10.0%
Neutral	561	25.2%
Agree	676	30.4%
SA	667	30.0%
I will only receive the COVID-19 vaccine if it is taken by many in the public		
SD	257	11.5%
Disagree	508	22.8%
Neutral	562	25.2%
Agree	531	23.8%
SA	369	16.6%
May change your opinion about the COVID-19 vaccine, whether by acceptance or rejection?		
Disagree	796	35.7%
Neutral	798	35.8%
Agree	633	28.4%

Table 5 shows distribution of participants' preparedness for covid-19 vaccination by their personal data. Agreement to have the vaccine was reported by 63.5% of males compared to 58.6% of females with recorded statistical significance (P=.032). Also, 61.2% of working participants agreed to have the vaccine compared to 55.7% of those who do not work (P=.034). Exactly 72% of respondents who work as health care providers agreed to have the vaccine compared to 59.1% of others (P=.001).

Table 5. Distribution of participants' preparedness for covid-19 vaccination by their personal data

Personal data		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
Age in years	18-29	741	59.8%	498	40.2%	.136
	30-39	191	55.5%	153	44.5%	
	40-49	220	63.8%	125	36.2%	
	50+	186	62.2%	113	37.8%	
Gender	Male	421	63.5%	242	36.5%	.032*
	Female	917	58.6%	647	41.4%	
Marital status	Single	644	59.7%	434	40.3%	.934
	Married	623	60.3%	410	39.7%	
	Divorced/ widow	71	61.2%	45	38.8%	
Educational level	Basic	54	60.0%	36	40.0%	.070
	Secondary	350	56.3%	272	43.7%	
	University/above	934	61.7%	581	38.3%	
Job	Not working	246	55.7%	196	44.3%	.034*
	Working	1092	61.2%	693	38.8%	
Job nature	Non health care provider	886	59.1%	613	40.9%	.001*
	Health care provider	206	72.0%	80	28.0%	
Have chronic health problem	Yes	364	62.3%	220	37.7%	.197
	No	974	59.3%	669	40.7%	

P: Pearson X2 test
* P < 0.05 (significant)

Table 6 illustrates distribution of participants' preparedness for covid-19 vaccination by history and perception regarding covid-19. Exactly 63.8% of respondents who had or knew someone whodied due to covid agreed to have the vaccine compared to 57.2% of those who did not (P=.006). Also, 70.9% of those who fear a high probability of being infected agreed to have the vaccine in comparison to 53.5% of those who do not (P=.001). Exactly 64.5% of those who had high fear level agreed to have the vaccine in comparison to 54.5% of those who rated their fear low (P=.003). Besides, 68.8% of respondents who know about covid complications will have the vaccine compared to 39% of those who do not (P=.001).

Table 6. Distribution of participants' preparedness for covid-19 vaccination by history and perception regarding covid-19.

Covid-19 related data		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
You or family member, or someone you know infected with covid-19	Yes	963	60.0%	643	40.0%	.834
	Maybe	74	62.7%	44	37.3%	
	No	301	59.8%	202	40.2%	
Know someone died with covid-19	Yes	626	63.8%	355	36.2%	.006*
	Maybe	69	56.6%	53	43.4%	
	No	643	57.2%	481	42.8%	
The probability my infection with Corona (COVID- 19) in the coming months is very high	SD	122	53.5%	106	46.5%	.001*
	Disagree	422	56.9%	320	43.1%	
	Neutral	496	59.8%	334	40.2%	
	Agree	183	70.9%	75	29.1%	
	SA	115	68.0%	54	32.0%	
How would you rate your fear of COVID-19 as (1) low, 5 high	1	321	54.5%	268	45.5%	.003*
	2-3	732	61.2%	464	38.8%	
	4-5	285	64.5%	157	35.5%	
Complications from COVID-19 are serious	SD	20	41.7%	28	58.3%	.001*
	Disagree	60	39.0%	94	61.0%	
	Neutral	399	52.9%	355	47.1%	
	Agree	468	66.6%	235	33.4%	
	SA	391	68.8%	177	31.2%	

P: Pearson X2 test
* P < 0.05 (significant)

Table 7 shows distribution of participants' preparedness for covid-19 vaccination by attitude towards the vaccine. Exactly 63.3% of participants who heard of conspiracy theories about the COVID-19 vaccine will have it and 70.5% of those who need to know more information regarding the vaccine (P=.001). Also, 88.4% of those who agreed that it is a good idea because it makes me feel less anxious about getting COVID-19 will have the vaccine compared to 10.6% who disagreed (P=.001). About 90% of respondents who know that vaccination reduces my chances of catching COVID-19 or its complications will have the vaccine in comparison to 5.9% of those who refused that assumption (P=.001). Also, 70.2% of respondents reported that they will have the vaccine if taken by many in the public compared to 55.3% of those who refused that condition (P=.001).

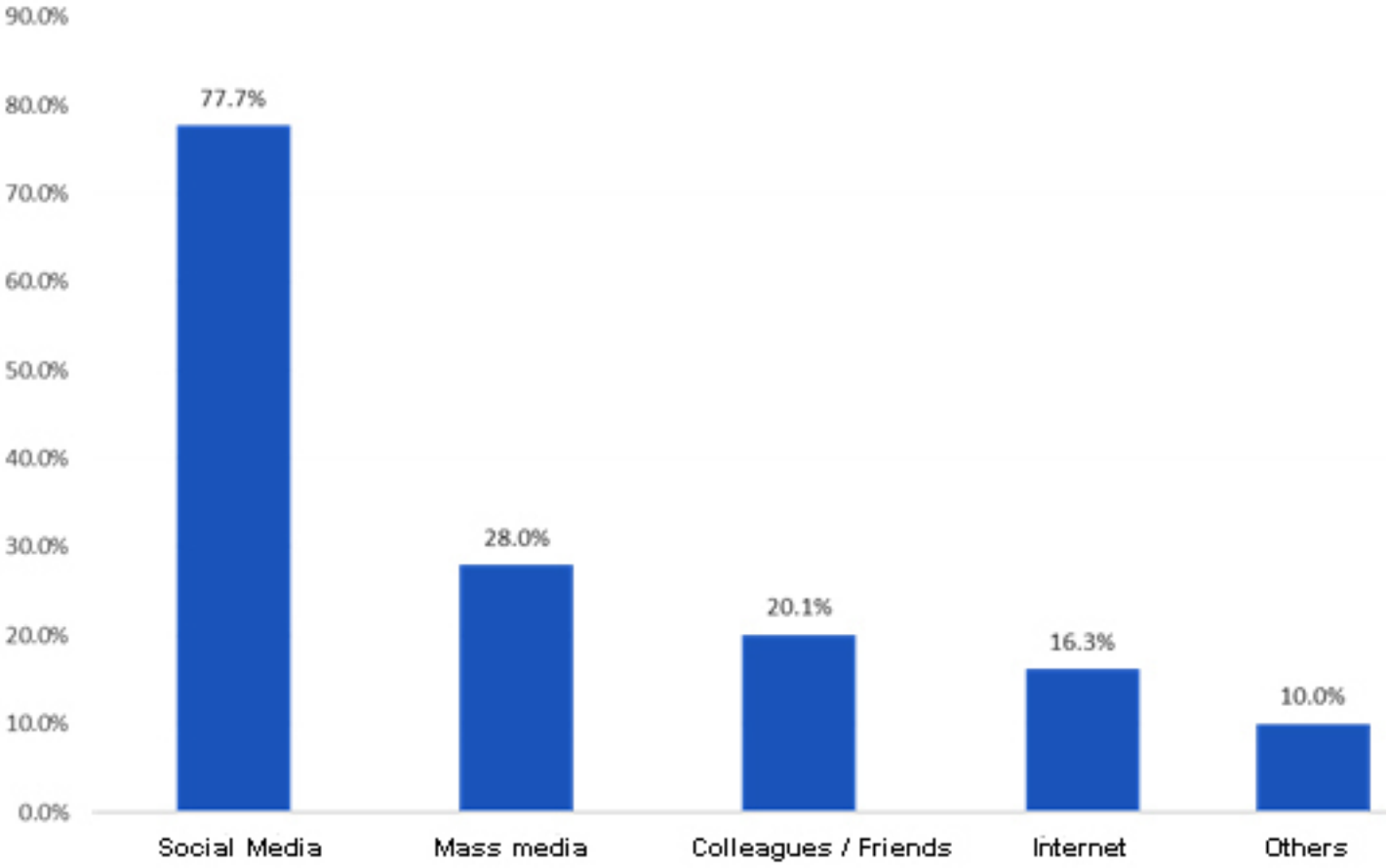
Considering source of information regarding covid-19 vaccine (Figure 1), the most reported source was social media (77.7%), followed by mass media (28%), colleagues and friends (20.1%), and internet (16.3%).

Table 7. Distribution of participants' preparedness for covid-19 vaccination by attitude towards the vaccine

Attitude		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
Have you heard of conspiracy theories about the COVID-19 vaccine?	Yes	763	63.3%	442	36.7%	.003*
	May be	196	55.7%	156	44.3%	
	No	379	56.6%	291	43.4%	
Would you like to receive more information about the COVID-19 vaccine?	SD	18	22.2%	63	77.8%	.001*
	Disagree	74	31.2%	163	68.8%	
	Neutral	131	48.9%	137	51.1%	
	Agree	526	65.3%	280	34.7%	
	SA	589	70.5%	246	29.5%	
Vaccination is a good idea because it makes me feel less anxious about getting COVID-19?	SD	18	14.3%	108	85.7%	.001*
	Disagree	27	10.6%	228	89.4%	
	Neutral	233	40.9%	337	59.1%	
	Agree	519	78.2%	145	21.8%	
	SA	541	88.4%	71	11.6%	
Vaccination reduces my chances of catching COVID-19 or its complications?	SD	6	5.9%	95	94.1%	.001*
	Disagree	27	12.2%	195	87.8%	
	Neutral	174	31.0%	387	69.0%	
	Agree	526	77.8%	150	22.2%	
	SA	605	90.7%	62	9.3%	
I will only receive the COVID-19 vaccine if it is taken by many in the general public	SD	142	55.3%	115	44.7%	.001*
	Disagree	301	59.3%	207	40.7%	
	Neutral	292	52.0%	270	48.0%	
	Agree	344	64.8%	187	35.2%	
	SA	259	70.2%	110	29.8%	
May change your opinion about the COVID-19 vaccine, whether by acceptance or rejection?	Disagree	566	71.1%	230	28.9%	.001*
	Neutral	368	46.1%	430	53.9%	
	Agree	404	63.8%	229	36.2%	

P: Pearson X2 test
* P < 0.05 (significant)

Figure 1. Source of information regarding covid-19 vaccine among study participants



Discussion

The study aimed to survey adult citizens in Saudi Arabia, to get insights into how general attitudes towards vaccines affect their willingness to vaccinate against COVID-19 and whether these variables play different roles across gender and age groups. World Health Organization (WHO), 2015, Strategic Advisory Group of Experts on Immunization classified vaccine hesitancy as a 'delay in acceptance or refusal of vaccination in spite of availability of vaccination services'(12), which can differ in method and intensity based on time and place of occurrence and what vaccine is involved, as has been confirmed in multiple studies (13, 14). Vaccine hesitancy is growing worldwide (15). Actually, WHO labelled it as one of the top ten global health hazards in 2019 (16). Globally, vaccine hesitancy and misinformation is reported as significant obstacles to getting coverage and community immunity (17, 18).

The current study revealed that nearly three quarters of the respondents had a family member, or someone they know who were infected with covid-19 while about 44% of them know someone who died with covid-19. Also, very low portions of the respondents reported that the probability of being infected with Corona (COVID-19) in the coming months is very high where one fifth of them rated that fear as 4 out of 5.

Regarding vaccination preparedness among study participants, two thirds of the current study participants showed their intention to have the covid-19 vaccine if available by the government. For those who refused, fear of side effects was reported among two thirds of them followed by fear of safety which was reported by half of those who will not have the vaccine. Doubt regarding the vaccine efficacy was the third cause (among one third), and 1 out of each four had distrust of pharmaceutical companies. Religious concepts were the barrier against being vaccinated among only 10% of refusers. A second factor that may stand behind being unvaccinated was that more than half of the respondents heard conspiracy theories about the COVID-19 vaccine. This means public awareness regarding vaccine nature; mechanism of manufacturing and approval procedures should be explained to keep them on track and be ready for being vaccinated with no doubt regarding safety and efficacy.

Regarding participants attitude towards the covid-19 vaccine, the current study revealed that about two thirds of the participants agreed that Vaccination reduces my chances of catching COVID-19 or its complications and nearly half of them thought that vaccination is a good idea because it makes me feel less anxious about getting COVID-19. Irrespective of that promising attitude, nearly 40% of the participants reported that they will only receive the COVID-19 vaccine if it is taken by many in the public which is mostly due to their distrust of vaccine safety and fear of side effects. Only one quarter of the respondents reported their hesitancy and may change their current situation towards being vaccinated.

As for factors associated with participants' preparedness to have the vaccine if available, the current study showed that males were more ready to have the vaccine, and participants who work in contact with public and that explains their readiness, and health care providers (who are at more risk of catching infection). Also, higher preparedness to receive the vaccine was reported among participants who know someone who died due to covid-19 infection (that motivates them to be vaccinated), those who thought that they are at high risk to catch the infection, and those who know about covid-19 complications severity and seriousness. Besides, participants with a positive attitude towards the vaccine need and role in minimizing the infection, had higher preparedness to have the vaccine.

Lazarus JV et al conducted a global survey of potential acceptance of a COVID-19 vaccine.(19). Researchers found that 71.5% of participants reported that they are somewhat ready to take a COVID-19 vaccine. Also, 48.1% reported that they would accept their employer's recommendation to do so. Variations in acceptance rates ranged from about 90% (in China) to less than 55% (in Russia). Respondents with higher trust level regarding the information from government sources were more ready to receive a vaccine and take their employer's advice to do so. In USA, Malik AA et al, (20) reported that 67% of the public told about their acceptance to have a COVID-19 vaccine if it is recommended for them. Males (72%) compared to females, older adults (≥55 years; 78%) compared to younger adults, Asians (81%) compared to other racial and ethnic groups, and college and/or graduate degree holders (75%). In Asia, Harapan H et al, (21) assessed that 93.3% of respondents were inclined to be vaccinated for a 95% effective vaccine, but this acceptance diminished to 67.0% for a vaccine with 50% effectiveness. In Saudi Arabia, determinants of COVID-19 vaccine acceptance were studied by Al-Mohaithef M et al (22). Authors found that 64% of the participants showed interest to accept the COVID-19 vaccine if it is available which is nearly identical to the current study finding. Readiness to accept the future COVID-19 vaccine is relatively high among older age groups, being married, participants with education level postgraduate degree or higher (68.8%), non-Saudi (69.1%), employed in government sector (68.9%). There were many other studies that assessed a highly variable rate of vaccine acceptance which varied between 8% and 67% for the H1N1 influenza A pandemic vaccine (23). The acceptance rate was reported to be 64% in the United States, (24) 56.1% in the United Kingdom, (25) 59.5% in Hong Kong, (16) and 59.5% in China (27).

The recommended herd immunity threshold for SARS-CoV-2, the virus causing COVID-19, is estimated to be between 55% and 82% which is higher than estimated preparedness to have the vaccine in Saudi Arabia which means building confidence in a COVID-19 vaccine is essential and mandatory to control the pandemic (28).

Conclusions and recommendations

In conclusion, the study revealed that acceptance of the COVID-19 vaccine in Saudi Arabia is somewhat good but not sufficient to have the recommended herd immunity. It is affected by the effectiveness of the vaccine, safety of the vaccine, being taken by others, and history of getting infection or experienced death due to covid-19. In addition, since acceptance is associated with perceived risk for COVID-19, it is also important to increase the perceived risk in communities. Policymakers and stakeholders should focus on evidence-based community messaging to improve uptake and break the transmission dynamics.

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A Multicenter Cross-sectional Study to Assess the Knowledge of Oral Health Problems Among Diabetes Patients in Saudi Arabia

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Abstract

Objectives: The aims of this study were:1) to assess the awareness of diabetes and its systemic and oral complications among adults with diabetes in Saudi Arabia, 2) to evaluate their behaviors toward maintaining proper oral hygiene and factors associated with adequate oral health knowledge, and 3) to identify what recommendations and improvements are needed in diabetic clinics in KSA.

Methods: A validated questionnaire of six parts was distributed online to include all diabetes patients in Saudi Arabia. After applying the criteria, 400 diabetes responses were included. The data was analyzed using SPSS statistical software version 24. Descriptive statistics, univariate and multivariate analysis were used to report the results.

Results: Participants' responses showed that older aged patients with type 2 diabetes and the longer duration of diabetes had higher levels of awareness regarding oral health. However, their knowledge about being at high risk for oral diseases was low compared to their awareness regarding systemic complications. Relatively lower percentages of the participants (55.9%) were aware that diabetes can make teeth and gums worse and that gum disease makes it harder to control blood sugar (24.8%). Almost two thirds of the individuals believed that they should have regular visits to dental clinics, but many barriers were identified for their irregularity or no visits. With regards to the participants' source of information, 52% learned from health care providers, and 50% from the internet.

Conclusions: Our study revealed comparatively better results of awareness than previous studies reported in Saudi Arabia, however not to the desired standard. Therefore, both dentists and all healthcare providers should be encouraged to take the responsibility to promote proper oral hygiene practices among their diabetic patients in order to reduce the risk of having periodontal diseases. Further research is required to identify obstacles preventing those patients from having regular dentist visits.

Key words: Diabetes, oral health, periodontal disease, awareness, Saudi Arabia

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease defined by hyperglycemia as a consequence of a deficiency in insulin's secretion, action or in both. It can be classified into two types. Type I diabetes is caused by a deficiency in the secretion of insulin as a result of autoimmune destruction of the pancreatic islet cells. The other classification is type II diabetes, which is caused by a combination of insulin action resistance and an inadequate insulin secretion as a compensatory response [1]. In 2019, approximately 9.3% of adults were living with DM in the world. It is predicted that 578 million people will have diabetes after 10 years in 2030 and the number will keep increasing in the coming 25 years until it reaches 51% in 2045 [2]. The prevalence of DM in adults is high in Saudi Arabia, which accounts for 18.5% [3].

DM is well known to have long term microvascular and macrovascular complications such as retinopathy, nephropathy, neuropathy, cardiovascular disease, cerebrovascular disease and sexual dysfunction [1]. One of these major complications of DM is oral diseases that can affect the patients' quality of life [4]. These oral manifestations include dry mouth, burning sensation, periodontal disease and altered taste [5].

There are some misconceptions about oral health that may truly lead to unhealthy behaviors. For instance, DM patients perhaps think that they have to stop brushing and flossing when their gingiva starts bleeding while brushing their teeth, instead of what they have to do, which is brushing and flossing frequently. Moreover, DM patients who have dry mouth might not know that improving oral health by rinsing their mouth with a rinse that has alcohol in it can actually lead to worsening dryness. These myths could act as considerable barriers to proper prevention and management of oral disease in DM patients who are at high risk of oral diseases [6].

Eight studies with similar aims were found internationally. Three studies done in Brazil, India, and Bangalore compared equal numbers of diabetic and non-diabetic patient's knowledge [7-9]. The Brazil and India studies found that the knowledge of diabetic patients to the association of oral health and diabetes was less than the non-diabetic groups [7,8]. The study in Bangalore, however, reported that the knowledge of the diabetic group was significantly better than their peers of the non-diabetic group [9]. Other international studies conducted in Mangalore, Melbourne, Pakistan, United Arab Emirates (UAE) and Egypt, only included diabetic patients in their sample [10-14]. Both studies done in Mangalore and Pakistan found that less than half of the patients interviewed knew about the relationship between diabetes and periodontal diseases with 22.5% in Mangalore and 35.4% answering 'Yes' in Pakistan [10,12]. In Melbourne and Egypt, most of the patients reported good knowledge with 78.2% in Melbourne, 60% in UAE and 72.5% in Egypt [11,14].

On a national level, five studies were done in Saudi Arabia. A study in Abha included 612 diabetic patients and found only 47.7% that agreed there is an association between diabetes and oral diseases [15]. A study in Riyadh found that out of 278 diabetic patients, 81% were aware of the increased risk of developing oral health diseases with diabetes [16]. Another study done in Riyadh interviewed 190 individuals, where 10.5% confirmed being diabetics, and where only 31.1% strongly agreed that there is a relationship between diabetes and oral diseases [17]. Two studies were conducted in Jeddah. One study found a positive correlation between the education level and awareness about the association between oral diseases and diabetes [18]. The other study, interviewed 500 individuals, with 15.2% diabetic patients among them, and concluded that 85% found an association between diabetes and oral tissue health [19].

The studies conducted at the national levels have several limitations. The Abha study had a completely self-administered questionnaire which could have had a percentage of no response to some items of the questionnaire as well as a high chance of responder bias [15]. With regards to the Jeddah studies, one of the studies distributed the questionnaire to mall goers, not necessarily to DM patients, and it did not correlate the level of awareness with the participants' characteristics [19]. The other Jeddah study used only one clinical site with a non-random convenience sampling and a self-administered questionnaire, therefore data collected may have high responder bias [18].

The current study was designed to investigate the levels of oral health knowledge and factors associated with adequate oral health knowledge in adults with diabetes in Saudi Arabia. This study addressed any limitations found in the national studies on the same topic. The knowledge gained from this study will indicate the magnitude of oral health knowledge among DM patients in Saudi Arabia. In addition, results from this multicenter study will help in identifying what recommendations/improvements are needed in DM clinics in KSA.

Methodology

A cross sectional study was carried out from October 2020-February 2021. A non-probability, convenience sampling technique was used with any person meeting the inclusion criteria included in the study. The inclusion criteria were applied to include any person living in Saudi Arabia with diabetes type 1 or 2 of any age group. Sample size calculations were based on the fact that there are 7 million diabetic patients in Saudi Arabia [20]. The Raosoft calculator was used with a 95% CI with a 5% margin of error resulting in a sample size of 385 diabetic patients. A validated questionnaire was distributed online and included the following categories: patient demographics, DM history, general DM awareness, oral hygiene practices, awareness of association between periodontal disease, and diabetes and patient's source of knowledge.

The data was analyzed using SPSS statistical software version 24. A P-value of <0.05 was considered significant. Descriptive statistics were applied with mean (standard deviation) or median (IQR) as appropriate. Univariate and multivariate analysis was applied to determine factors that influence the level of oral hygiene knowledge among diabetic patients.

Results

Overall 1,177 individuals filled out the questionnaire with 764 (64.9%) being non diabetic and 410 (34.8%) diabetic individuals. Out of the diabetic responses 10 responses were excluded due to not meeting the criteria of living in Saudi Arabia or due to duplicate responses. Therefore, only 400 diabetics' responses were included in the analysis. They were asked to fill out a predesigned valid questionnaire to assess the level of their awareness about association between periodontal disease and diabetes. The results' section was formed of three main compartments; the first one describes characteristics of the participants; the second one displays their awareness about the association between periodontal disease and diabetes and the third part shows factors potentially associated with variation in the level of awareness.

Characteristics of the participants:

There was a dominance of females (57.3%) over males (42.8%), and the overwhelming majority were Saudis (95%). The great majority of the participants (97.0%) were aged eighteen years or older. Most of them had either undergraduate education (40.5%) or university qualifications (49.0%), with only 7.5% who had postgraduate degrees. Less than one half of the participants (44.8%) were employed, with more than one third (35.5%) having a family income ranging between 5.000 to <10,000 SR and almost one quarter had monthly income ranging between 10.000 and <20,000 SR. Smokers formed 19.8% of them (Table 1).

Clinically, according to the participants, almost two thirds (61.5%) were type II diabetics, and 15% were type I, while one quarter (23.5%) did not know their type of diabetes. Most of the cases had diabetes for a relatively long duration ranging between five to less than ten years (22.3%) and ten years or more (43.8%). Family history of diabetes was positive in most of the cases (84.8%); that were mainly first-degree relatives (82.6%). Less than two thirds of the cases (61.3%) described themselves as being controlled diabetics; and one half (51.7%) claimed that they visited a physician for follow up in the past year (Table 1).

Regarding basic knowledge of the individuals about diabetes, Table 2 shows that 53.8% of the individuals knew that diabetes is caused by an increase in blood sugar level, and 55.8% attributed it to being overweight. The great majority (95.5%) agreed that patients should eat a healthy diet and perform daily physical exercise (91.5%). Most of the participants knew that complications of diabetes include eye complications (98.3%), diabetic foot (80.3%), nervous complications (77.0%) and kidney complications (77.0%). The oral hygiene practice is presented in Table 2 which demonstrates that almost two thirds of the individuals believe that there should be regular visits to dental clinics; reasons for irregularity or no visits included high costs (4.5%), difficulty in scheduling (3.3%) and fear or anxiety (2.0%). Although the great majority (91.5%) reported that they should brush their teeth once daily, a much lesser percentage (47.5%) reported that they should floss their teeth at least once daily.

Awareness of the participants about association between periodontal disease and diabetes:

Almost two thirds of the participants (61.0%) were aware that diabetic patients are more likely to have mouth infection; and 57.5% were aware that smokers have more serious gum disease than non-smokers; and relatively lower percentages were aware that diabetes can make teeth and gums worse (55.9%) and that gum disease can lead to loss of teeth (53.8%). The lowest percentages of awareness were observed for the items that dry mouths are more likely to have tooth decay (39.3%) and gum disease makes it harder to control blood sugar (24.8%).

To facilitate comparisons of the level of awareness within the diabetic patients, the overall awareness score was calculated, with one score for each correct answer, and the summed-up outcome was transferred to percentages. The ultimate mean score percentage was 48.5%±30.3%. Notably, a borderline significance was found in the difference in awareness according to age, where older diabetic patients aged 18+ years had better levels of awareness (49.0%±30.4%) than younger patients (34.3%±23.4%) p=0.055. Otherwise, no statistically significant difference was found regarding gender, education level, employment or family income p>0.05 (Table 1). Moreover, the table shows that there is no statistically significant difference in the level of awareness of the participants according to their residence, region or health institute.

In addition, Table 1 demonstrates that type II diabetic patients recorded the highest level of awareness (51.2%±30.3%) when compared to type I diabetic patients (39.6%±27.7%). Also, it was noted that the longer the duration of diabetes corresponded to a higher level of awareness; the mean score percentage ranged between (39.1%±29.9%) in patients with duration of diabetes <1 year and up to (55.7%±31.4%) in those with duration from 5-<10 years p<0.05. On the other hand, no statistically significant difference was observed in the level of their awareness according to family history of diabetes p>0.05.

Sources of the participants' knowledge regarding diabetes:

All 400 participants answered the question of where they learned about their information regarding diabetes and oral health. As shown in Figure 1, more than half (52%) had learned from health care providers, and the internet was considered a source in 50% of participants. In addition 46% noted that family and friends were considered a source of health information, while 33% were from health awareness campaigns, 21% from books and journals and only 6% from school.

Table 1: Description of the study group (n=400).

Characteristics	No.	Percentage	Mean±SD	p
Gender:				
Male	171	42.8	51.7%±31.8%	
Female	229	57.3	46.2%±29.0%	0.079
Nationality:				
Saudi	380	95.0	49.1%±30.7%	
Non Saudi	20	5.0	38.3%±20.9%	0.039
Region				
Makkah	346	86.5	49.7%±30.1%	
Riyadh	31	7.75	37.6%±30.9%	0.126
Eastern	8	2	51.4%±29.1%	
Northern Borders	8	2	30.6%±28.3%	
Almadinah	3	0.75	66.7%±38.5%	
Albaha	2	0.5	72.2%±23.6%	
Age categories:				
<18 years	12	3.0	34.3%±23.4%	0.055
±18 years	388	97.0	49.0%±30.4%	
Education level:				
Illiterate	12	3.0	42.2%±30.1%	
Undergraduate	162	40.5	50.0%±30.5%	0.097
University	196	49.0	47.1%±29.4%	
Postgraduate	30	7.5	69.4%±8.9%	
Employment:				
Employed	179	44.8	48.2%±29.1%	0.832
Unemployed	221	55.3	48.8%±29.1%	
Family income:				
<5,000 SR	75	18.7	54.7%±32.1%	0.215
5,000-<10,000 SR	142	35.5	45.6%±29.0%	
10,000-<20,000 SR	102	25.5	47.7%±30.5%	
±20,000 SR	81	20.3	49.0%±30.3%	
Smoking status:				
Smoker	79	19.8		
Non smoker	321	80.3		
Type of diabetes:				
Type I	60	15.0	39.6%±27.7%	0.026
Type II	246	61.5	51.2%±30.3%	
Do not know	94	23.5	47.2%±31.2%	
Medications				
Insulin	74.4	18.6		
Oral Hypoglycemic drugs	244	61		
Both	75.6	18.9		

Table 1: Description of the study group (n=400).(continued)

Duration of diabetes:				
<1 year	27	6.8	39.1%±29.9%	0.035
1-<5 years	109	27.3	48.7%±30.0%	
5-<10 years	89	22.3	55.7%±31.4%	
10+ years	175	43.8	46.2%±29.6%	
Family history:				
Yes	339	84.8	48.7%±30.4%	0.784
No	61	15.3	47.5%±30.4%	
Degree of consanguinity (n=339):				
First degree	280	82.6		
Second degree	19	5.6		
Both first and second degree	23	6.8		
Distant consanguinity	5	1.5		
All	12	3.5		
Control of diabetes:				
Controlled	245	61.3		
Uncontrolled	155	38.8		
Visited physician in the past year for follow up:				
Yes	30	51.7		
No	28	48.3		
Follow up Center				
NGH	91	22.7	55.7%±30.6%	
MOH	86	21.5	45.6%±28.8%	0.064
Private	103	25.7	46.4%±29.5%	
Other	48	12	44.9%±30.1%	

Table 2: Response of the participants to the questionnaire items.

Items	No.	Percentage
Awareness about diabetes		
Causes of diabetes:		
Increase blood sugar level (right)	215	53.8
Overweight (right)	223	55.8
Body unable to make sugar (wrong)	81	20.3
Eating too much (right)	206	51.5
Recommended dietary habits:		
Patient must eat healthy diet (right)	382	95.5
Patient must eat high protein diet (wrong)	139	34.8
Patient must eat carbohydrate diet (wrong)	16	4.0
Recommended frequent exercise:		
Daily (right)	366	91.5
Complications of diabetes:		
Eye complications (right)	393	98.3
Nervous complications (right)	308	77.0
Kidney complications (right)	308	77.0
Heart complications (right)	253	63.3
Diabetic foot (right)	321	80.3
Oral hygiene practice		
Frequent visits to dental clinics:		
Regular	240	60.0
No need for regular visits	149	37.3
No visits	11	2.8
Reasons for irregular or no visits:		
High costs	18	4.5
Difficulty in scheduling	13	3.3
Fear or anxiety	8	2.0
Do not like dentists	7	1.8
Cannot miss work	8	2.0
Transportation problems	2	0.5
Frequent brushing:		
Once	366	91.5
Twice	229	57.3
>Twice	112	28.0
Never	2	0.5
Frequent flossing:		
At least once	190	47.5
Occasional	136	34.0
Never	74	18.5

Figure 1: Sources of the participants' knowledge regarding diabetes

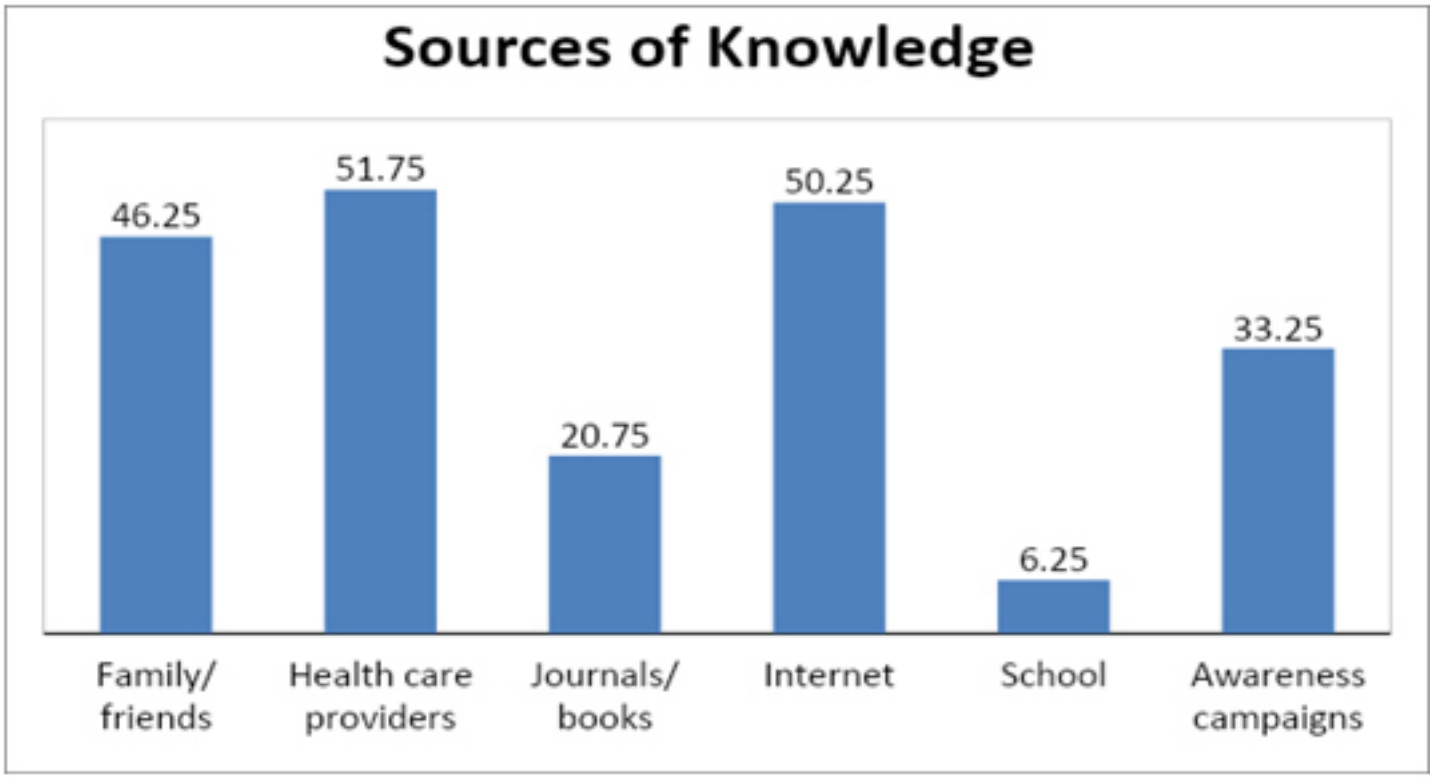

Table 3: Response of the participants to the items reflecting awareness about association of periodontal disease and diabetes.

Items*	Correct	Percentage
People with diabetes are more likely to have infection in their mouth.	244	61.0
People with diabetes are more likely to have gum disease.	221	55.3
Diabetes can make ones' teeth and gums worse.	223	55.8
People with dry mouths are more likely to have tooth decay.	157	39.3
People with dry mouths are more likely to have sore in their mouth.	171	42.8
If your gums bleed every time you brush your teeth, it's an early sign of gum disease.	198	49.5
Gum disease can lead to loss of teeth.	215	53.8
Gum disease makes it harder to control blood sugar in diabetes.	99	24.8
Diabetic smokers have more serious gum disease than nonsmokers.	230	57.5

*"Yes" is the right answer for all items.

Discussion

The prevalence of diabetes has been increasing worldwide, and WHO estimated that 366 million people will suffer from diabetes by 2030 [13]. Type 2 diabetes accounts for the majority of diabetic people around the world. This current study is in agreement with this fact as almost two thirds (61.5%) of our participants were type II diabetics. The study also showed that 61.3% of our participants described themselves as being controlled diabetics. Furthermore, results suggested that the study population had considerably more knowledge about general diabetic items and its systemic complications than they do for oral or dental complications. Most of them knew that complications of diabetes include eye complications (98.3%), diabetic foot (80.3%), nervous complications (77.0%) and kidney complications (77.0%). However, two thirds of the participants (61.0%) were aware that diabetic patients are more likely to have mouth infection; and relatively lower percentages were aware that diabetes can make teeth and gums worse (55.9%) and that gum disease makes it harder to control blood sugar levels (24.8%). Several investigators have reported similar low percentages regarding knowledge of diabetic patients. A study found that their patients were aware of the increased risk for eye diseases (98%), heart diseases (84%), kidney diseases (94%), but only 33% considered periodontal diseases as complications of diabetes [21]. Another study in the UAE also investigated similar issues and they reported closer results [13].

Diabetic patients are known to be at high risk of developing several oral health diseases such as gingivitis, periodontitis, thrush, and dry mouth [22], salivary gland dysfunction, halitosis, burning mouth sensation, candidiasis, and taste disturbance [23]. It has been established previously that DM can increase the risk of developing inflammatory periodontal diseases. On the other hand, periodontal diseases can also affect DM, by means of affecting blood glucose level [24]. Thus, prevention and management of oral health diseases are significantly important as well as increasing awareness about oral hygiene, the effect of diabetes on oral health and regular dental checkups [25].

Data in this study revealed that the majority of the participants believed they should have regular dental visits, but various reasons have been reported explaining their irregularity or no dental visits. The survey clearly showed that more than one third (35.5%) had a family income ranging between 5.000 to <10,000 SR, hence, high costs of dental clinics was the main cause (4.5%) followed by difficulty in appointment scheduling (3.3%) and fear or anxiety (2.0%). These reasons were also documented in a study done in Egypt when they assessed their patients for irregular dental visits [14]. Therefore, our results emphasize the necessity for carrying out more research in Saudi Arabia in order to identify the barriers behind the noncompliance of diabetic patients with regular dental checkups. Further research might also motivate the government, private health sectors as well as insurance companies to create a system that facilitates the annual dental visits for all diabetic patients to meet the objective of the United States National Institutes of Healthy People set in 2010 which aims to increase the proportion of diabetic patients who have annual dental visits to 71% [26].

Regarding oral hygiene practices, findings demonstrated that participants had moderate knowledge about oral hygiene measures in which 91.5% of the study population believed that brushing teeth should be at least once a day, while 47.5% believed in using dental floss to clean between their teeth. Numerous national and international previous studies supported our findings [8,14,18]. Furthermore, in accordance with national studies [16,18], our data illustrated that the greatest percentage of diabetic participants received limited advice from their healthcare providers as 6.5% of them were only advised about the importance of regular dentist checkups and 59.5% have never been advised about either brushing their teeth or regular dental visits. The awareness of oral health in relation to diabetes is a mutual responsibility between healthcare professionals and dentists, but only 45.25% of our study population had been advised by dentists to control their blood sugar. Thus, physicians, dentists and other healthcare providers play an important role in raising the awareness of oral health priority among diabetic patients and to encourage them to seek oral examinations regularly. This will help in early identification of periodontal diseases associated with diabetes and thereby lead to early prevention and better quality of life.

Results of this study revealed that older diabetic patients aged 18+ years had better levels of awareness of oral disease compared to younger patients. Similar results have been seen in a study conducted in Riyadh, Saudi Arabia [17]. In addition, type II diabetic patients recorded the highest level of awareness when compared to type I diabetic patients. This may be attributed to the fact that type I diabetes affects younger populations than type II diabetes. Also, it was noted that the longer the duration of diabetes corresponded to a higher level of awareness. Respondents who have diabetes from 5 to less than 10 years were more likely to know of the association between DM and oral health.

Other factors such as gender, education level, employment status, family income or residence region showed no statistically significant difference in the level of awareness which disagreed with the findings of the previous studies conducted in Saudi Arabia and Egypt [14,17,18]. Moreover, there is no statistically significant difference observed in the level of awareness of the participants according to the health institute they follow up at or family history of diabetes.

Different populations have different sources of information especially when it comes to health problems and complications. In this study, it was reported that Health care workers (HCW), internet, family and friends are the most used sources of information in almost 50% of the cases, while a lower percentage (33%) was from health awareness campaigns, and the least of 6% was from school. This is comparable with the results obtained from

a previous study conducted in Saudi Arabia [18]. Although HCW was one of the top three sources, other informal sources like the internet, family and friends with limited scientific background have to be taken into account. Promoting more health education programs would deliver accurate and updated information for diabetic patients. In addition, the study suggested that the role of schools in health education has to be improved especially when considering young patients with type 1 diabetes.

Conclusion and Recommendations

Patients of older age, type 2 diabetes and the longer duration of diabetes have been shown to have higher levels of awareness regarding DM and oral health. Although the level of awareness in this study is slightly better than previous studies reported in Saudi Arabia, it is still limited, indicating the need for further efforts and cooperation between physicians, diabetic educators, dentists and policy makers.

Limitations

This study was supposed to be conducted as an interview aiming for more understanding and accurate results. However, due to the Coronavirus Disease 2019 pandemic, some patients were contacted by phone while others were asked to fill out the questionnaire. Also due to this pandemic, it is reported that almost 50% of the cases confirmed non-compliance to follow up appointments during the past year leading to missed or inaccurate data regarding some factors that may considered as significant when considering oral health awareness such as compliance, controlled diabetes (recent A1C level) and regular dental visits.

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Prevalence and Co-occurrence of Major Depression and Generalized Anxiety Disorders Among Adolescents in Qatar

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Abstract

Background: Depression and anxiety are the commonest mental health disorders worldwide (1). In Qatar, a cross-sectional study conducted among Qatari adolescents in secondary schools in 2017 found that 34.5% have depression with female predominance (5), but no study in Qatar has addressed both disorders co-occurrence.

Objectives: The main objective is to assess the prevalence and co-occurrence of major depression disorder and generalized anxiety disorder in adolescents in Qatar.

Research participants: adolescents aged 12-18 years old.

Method: Cross-sectional study. An online questionnaire including Demographic data, PHQ-9 and GAD-7 will be sent to parents or legal guardians to take online consent, then to be filled in by their children in the ages of 12-18 years old.

Proposed analysis: Chi-square test will be used to test the significance of association between variables. The significant level for all statistical analysis was set at 0.05.

Anticipated result: According to a previous local study in Qatar we expect the prevalence of both disorders in this age group to be around 30% if not more and as per worldwide studies result 25-50% of depressed patient have anxiety also and 10-15% who have anxiety found to have depression as co-morbidity, so we expect to have co-occurrences in this range.

Key words: Depression, Generalized Anxiety disorders, Adolescents, Qatar, PHQ-9, GAD-7, cross-sectional.

Abbreviations
HMC: Hamad Medical Corporation
PHQ-9: Patient Health Questionnaire-9
GAD-7: Generalized Anxiety Disorder-7
GCP: Good Clinical Practice

Discussion

Adolescence is a vital time to develop healthy mental well-being. It is a time where youths will be exposed to multiple physical, social, psychological, and emotional changes. Therefore, it is important to intervene at this age group because they are malleable to change, thereby enhancing their social skills, problem-solving, coping and managing emotional skills to maintain their general mental well-being.

Depression and anxiety are the commonest mental health disorders worldwide. In 2017, 322 million people were suffering from depression and 264 million living with anxiety (1). They are inter-related in many aspects and quite a large number of people with anxiety will have associated depression and vice versa.

Depression prevalence is widely variable among countries. In the United States, the prevalence rate of depressive disorders among 13-18 years old is 5.9% for girls and 4.6% for boys (2). A study done in Armenia in 2013 found the prevalence of depression was more than 16% among 713 adolescent students (with 21% and 6% for females and males respectively) (3). In Egypt, a study conducted in a girls' secondary school found that depression was 15.3% by Children Depression Inventory (CDI)(4). In Qatar, a cross-sectional study conducted among Qatari adolescents in secondary schools in 2017 found that 34.5% have depression with female predominance and they found that bad relationships with peers, parents and teachers were among the most significant predictors of depression (OR=14.0, 95%CI=1.55-124), (OR=9.4, 95%CI=1.04-85.4), (OR=5.0, 95%CI=1.41-18.26) consecutively (5).

In 2004, a UK survey of children and adolescents aged 5 to 16 years estimated that 0.7% had a generalized anxiety disorder (6). Another study was conducted in Iran which showed that the prevalence of generalized anxiety disorder among adolescents was about 20% (7).

Regarding co-occurrence of the previous disorders, studies show that about one-quarter to one-half of the young, depressed patients meet the anxiety disorders diagnostic criteria. In addition, studies showed about 10-15% of the patients diagnosed with an anxiety disorder had the co-occurrence of depression (8). However, other studies demonstrated that depressed patients showed more than 70% of anxiety symptoms, with similar depressed symptoms percentage of about 60% among anxious patients. In the same study co-occurrence was more prevalent among females with a percentage of 17% compared to 5% among males (9). In addition, there was a larger study, which was done on more than 74,000 individuals among 24 countries that showed the mean of lifetime prevalence of Major depressive disorder based on DSM IV criteria was 11.2%, with 45% of these adults complaining once or more of anxiety disorders in their lifetime (10).

A major depressive disorder is an episode of at least 2 weeks duration of depressed mood and/or lack of interest and multiple other symptoms. While generalized anxiety disorder is a persistent and excessive worry about different things for at least six months duration. Both might be explained by multiple risk factors like genetic, stressful events, and environmental factors.

Both disorders have specific diagnostic criteria in the diagnostic and statistical manual of mental disorders fifth edition (DSM-V). Patient health questionnaire-9 and generalized anxiety disorder-7 are self-reported screening tools for both major depression and generalized anxiety respectively. A PHQ-9 score of 11 or more had a sensitivity of 89.5% and a specificity of 77.5% for detecting adolescents who met the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition criteria for major depression (11). While the GAD-7 score of ≥11 represents the optimal sensitivity (97%) and specificity (100%) for detecting moderate anxiety in adolescents (12). In a Saudi research study, the validity of Arabic translation of PHQ-9 and GAD-7, the Arabic version of PHQ-9 showed good internal consistency with Cronbach's alpha of 0.857 and acceptable Cronbach's alpha of 0.763 for GAD-7 (13).

Nowadays, people are suffering more from anxiety and depression worldwide, because of the exposure to a highly stressful environment, especially for adolescents. Thus, early detection of anxiety and depression among adolescents may have a significant effect on society and the community as a whole. Early detection and management of depression and anxiety will result in a decrease in hospital admission, prevention of disease progression and rapid response to initial intervention. Having healthy adolescents with fewer depression and anxiety disorders will guarantee higher productive individuals throughout their future career. This will ensure less employees missing work and will decrease the burden cost paid by the governments annually, resulting in strong economies and successful communities. When we are aware about the baseline numbers of anxiety, depression, and co-occurrence in the society, this will help us to adapt our health system to serve the affected people. Moreover, it will help us to monitor the success of our interventions if the numbers are declining, skyrocketing, or staying stationary.

Material and Methods

Study Design:
Cross-sectional, Survey-based study.

Study Area:
The study will be conducted in Qatar targeting adolescents aged 12–18 years old.

Objectives:
Primary objectives:
• To estimate the prevalence and co-occurrence of Major Depression and Generalized Anxiety Disorders among Adolescents in Qatar in 2021.

Secondary objectives:
• To study demographic characteristics among patients and their correlation with depression and anxiety.
• To study the association between the following factors and both disorders such as, parent's marital status, Peer relationship, Relationship with parents, Family History of depression, Family conflicts, Relationship with teachers and psychological abuse.

Data Collection (Instrument used and Outcome Measures):
Data will be collected through online Questionnaire (Arabic or English) using survey monkey platform, questionnaires will be anonymous but optional field will be added where participants interested in being contacted for further discussion and possible referral to mental health support can voluntarily fill their contact details, the questionnaires are expected to be completed within 10 minutes.

The Primary Investigator (PI) will give the survey-monkey link, information sheet and consent to the Health information department and they will send mobile messages that contain the survey-monkey link, information sheet and consent to the parents/guardians asking them to sign consent approving their adolescents aged (12-18 years-old) to participate in the study.

In the beginning data will be collected via online survey then eventually will be stored in primary investigator personal computer. All data will be accessed through the primary investigator.

A cutoff of ≥11 for both PHQ-9 and GAD-7 has a reliable sensitivity and specificity for depression and anxiety respectively. We will use this cutoff to determine both diseases.

Adolescents who meet the diagnostic criteria for generalized anxiety disorder and /or major depressive disorder will be offered (if they showed interest by filling the optional field with their contact details) an optional referral for further evaluation and possible mental health support. Participants who reject referral will still be included in our study.

Population and Setting:
Random sample of adolescents (12-18 years old) living in Qatar in 2021.

Sample size:
The estimated sample size was 730 adolescents aged 12–18 years-old taking into consideration the known prevalence of depression (34.5% ± absolute precision 3.45%) detected in a similar population (5), to achieve a significance level <0.05 (95% confidence level). This sample size will be divided into 3 clusters (243 in each cluster) (14).

Sample technique:
• Total number of primary health care centers in Qatar is 27.
• Using cluster random sampling, 3 health centers from each municipality in Qatar will be selected; from those health centers all registered adolescents aged 12-18 years-old will be included to cover the sample size.

Inclusion criteria:
• All Adolescents aged (12–18 years-old), living in Qatar, including orphans and double orphans
• Consent by parents or legal guardian.

Exclusion criteria:
• Age less than 12 years-old or more than 18 years-old.
• Not consented by parents or legal guardian.

Study Duration and Timelines
The process of data collection will start once the approval is obtained.

Task	Mar-April 2020	May-Aug2021	Sept-Oct2021	Nov-Dec 2021
Writing and approval of the proposal				
Data collection				
Data analysis				
Research writing				

Informed Consent
Detailed information about the study will be presented in the first page in SurveyMonkey then parent consent will be asked, if they agree and press next this will be considered as informed consent. Afterward, parents will be asked to give their mobile number to their children to fill in the questionnaires.

Data collection, data management and confidentiality
There is no physical data, only Computer Data from the questionnaire which will be stored in the PI's personal computer in protected files, and access will be under control of the PI who is a PHCC staff member. Data will be stored for at least five years.

Outcomes
• Primary outcome: the prevalence and co-occurrence of Major Depression and Generalized Anxiety Disorders among Adolescents in Qatar in 2021.
• Secondary outcome: the association of demographic and personal factors with depression and anxiety.

Subject withdrawal/ withdrawal of consent
The participant will be informed that participation in this study is optional, and they are free to refuse to participate in this research project at any time.

Statistical Consideration and data analysis
A cutoff of ≥11 for both PHQ-9 and GAD-7 has a reliable sensitivity and specificity for depression and anxiety respectively. We will use this cutoff to determine both diseases.

Data will be presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means and standard deviations for quantitative variables. The dichotomous variables will be expressed as numbers and percentages. Qualitative variables will be compared using the chi-square test. Non-parametric correlation will be used to assess the correlation between demographic characteristics among adolescents, their parents and their prevalence of depression and anxiety.
Multiple Logistic Regression will be used to identify the factors affecting the response variable under study. A $p<0.05$ will be considered statistically significant. The data will be analyzed by a biostatistician using SPSS for Windows (Version 25.0; SPSS Inc., Chicago, IL, USA).

Ethical consideration
After obtaining approval, the study will be conducted in full conformance with principles of the "Declaration of Helsinki", Good Clinical Practice (GCP) and within the laws and regulations of the Ministry of Public Health in Qatar. Informed consent will be obtained from targeted parents. Adolescents who meet the diagnostic criteria for Generalized anxiety disorder and /or Major depressive disorder in case they show interest by giving their contact details, will be offered an optional referral for further evaluation and management by a Psychiatrist.

Discussion

Depression and Generalized anxiety disorders have been given quite a deal of attention by the Primary Health Care Corporation in Qatar, which is translated into a dedicated clinical service especially for the adolescents(5). Moreover, awareness programs have been conducted to highlight the importance of mental health disorders and their effects on the community, in collaboration with different governmental sectors; i.e. media, and ministry of education.
In a recent study in Qatar, a cross-sectional survey conducted among Qatari adolescents in secondary schools in 2017 found that 34.5% have depression with female (5). Furthermore, studies in the US showed that about 10-15% of the patients diagnosed with an anxiety disorder had the co-occurrence of depression (8). There are no current studies demonstrating the concurrence of these two conditions among Qatari adolescents, hence the significance of this cross-sectional survey.

Strengths and limitation
The participants are randomly selected with the aid of data withdrawn from health information management department to ensure the generalizability of the results. The surveys are electronically sent to the parents' emails and mobile phones, to ease access especially during the COVID pandemic. The PHQ-9 and GAD-7 questionnaire will be sent in both Arabic and English language (Arabic version has been validated) to ensure the validity of the withdrawn results. In addition, previous literature has demonstrated that GAD-7 and PHQ-9 surveys are a reliable and valid tool in detecting depression and anxiety.

However, low response is one of the biggest issues that has been faced in previous similar studies. It is attributed to the fact that the survey is electronic which might pose some technological challenges for some parents as well as the sensitive nature of the questions. Moreover, screening for both conditions might considerably prolong the time taken to fill in the survey which will hinder the completion rate. Furthermore, social acceptance of these conditions might pose a challenge in filling or accurately filling the questionnaires. Finally, dealing with an emotionally vulnerable age group can result in considerable subjectivity in the survey filling process.
In this study, we are aiming to find the prevalence of the co-occurrence of Depression and Generalized anxiety disorder. Furthermore, we are trying to investigate the associations of this occurrence and other demographic cofactors, such as social structure, family stability, history of mental disease in the family, socioeconomic level, and level of education.

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Efficacy of curcumin on inflammatory pain across different disorders: a systematic review and meta-analysis of Randomized controlled trials

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Abstract

Aim: to evaluate randomized controlled trials and perform a meta-analysis to assess the efficacy of curcumin on inflammatory pain in different disorders, in comparison to placebo and traditional pain treatments (NSAIDs and glucosamine plus chondroitin).

Method and design: meta-analysis of randomized controlled trials (RCT).

Data sources: Pubmed and Cochrane library were searched for relevant RCTs from January 1999 to July 2021. Reference lists were manually checked. Selection criteria: published RCTs comparing curcumin to placebo or other treatment modalities in adults with different pain disorders were eligible for inclusion.

Data collection and criteria: the studies were selected, and their quality was assessed by two review authors. Standardized mean difference (SMD) was used to analyze the continuous outcome using a random effect model.

Results: In all the 15 studies included 1475 subjects. Curcumin was found to be superior in controlling pain against placebo. Moreover, curcumin demonstrated a superior effect in controlling osteoarthritic pain when compared to Glucosamine and Chondroitin combination. However, Curcumin was found to be similarly effective to NSAIDs in controlling pain.

Conclusions: Curcumin was found superior in pain relief against placebo and combination of glucosamine and chondroitin. In addition, it demonstrated equal efficacy in relieving osteoarthritic pain, when compared to NSAIDs.

Key words: curcumin, inflammatory pain, osteoarthritis, NSAIDs, VAS, MOMAC, meta-analysis, Dysmenorrhea, post-surgical pain.

Abbreviation
VAS: Visual Analog Scale
WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index.
NSAIDs: Non-Steroidal Anti-inflammatory Drugs

Introduction

Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage” (pain terms, 1979). The significance of chronic pain lies in the fact that it is one of the most common complaints presenting to the health care system. In a recent large scale study conducted by the World Health Organization across different countries, prevalence of pain was estimated to be 21.5% of the total visits in the primary health care setting (Gureje, O., Von Korff, M., Simon, G. E., & Gater, R., 1998). Moreover, prevalence of moderate to severe chronic pain among adults in Europe was estimated to be 19% (Breivik, H. et al. 2006). The effect of pain can be profound on quality of life, well-being, and pose an economic burden on the national health care systems. In Australia, a study showed that chronic pain was responsible for increased primary care visits, emergency visits, and hospitalization. In the UK, it is estimated that the annual cost of managing chronic pain is around £69 million/ year (Phillips C. J. ,2009). For these reasons pain is thoroughly investigated, and continuous search for safer and cheaper analgesics are always pursued.

Chronic Inflammatory pain is one of the types of pathological pain. It is caused by tissue injury which will produce neural plasticity, that involves both peripheral and central sensitization. The sensitization process leads to decreasing the nociceptive threshold, which consequently leads to patients experiencing spontaneous pain, hyperalgesia, and allodynia (Sun, J., et al 2018). The mechanism of inflammatory pain starts when tissue damage happens. This in turn, will result in the release of a group of chemical mediators, known as “the inflammatory soup”. These mediators will provoke nociceptors, which will produce pain. The mediators are Prostaglandins, TNFα, growth factors and kinins. When these mediators bind to nociceptive receptors, they start the process of peripheral sensitization. The binding activates protein kinase which will result in the reduction of the pain threshold leading to hyperalgesia (Mackey, S., 2004). Moreover, inflammatory mediators can stimulate central sensitization. They promote the expression of genes responsible for the production of COX-2 enzymes. These enzymes play an important role in the production of prostaglandins, which are important players in the inflammatory soup. One of the most important pharmacological agents that target this step are NSAIDS. They inhibit the COX-2 enzyme which will reduce the synthesis of prostaglandin. This will result in modulation of the inflammatory and nociceptive mediators, and reduction of inflammatory pain (Macky 2004). However, most of the traditional NSAIDs have a simultaneous effect on COX-1 enzyme. Inhibition of this enzyme is believed to be linked to major adverse events such as GI toxicity, increased bleeding time and risk of hemorrhage (Mackey, S. 2004). The potential adverse events can limit its use in the management of inflammatory pain in high-risk patients, therefore, the need for safer alternative has always been investigated. Herbal dietary derivatives such as curcumin have shown to have an anti-inflammatory effect and been thoroughly investigated (Yavarpour-Bali, Ghasemi-Kasman & Pirzadeh, 2019).

Turmeric is a herbal plant that has been widely consumed in southeast Asia, China and India for dietary and medicinal purposes (Wang et al., 2017). The main ingredients of turmeric are curcumin, demethoxycurcumin and bisdemethoxycurcumin (He et al., 2015), and curcumin longa is considered to the most valuable for therapeutic purposes. According to (Yavarpour-Bali, Ghasemi-Kasman & Pirzadeh, 2019), curcumin has proven to be pharmacologically beneficial, due to its antimicrobial, anti-inflammatory and antioxidant properties. Studies have proven that curcumin has an inhibitory effect on production of LPS-induced TNF-alpha and PGE2, which consequently has a positive effect on the inflammatory process and reduces inflammatory pain (Lantz, Chen, Solyom, Jolad & Timmermann, 2005). Moreover, the safety profile for curcumin has encouraged clinicians and researchers to extensively study curcumin as an alternative therapy for medical conditions (Dende et al., 2017). However, factors such as poor absorption, rapid metabolism, and elimination of curcumin in the human body posed major challenges in using curcumin as an alternative therapy (Siviero et al., 2015). It was not till recently, that new preparations of curcumin in labs have successfully enhanced its stability and bioavailability (Stanić, 2017). Nanotechnology implementations have successfully counteracted some of the curcumin innate behavior that usually hampers its therapeutic properties (Pichardo, E et al, 2020).

Several reviews have been conducted to investigate the effect of curcumin on Osteoarthritis. However, few reviews have investigated the effect of curcumin on chronic inflammatory pain in general. Therefore, this meta-analysis is aiming to investigate the effect of curcumin on pain associated with different inflammatory conditions (e.g., Rheumatoid Arthritis, Prostatitis, chronic inflammatory pelvic pain, post-operative pain) along with osteoarthritis.

Methods

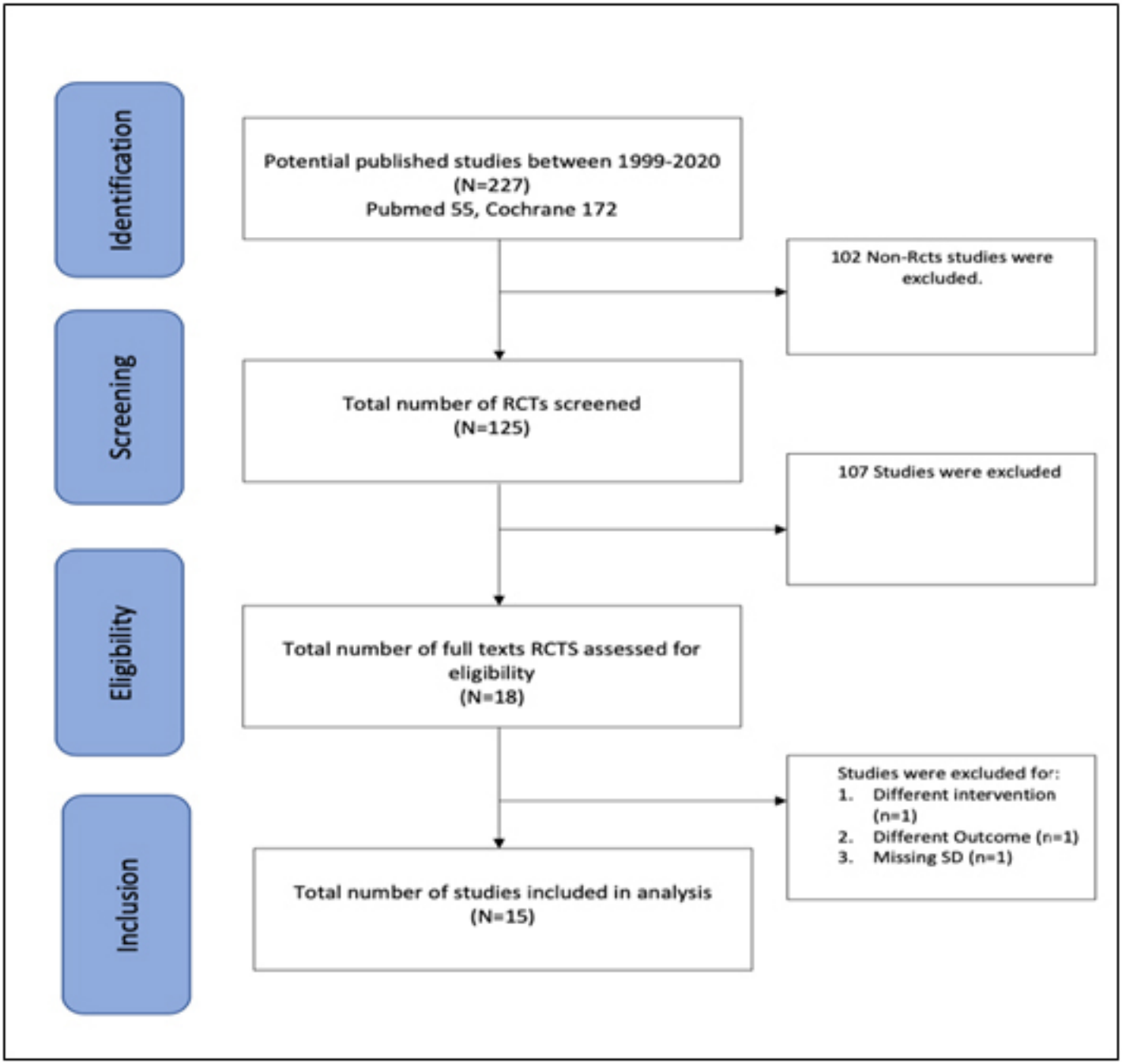
1. Search strategy

An electronic literature search was performed by two reviewers for RCTs assessing the effect of curcumin on inflammatory pain in different disorders. The electronic databases include Pubmed and Cochrane. Date was restricted to from January 1999 until July 2021. The following text terms were used, “curcumin”, “pain”, and “randomized controlled trials”. The reference list of all studies included were checked manually. The detailed retrieval process is shown in Figure 1.

2. Inclusion criteria

Inclusion criteria were: (1) Randomized control trials involving curcumin as the intervention, (2) control being NSAIDs, placebo or combination of Glucosamine plus Chondritin, (3) participants are adults, (4) RCTS assessing inflammatory pain and measuring numerical pain scales especially visual analogue scale (VAS) and WOMAC pain.

Figure 1: PRISMA chart of search strategy and study selection



3. Exclusion criteria

The exclusion criteria were: (1) using curcumin as an adjuvant therapy, (2) other type pf pain such as cancer pain and neurogenic pain. (3) non-randomized control trials. (4) different outcome. (5) studies missing valuable data to include in the meta-analysis such as standard deviation (Figure 1).

4. Data extraction

Three reviewers conducted the search and applied both the inclusion and the exclusion criteria. Data extraction from all studies was done separately. Later on, the data (characteristics, design and outcomes) were collected for final review among the 3 reviewers for final agreement to be included and analyzed.

5. Risk of bias and Quality assessment

The methodological quality of controlled trials was assessed using jaded scale, where points are given for three key methodological features of clinical trials, which are randomization, blinding and subjects follow up. An overall score of five is given. Studies with more than or equal to 3 points are considered high quality studies.

6. Statistical analysis

RevMan 5.1 was used for meta-analysis. The continuous variables were analyzed by standard Mean Difference (SMD) and 95% confidence interval (CI).

The chi-squared statistic and the I2 statistic were used for the assessment of heterogenicity. AP<0.05. I2>50% was considered as a significant heterogeneity. A random-effect model was used. A funnel plot was used to show publication bias. (Figure 3)

Three subgroup analyses were done to identify (1) effect of curcumin vs. Glucosamine and chondroitin, (2) Non-inferiority to NSAIDs, and (3) curcumin vs placebo.

Results

Table 1. included Study characteristics

Study	participants	Age mean Control	Age mean intervention	comparison	diagnosis	outcome	Jaded score
Chandran, 2012	45, mixed	48.87 (±10.78)	47.8 (±8.60)	Diclofenac	Rheumatoid arthritis	Disease activity score (pain)	5
Kuptniratsaikul H et al. 2009	107, mixed	60(±8.4)	61.4 (±8.7)	ibuprofen	Osteoarthritis	Pain on level walking numerical scale	5
Kuptniratsaikul et al. 2014	367, mixed	60.9 (±6.9)	60.3 (±6.8)	ibuprofen	Osteoarthritis	WOMAC pain	5
Belcaro H et al. 2014	124, mixed	56.6 (±4.7)	55.8(±5.8)	Glucosamine +chondroitin	Osteoarthritis	WOMAC pain	2
Haroyan et al. 2018	201, mixed	54.65 (±8.84)	56.04(±8.55)	placebo	Osteoarthritis	WOMAC pain	5
Khanna et al. 2020	80, mixed	53.4 (±6.64)	51.5 (±5.95)	Glucosamine +chondroitin	Osteoarthritis	Visual analogue scale	5
Madhu et al. 2013	120, mixed	56.77 (±9.98)	56.63(±10.58)	placebo	Osteoarthritis	Visual analogue scale	5
Madhu et al. 2013	120, mixed	56.8 (±7.99)	56.63(±10.58)	Glucosamine	Osteoarthritis	Visual analogue scale	5
Morgia et al. 2017	55, mixed	Median 32 (IQ 29-38)	Median 32 (IQ 28.75-38.75)	placebo	Chronic prostatitis/ chronic pelvic pain syndrome type 3	Visual analogue scale	3
Panahi H et al. 2014	40, mixed	57.57 (±9.05)	57.32(±8.78)	placebo	Osteoarthritis	WOMAC pain	5
Thomas et al. 2020	72, mixed	52.3 (±4.59)	51.7 (±5.52)	Glucosamine +chondroitin	Osteoarthritis	Visual analogue scale	3
Moharamzad et al, 2011	67, mixed	unavailable	unavailable	placebo	Osteoarthritis	Visual analogue scale	5
Srivastava et al, 2016	133, mixed	50.27 (±8,63)	50.23(±8.08)	placebo	Osteoarthritis	Visual analogue score	5
Nakagawa et al, 2014	41, mixed	66.2 (±7.2)	71.9(±5.3)	placebo	Osteoarthritis	Visual analogue scale	5
Agarwal et al, 2011	50, mixed	37.16 (±12.7)	38.44(±12.8)	placebo	Post laparoscopic cholecystectomy	Visual analogue scale	5
Tabari et al, 2020	74, females	Range 18-35	Range 18-35	placebo	dysmenorrhea	Visual analogue scale	5

Results

1. Study selection

Included studies were selected after going through the process of identification, screening, eligibility and inclusion. The flow process is shown in Figure 1. Using search terms mentioned above, 227 articles were found in Cochrane and PubMed. A total of 125 potential randomized controlled trials studies were identified. Exclusion criteria was applied and a total of 15 studies were included in the analysis.

2. Study and patient characteristics

Table 1 shows the details of study characteristics of all 15 suitable studies included in the meta-analysis. The number of total participants is 1,475, and the scale of each RCT was 40-367. All of the studies were published between 2009 and 2020.

Table 2. Description of Jaded score assessment

Study	Year	Randomization	Blinding	Follow-up of patients	Total jaded score
Chandran et al.	2012	2/2	2/2	1/1	5/5
Kuptniratsaikul H et al.	2014	2/2	2/2	1/1	5/5
Kuptniratsaikul et al.	2009	2/2	2/2	1/1	5/5
Belcaro H et al.	2014	1/2	0/2	1/1	2/5
Haroyan et al.	2018	2/2	2/2	1/1	5/5
Khanna et al.	2020	2/2	2/2	1/1	5/5
Madhu et al.	2013	2/2	2/2	1/1	5/5
Morgia et al.	2017	1/2	1/2	1/1	3/5
Panahi H et al.	2014	2/2	2/2	1/1	5/5
Thomas et al.	2021	2/2	0/2	1/1	3/5
Moharamzad et al.	2011	2/2	2/2	1/1	5/5
Srivastava et al.	2016	2/2	2/2	1/1	5/5
Nakagawa et al.	2014	2/2	2/2	1/1	5/5
Tabari et al.	2020	2/2	2/2	1/1	5/5
Agarwal et al.	2011	2/2	2/2	1/1	5/5

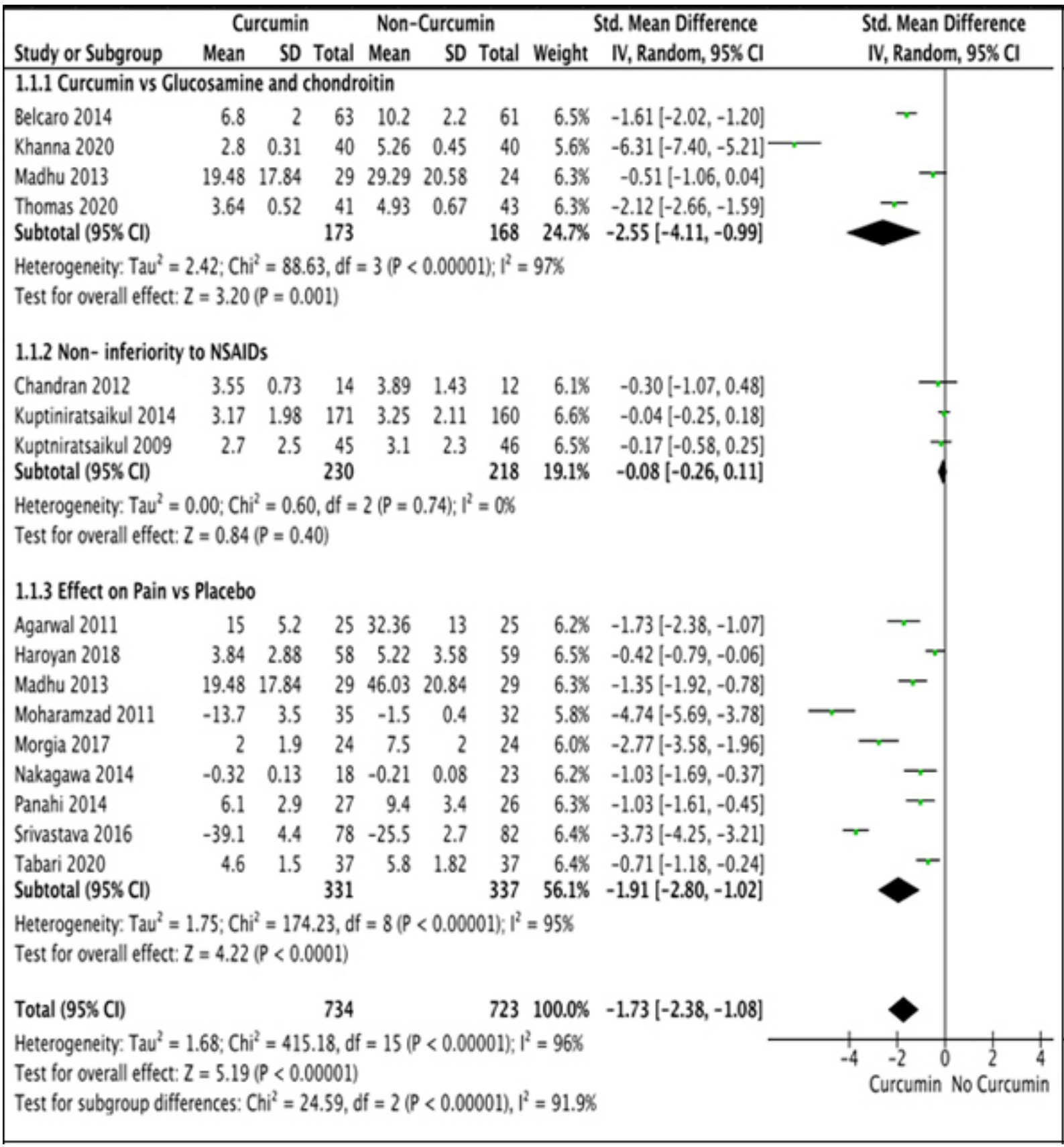
Fifteen studies were included in this meta-analysis. A total number of 1,457 subjects were included, 723 in control and 734 in intervention. Most of the studies were high quality studies and one only was of low quality.

Subgroup analysis was done. In assessing effect of curcumin vs the combination of Glucosamine plus chondroitin, four studies showed that there was significant difference between groups (SMD=-2.55, 95 % CI (-4.11,-0.99), P 0.74). Assessment of heterogeneity was done through chi square test and I2 showing high heterogeneity. Chi2=88.63, df=3, p<0.00001, and I2=97% (Figure 3).

In assessing effect of curcumin vs. NSAIDs, three studies showed that there was no significant difference between groups (SMD=-0.08, 95 % CI (-0.26, 0.11), P 0.40). Assessment of heterogeneity was done through chi square test and I2 showing low heterogeneity. Chi2=0.60, df=2, p=0.74, and I2=0%. (Figure 2).

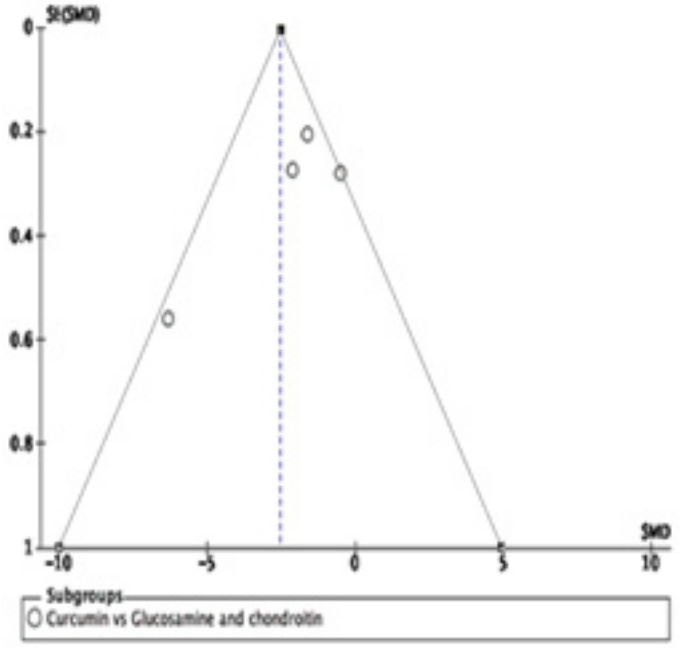
In assessing effect of curcumin vs. placebo, nine studies were included, and analysis showed significant difference between groups (SMD=-1.91, 95 % CI (-2.80, -1.02), P <0.0001). Assessment of heterogeneity was done through chi square test and I2 showing high heterogeneity. Chi2=174.23, df=8, p <0.00001, and I2=95%. (Figure 2).

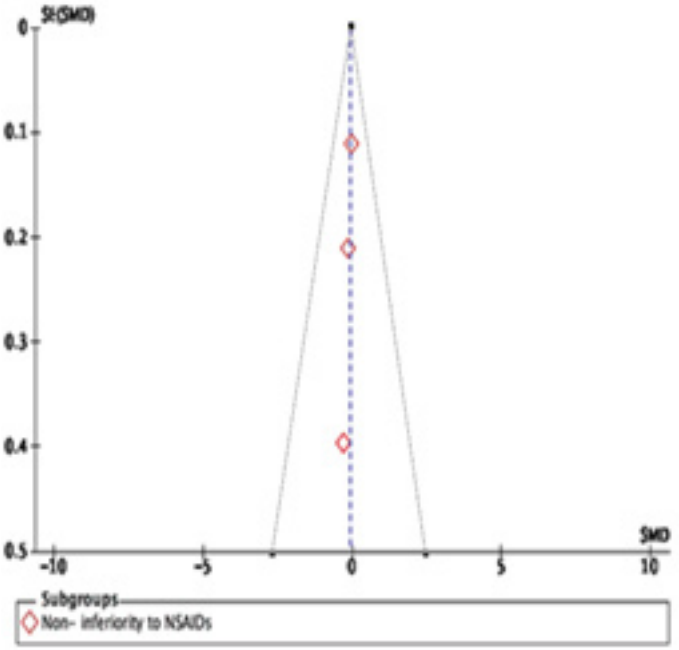
Figure 2: Forest plot.

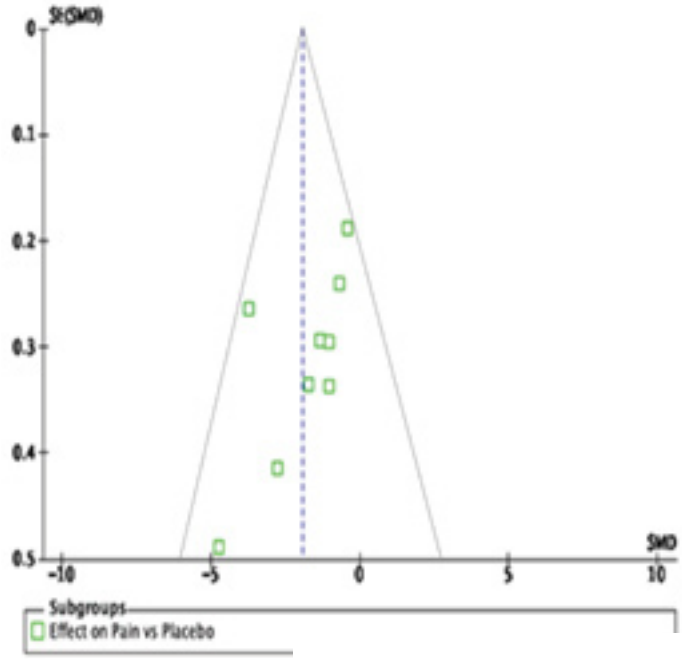


Publication Bias assessment:

Funnel plot was produced to assess the publication bias in every sub-group analysis, which indicated that there is no publication bias (Figure 3).







Discussion

The aim of our meta-analysis was to assess the effect of curcumin on different medical conditions presenting with chronic inflammatory pain (osteoarthritis, Rheumatoid arthritis, chronic pelvic pain type 3, prostatitis, dysmenorrhea and Post-operative pain). Curcumin has demonstrated a superior effect on pain control against placebo in osteoarthritis, rheumatoid arthritis, post-surgical pain and dysmenorrhea. In addition, subgroup analysis was conducted to investigate the effect of curcumin against traditionally used medications (NSAIDS and combination of glucosamine and chondroitin). Results drawn from 3 RCTs showed that curcumin is non-inferior to NSAIDs in alleviating osteoarthritic pain. Moreover, curcumin has demonstrated a superior effect in alleviating osteoarthritic pain when compared to glucosamine plus chondroitin in four RCTS.

The overall effect of curcumin on alleviating pain secondary to osteoarthritic changes supports previous published reviews. However, our meta-analysis has included different conditions that manifest inflammatory pain, such as dysmenorrhea, rheumatoid arthritis, post-operative pain, prostatitis and chronic pelvic pain, which has proven to be effective.

Most of the RCTs included are conducted on Asian populations. This is secondary to the fact that curcumin has been widely used for its dietary and medicinal purposes in the Asian culture. This could limit the generalizability of the results to other ethnic groups.

Strengths and limitation

The meta-analysis included 15 well conducted RCTs, most of them of high quality (achieved score of five on Jaded score). Moreover, the total number of participants included in the analysis is 1,457. The curcumin preparation in the RCTs was appropriate and increases the bioavailability and absorption for the participants. Finally, in comparison to previously published reviews, this analysis included wider variety of inflammatory conditions that could present as pain.

On the other hand, most studies were conducted in Asia and comprised of Asian populations, which limits the use of these results on different ethnic groups. The meta-analysis did not take into consideration the time duration of treatment, dose factors and different conditions. The difference in the duration of treatment in the RCTs, doses, preparation can explain the increased heterogeneity in the results. Finally, the meta-analysis did not investigate the adverse events of curcumin and its safety profile in the RCTs.

Future research can be done to investigate the effect of curcumin on pain in different ethnic groups to solidify the generalizability of these findings.

Conclusion

In this analysis, curcumin was found superior in pain relief against placebo and combination of glucosamine and chondroitin. In addition, it demonstrated equal efficacy in relieving osteoarthritic pain, when compared to NSAIDs. It also showed excellent safety profile in previous literature.

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Teachers' awareness regarding first-aid management and control of epistaxis inside schools in Taif region, Saudi Arabia

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Abstract

Background: Epistaxis is one of the commonest ENT emergencies worldwide and awareness of the first aid is important especially among teachers inside school as students easily get injured during school activities. This study aimed to assess the level of awareness regarding first-aid management and control of epistaxis among teachers inside schools in Taif region, Saudi Arabia.

Methods: Based on a review of the literature on awareness regarding first-aid management and control of epistaxis a cross sectional study was conducted with an online survey which was distributed to all schoolteachers in Taif city. Responders were selected randomly and the predesigned questionnaire was sent to them.

Results: The study revealed that teachers have fair knowledge about epistaxis control. Most of them were aware of changing the head position; almost (80.1%) of the teachers will try to stop bleeding by applying pressure on the nose and about one third of them will do it on the lower part of the nose, while 17% of the teachers reported that they will use other methods where most of them reported that they will seek health care or call for emergency assistance.

Conclusion: Sixty-three percent of the teachers have fair knowledge regarding the control of epistaxis, especially those who have had previous experience with it. However, more attention should be paid to improve the awareness regarding epistaxis management in the area through health training and educational sessions.

Key words: Teachers, awareness, first-aid, epistaxis, schools, Taif

Introduction

Epistaxis is defined as bleeding from the nose or nasopharynx. It is one of the commonest ENT emergencies faced in the emergency departments in the world (1). Knowledge of first aid is important for everyone, therefore teaching it is mandatory, especially in schools. The best way to deal with an emergency is as soon as possible. As a result, having a strong foundation in first-aid skills and practices could save a student's life (2).

Most of the time, the causes of epistaxis are unknown and can be divided into two categories: local causes involving the nose, paranasal sinuses, and the nasopharynx, and systemic causes (i.e., hypertension, blood dyscrasias, and use of anticoagulant medications) (3). In the pediatric population, trauma is the most common cause of epistaxis (4).

About 66% of the population suffer from epistaxis during their life. More than half of children aged 6 to 10 years had at least one episode of epistaxis (2). It doesn't only impact hemodynamic stability; it can cause their parents great anxiety (5). Epistaxis typically stops spontaneously or can be controlled conservatively at home with measures like application of direct pressure to the septal area, tilting the head forward and putting cold water on the face. However, some cases can be extremely serious and life-threatening (5), requiring active intervention and hospitalization. Since the prevalence of epistaxis is high, but poorly understood, first-aid measures with sufficient expertise are needed for the management of acute epistaxis in the absence of hospital facilities (4,6).

In the Kingdom of Saudi Arabia (KSA), a study was done in 2018 to assess teachers' awareness regarding emergency management of epistaxis inside the School in Alahssa region. According to the report, 54 percent of teachers obtained information about how to control nose bleeding and 67 percent of students had previously experienced epistaxis. 15% said they would not attempt to stop the bleeding, 25% said they would apply pressure on the cartilaginous region of the nose, and 57% knew they should lean their head forward (1).

Another study was done in 2019 in Riyadh city, KSA and found that approximately one-third of 1,073 teachers had good knowledge of epistaxis management and about 68.1% of the teachers had experienced at least one case of epistaxis in their schools. However, the site and duration of nasal pressure awareness were poor, Nose pressure as a method to control of epistaxis was recorded by 76.5%, 23% mentioned the lower part as the area for pressure, while 12.8% told about pressing for 6–10 minutes (4).

There was another study done in 2019 in Jeddah (7), The study included 706 individuals, The knowledge scores obtained in this study were a good score of 57.5% and an excellent score of 3.5%. Most participants selected that a first-aid course would be the best source of information to increase their awareness regarding epistaxis, as reported in other studies (8).

Another research, including 540 participants, was done in Tabuk (9). The findings showed that in Saudi Arabia, a high percentage of the participants suffered from epistaxis. There was also a clear understanding of the causes of epistaxis and how to manage epistaxis occurrences. Epistaxis prevalence was found in 45.2% of the participants. In the majority of cases, 89.6% said that first aid measures are necessary, and 85.9% said that public knowledge about epistaxis first aid measures is insufficient (9).

During the year 2021, a study was performed in the Hail area to assess male school teachers' awareness, attitude, and practice of first aid. According to the report, 90.9 percent of teachers were aware of first aid, 58.28% had not received first aid training, and 87.9% needed to learn first aid concepts. Age, sex, and marital status all had a major effect on first-aid awareness (10).

Knowledge of first aid and basic life support is important for everyone, therefore teaching them should be mandatory especially in schools (11). As schools do not typically have trained health care suppliers on site, it is important for teachers to be trained in first aid and need to be updated periodically in their skills and information (12). Early on is the safest time to deal with an emergency. As a result, having a strong foundation in first-aid skills and knowledge could save a student's life (2).

There has been no study done in Taif City and thus our study was undertaken to assess the awareness regarding practices of first aid and epistaxis among school teachers in Taif city, Saudi Arabia.

Methods

Study design and time frame: a cross sectional study was conducted to assess awareness regarding first-aid management and control of epistaxis among teachers inside schools at Taif city, KSA in September 2020 to April 2021.

Study participants: teachers in Taif city, KSA. The study included school teachers of both sexes, all ages and all nationalities, where those who were not working in Taif city were excluded.

Sample size: the study sample was 377 participants calculated by the Raosoft calculator and selected randomly.

To collect data, an online survey with a pre-designed questionnaire was used as the study instrument. The questionnaire included items to collect demographic data and evaluation of the teachers' knowledge about control of epistaxis inside schools. The questionnaire included ten questions that assessed participants' previous information about first aid to stop nose bleeding or epistaxis and their knowledge about epistaxis control. For every right answer a score of "1" was given and for a wrong answer a score of "0" was given leaving a total score of 10. Participants

who got < 50% of the total score were classified as having poor knowledge, those who had 50-75% of the total score were classified as having fair knowledge and those who got > 75% of the total score were classified as having good knowledge.

Ethical considerations: all participants were informed about the aim of the study, and online consent was obtained from every participant.

The results were analyzed using SPSS statistical software version 25 (IBM SPSS Statistics for Windows, Version 21.0). IBM Corp., Armonk, NY.). The Chi-squared test ($\chi 2$) was used to test the relationship between variables and qualitative data was expressed as frequencies and percentages. The mean and standard deviation (Mean ± SD) were used to represent quantitative data. A significance level was set at a p- value of < 0.05.

Results

Table 1 shows that 49.1% of the participants had an age that ranged from 36-45 years, 66.8% were male and 99.7% had Saudi nationality. Most of the participants (95.2%) were working in governmental schools, 39.8% were working in primary schools and 55.7% had a scientific specialty.

Figure 1 shows that 66.6% of the participants had students or school staff who had suffered nose bleeding or epistaxis. Figure 2 shows that 56% of teachers reported receiving previous information about first aid to stop nose bleeding or epistaxis.

Table 2 shows that most of studied teachers answered correctly that: if they experience bleeding, they will try to stop bleeding by applying pressure on the nose (80.1%), they will apply pressure on the lower part of the nose (29.1%), 10.1% reported that they will press for 6-10 minutes and 61.3% reported that they will not try to fill the nose with a tissue or gauze. Of studied teachers, 81.9% answered correctly that they will try to stop bleeding by changing the head position, 49.9% reported that they will change the head position by tilling it forward and 57.8% reported that they will try to put ice on the head or the nose. Only 17% of the teachers reported that they will try other methods where most of them reported that they will seek health care or call the emergency services. About 32% (32.6%) of them reported correctly that they will go to the emergency centre if bleeding lasts more than 30 minutes.

The mean knowledge score was 5.39 ± 1.37. Figure 3 shows that the percentage of poor, fair and good knowledge about epistaxis control among teachers was 28.9%, 63.7% and 7.4% respectively.

Figures 4 and 5 show that male teachers have better knowledge than female teachers about controlling epistaxis and most of those who had fair to good knowledge about control of epistaxis received previous information.

Table 3 shows that a non-significant relationship was found between teachers' age, nationality, school type, teaching level and specialty and their knowledge level about epistaxis control (p=> 0.05).

Figure 1. Percentage distribution of teachers according to having any student or school staff ever suffered a nose bleeding or epistaxis

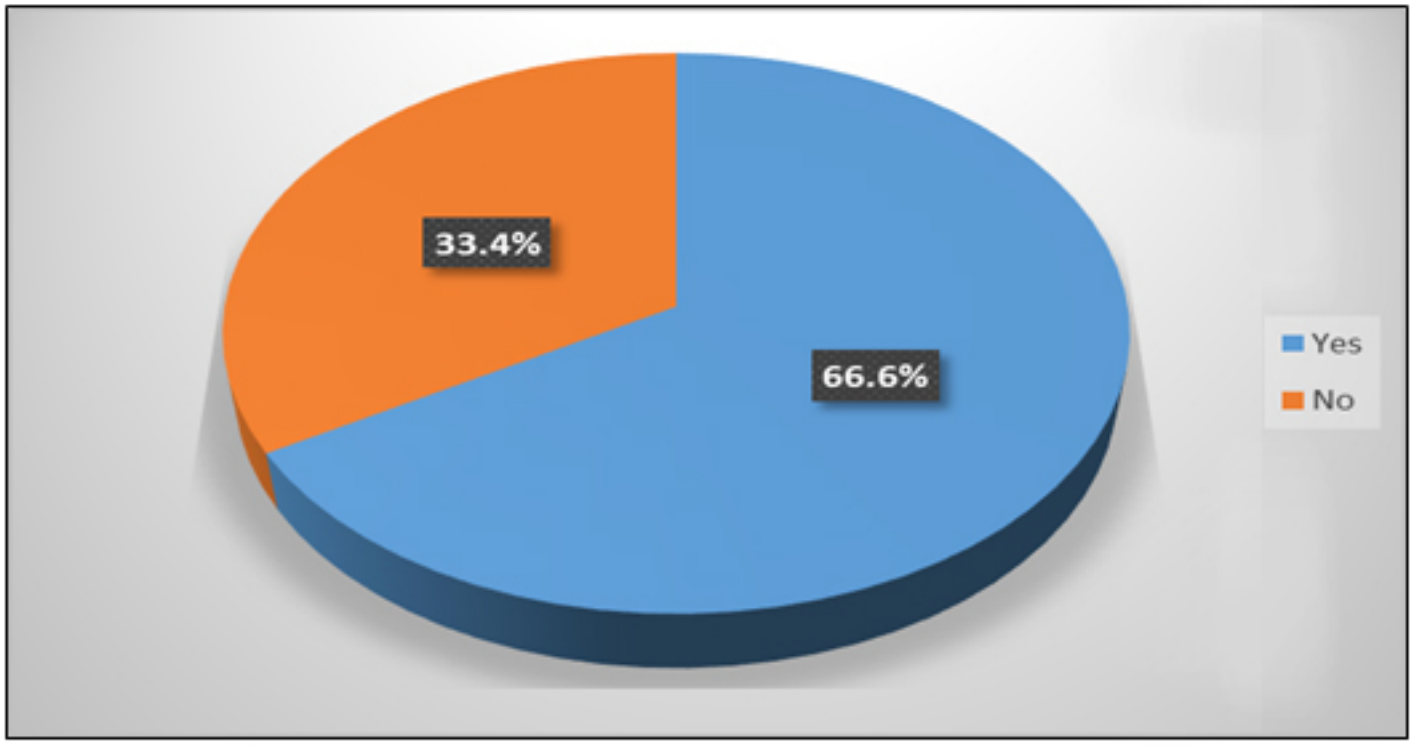


Table 1. Distribution of studied teachers according to their age, nationality, school type, teaching level and specialty (No. 377)

Variable	No. (%)
Age	
Under 25	22 (5.8)
26 - 35	47 (12.5)
36 - 45	185 (49.1)
Above 46	123 (32.6)
Gender	
Male	252 (66.8)
Female	125 (33.2)
Nationality	
Saudi	376 (99.7)
Non-Saudi	1 (0.3)
School type	
Governmental	359 (95.2)
Special	18 (4.8)
Teaching level	
Kindergarten	20 (5.3)
Primary school	150 (39.8)
Intermediate school	73 (19.4)
Secondary school	134 (35.5)
Teacher specialty	
Scientific	210 (55.7)
Literature	167 (44.3)

Figure 2. Percentage distribution of teachers according to receiving previous information about first aid to stop nose bleeding or epistaxis

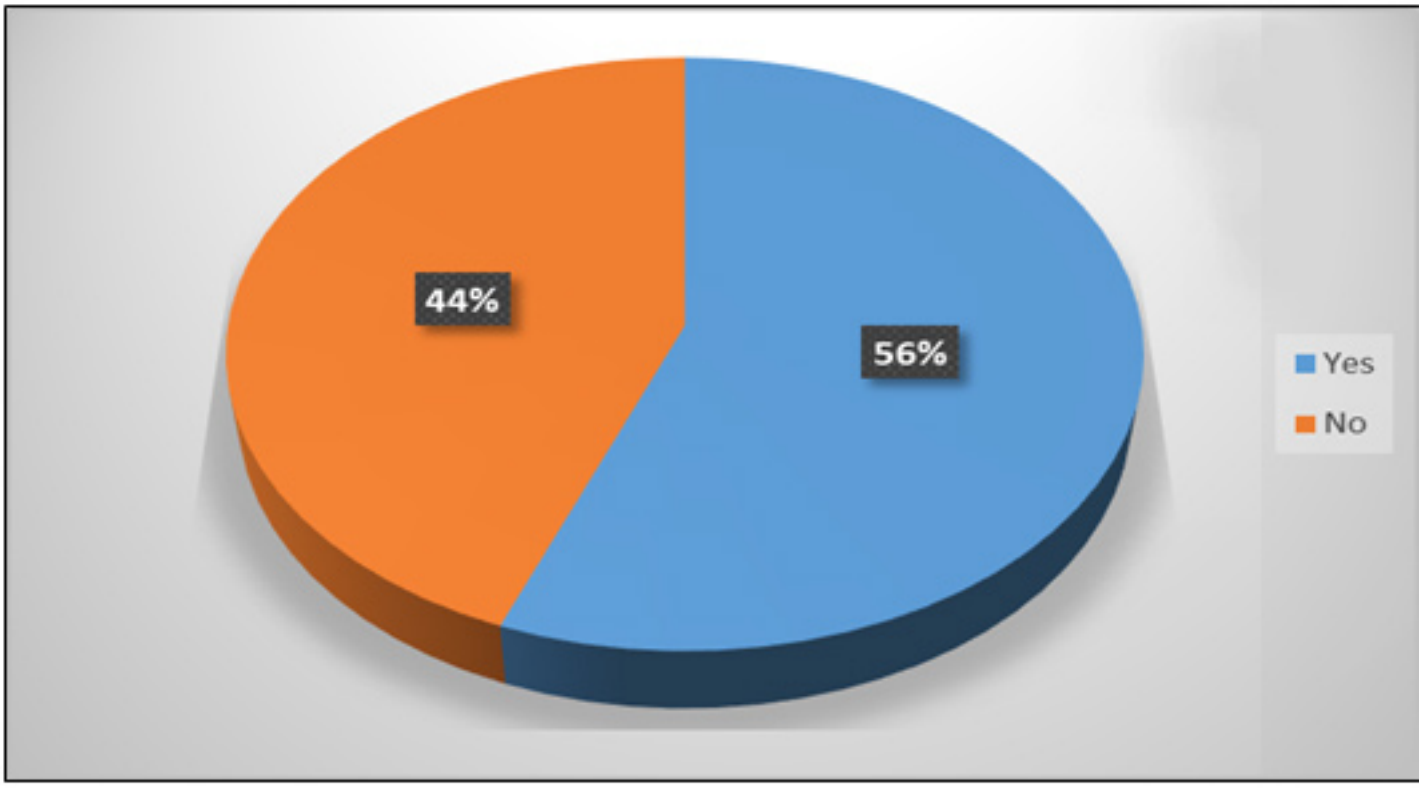


Table 2. Distribution of studied teachers according to their knowledge about epistaxis control (No. 377)

Variable	No. (%)
If you experience bleeding, will you try to stop bleeding by applying pressure on the nose?	
Yes (correct answer)	302 (80.1)
No	75 (19.9)
If yes, where exactly is the pressure?	
Upper part of the nose	214 (70.9)
Lower part of the nose (correct answer)	88 (29.1)
For how long will you press the nose?	
Less than 2 minutes	171 (45.4)
2 - 5 minutes	154 (40.8)
6 - 10 minutes (correct answer)	38 (10.1)
11 - 20 minutes	9 (2.4)
More than 20 minutes.	5 (1.3)
Will you try to fill the nose with a tissue or gauze?	
Yes	146 (38.7)
No (correct answer)	231 (61.3)
Will you try to stop bleeding by changing the head position?	
Yes (correct answer)	320 (84.9)
No	57 (15.1)
How do you change the head position?	
Tilt it forward (correct answer)	188 (49.9)
Tilt it backward	189 (50.1)
Will you try to put ice on the head or the nose?	
Yes (correct answer)	218(57.8)
No	159 (42.2)
Will you use other methods?	
Yes	64 (17)
No (correct answer)	313 (83)
If yes, what are these methods:	
Seek health care or call the emergency	23 (6.1)
Herbal medicine	1 (0.3)
Inhale cold water	11 (2.9)
Wash the nose with cold water	5 (1.3)
Washing the head with cold water	14 (3.7)
Fill the nostril with cotton	3 (0.8)
Sit in a chair with your back straight and your head elevated	2 (0.5)
Smell perfume	3 (0.8)
Sleeping on the back	2 (0.5)
When do you think you should go to the emergency?	
I do not think it needs an emergency visit	29 (7.7)
If the bleeding lasts more than 10 minutes	166 (44)
If the bleeding lasts more than 30 minutes (correct answer)	123 (32.6)
If the bleeding lasts more than 60 minutes	23 (6.1)
I don't know	36 (9.5)

Figure 3. Percentage distribution of teachers according to their knowledge level about epistaxis control

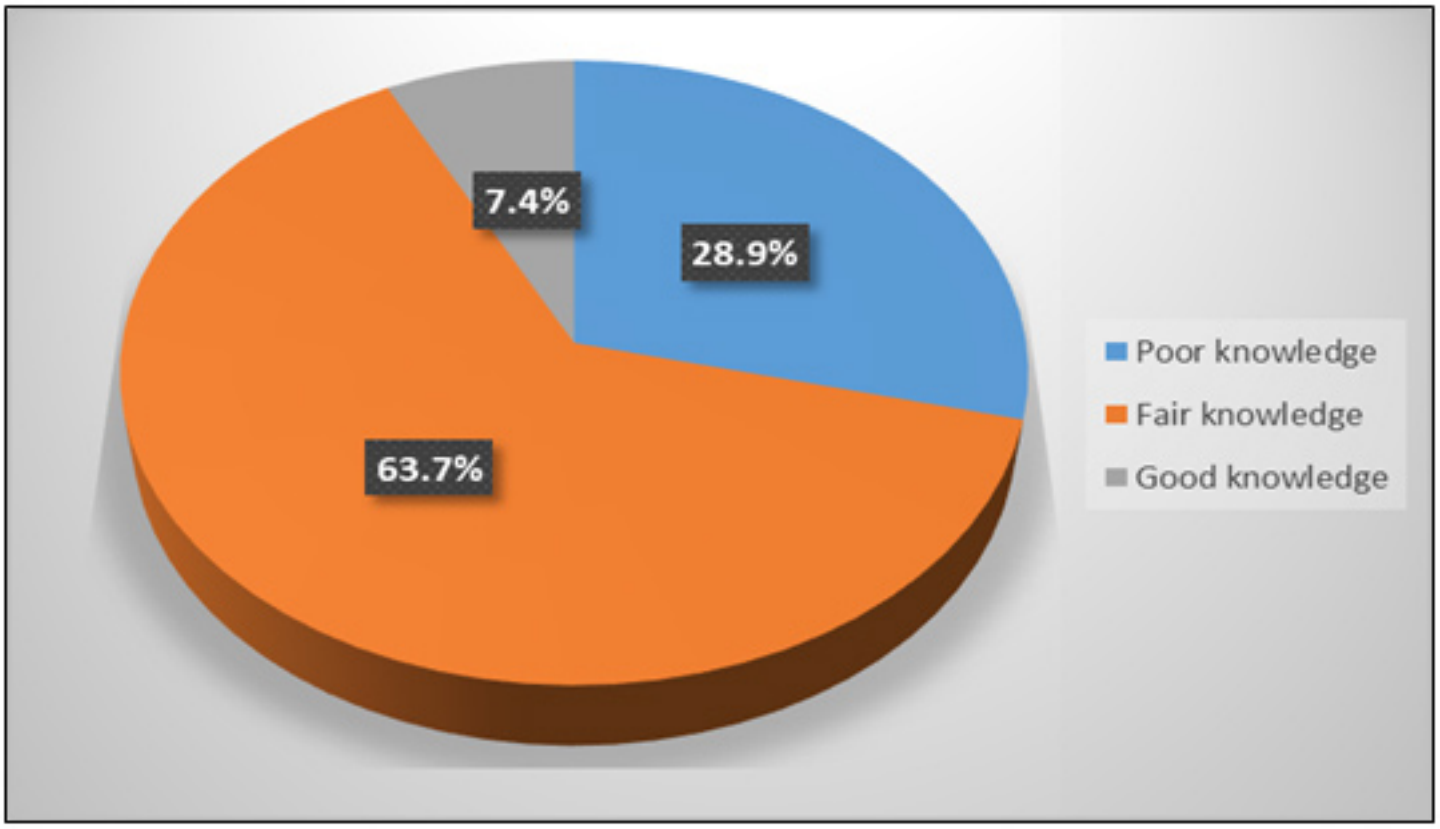
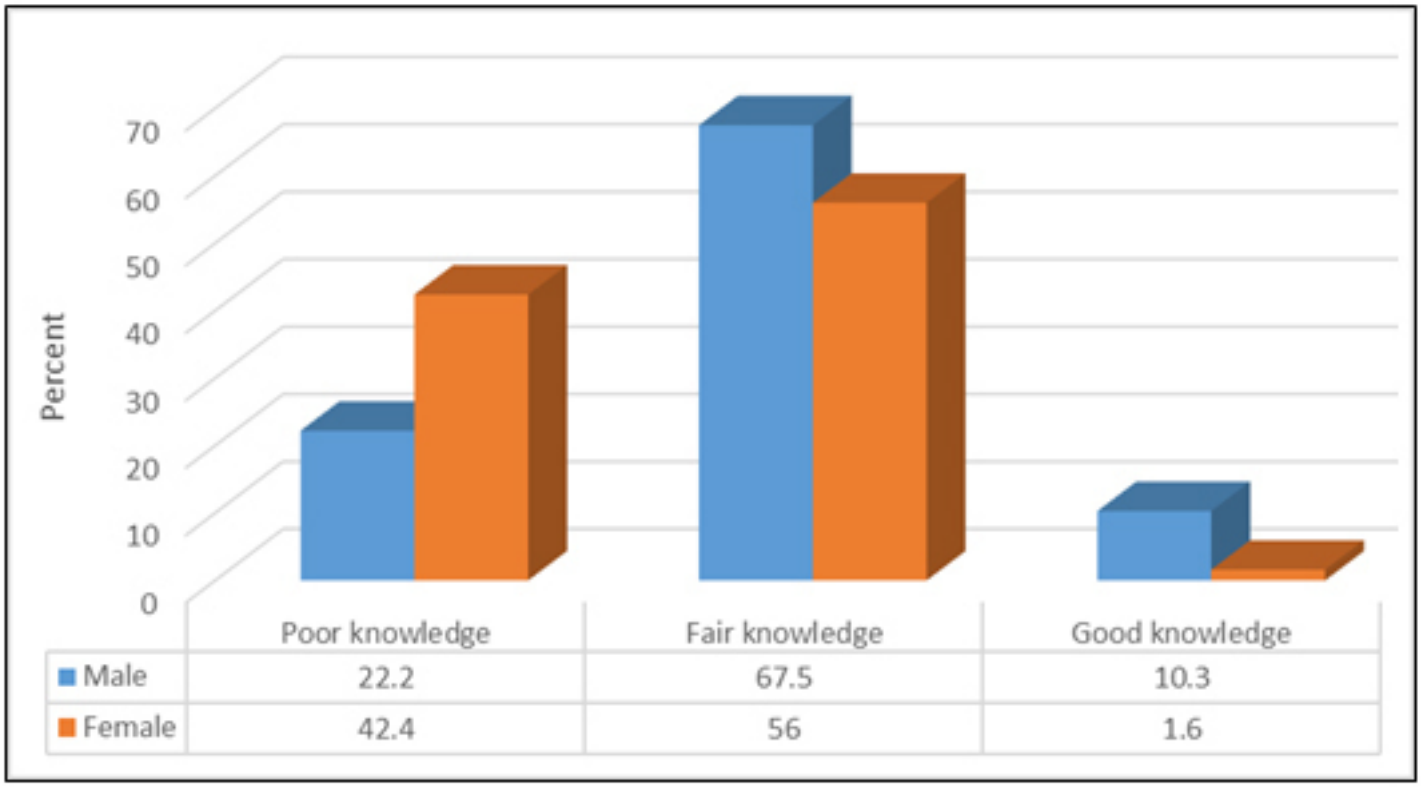
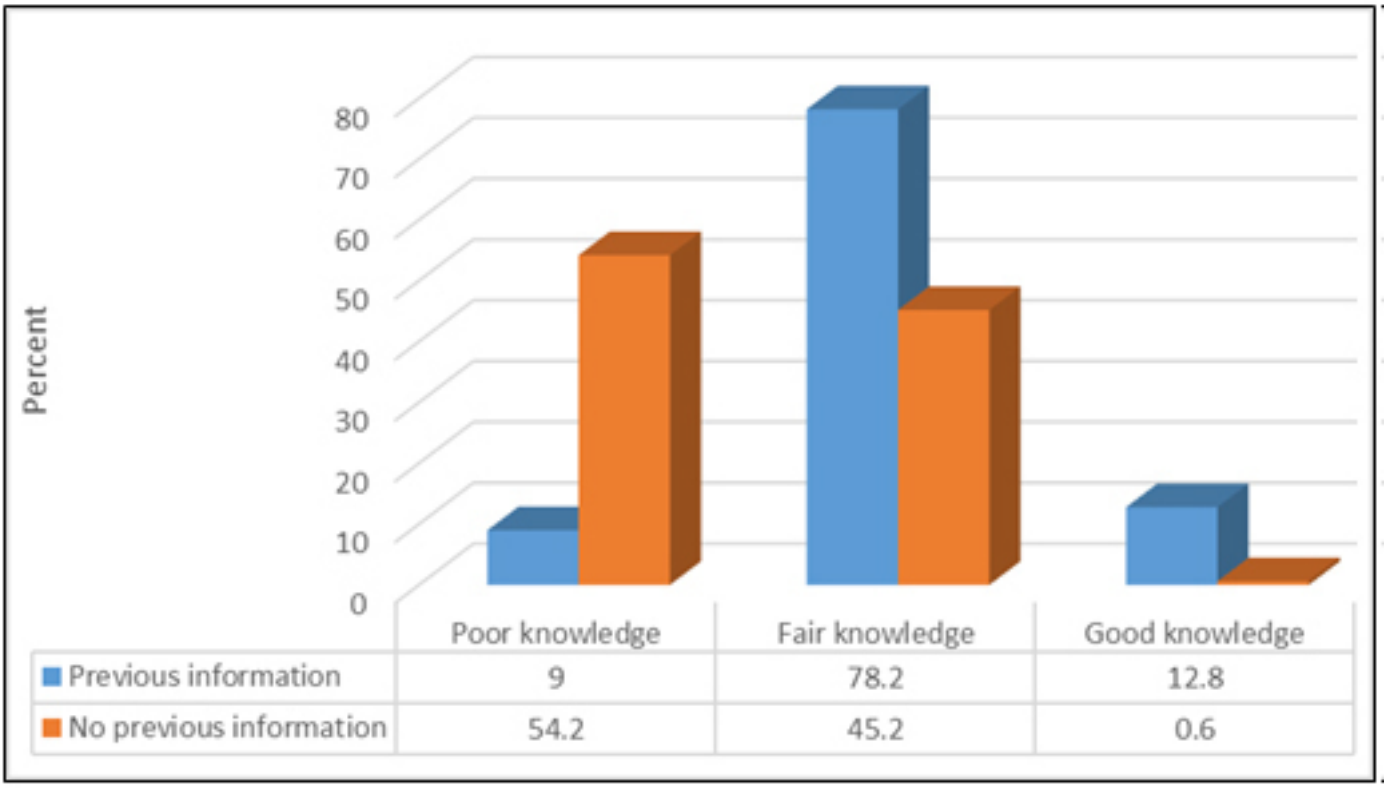


Figure 4. Relationship between teachers' knowledge level about epistaxis control and their gender



N.B.: ($\chi 2$= 22.03, p-value = < 0.001)

Figure 5. Relationship between teachers' knowledge level about epistaxis control and receiving previous information



N.B.: ($\chi 2$= 100.19, p-value = < 0.001)

Table 3. Distribution of studied teachers according to their characteristics (No. 377)

Variable	Knowledge level			$\chi 2$	p-value
	Poor No. (%)	Fair No. (%)	Good No. (%)		
Age					
Under 25	8 (36.4)	12 (54.5)	2 (9.1)	3.93	0.686
26 - 35	17 (36.2)	26 (55.3)	4 (5.5)		
36 - 45	53 (28.6)	121 (65.4)	11 (5.9)		
Above 46	31 (25.2)	81 (65.9)	11 (8.9)		
Nationality					
Saudi	109 (29)	239 (63.6)	28 (7.4)	0.57	0.751
Non-Saudi	0 (0.0)	1 (100)	0 (0.0)		
School type					
Governmental	104 (29)	227 (63.2)	28 (7.3)	1.63	0.443
Special	5 (27.8)	13 (72.2)	0 (0.0)1		
Teaching level					
Kindergarten	3 (15)	15 (75)	2 (10)	10.38	0.109
Primary school	36 (24)	104 (69.3)	10 (6.7)		
Intermediate school	20 (27.4)	49n (67.1)	4 (5.5)		
Secondary school	50 (37.3)	72 (53.7)	12 (9)		
Teacher specialty					
Scientific	58 (27.6)	139 (66.2)	13 (6.2)	1.72	0.422
Literature	51 (30.5)	101 (60.5)	15 (9)		

Discussion

The current research examined teachers' knowledge of first-aid management and epistaxis regulation in the classroom. Most of the participants are teachers in Taif schools with age ranging from 36 to 45 years.

Results of the present study showed that the majority of teachers had fair awareness regarding epistaxis and the measures for its management. The highest level of awareness was about the importance of changing the head position, putting ice on the nose and not filling the nose with a tissue or gauze.

Teachers' awareness was poor regarding the correct site and duration of nasal compression. This low awareness was recorded irrespective of the fact that the majority of the teachers claimed that they had information regarding epistaxis first aid.

In addition, teachers' awareness was relatively better among those who claimed that they had received information regarding epistaxis management and first aid.

In our research we found that epistaxis was a common accident that occurs in schools as 66.6% of the participants had students or school staff who had suffered from epistaxis. This result agrees with that revealed from a previous study done in Saudi Arabia which found that 67% of teachers had students who had experienced epistaxis before (1). In this study, epistaxis was the most common disorder due to sports or playing (1).

In this work, it was found that the mean knowledge score about epistaxis control among teachers was 5.39 ± 1.37 and most of them had fair knowledge. The percentage of poor, fair and good knowledge about epistaxis control were 28.9%, 63.7% and 7.4% respectively. A previous study done in India found that 39.7% of teachers had poor knowledge about Epistaxis (13).

The present study illustrated that teachers who had previous knowledge about epistaxis had a significantly higher level of those who had good knowledge about epistaxis control. In comparison with a study done in Ethiopia, good knowledge towards first aid was significantly related to the training and experience due to exposure to children who need first aid epistaxis control (14). Another research conducted in Saudi Arabia found no substantial relationship between educational level and awareness of the causes and control of epistaxis cases (9).

Limitations

The small sample size of this study was one of its limitations; another limitation was that these findings were limited to one region, making them unrepresentative of the entire Saudi population and the limited time of the study is another limitation.

Conclusion

Teachers' awareness regarding first-aid management and control of epistaxis inside the schools in Taif was fair. However more attention should be paid to improve students and teacher's awareness regarding first aid management of epistaxis. Improving health education about first aid management and control of epistaxis is an important step towards avoiding the complications. Further media efforts are needed to raise awareness of first aid management and control of epistaxis among the population. This includes providing free first aid courses for teachers and students inside schools.

Acknowledgement

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Relationship between Socioeconomic Status and Parental Feeding Practices for Children 3-5 years old

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Abstract

Introduction: Parental feeding practices have an integral role on children's dietary intake, and thus on their long-term health outcomes. Research examining the relationship between socioeconomic status (SES) and these practices is still limited and remains inconclusive.

Aim of the study: Exploring the relationship between the SES and the parental feeding practices will identify target groups who may benefit from interventions aimed at modifying unhelpful parental feeding practices.

Methodology: This was a cross-sectional study done over 1 year. Participants were recruited from Clinical Nutrition Clinics at AbouElrish children hospital, Cairo University. A total of 712 eligible parents of children aged 3-5 years were asked to fill in El-Gilany socio-economic status (SES) scale and the Arabic version of the child feeding practices questionnaire (CFPQ), then the individual domains and the total scores were calculated.

Results: The mean children's age was 3.75±1.73. Low social class represented 69.9% of the sample. The most common feeding practice adopted by the parents was encourage balance and variety (Mean ± SD 17.63 ± 2.88) while the least used feeding practice was emotional regulation (Mean ± SD 5.26 ± 3.36). There was statistical significance between the three levels of social classes and the following feeding practices: child control (P=0.002), encourage balance and variety (P= 0.004), restriction for weight (P= 0.005) and teaching nutrition (P <0.001).

Conclusion: The parental feeding practices are changing according to the SES. These practices can be promoted to improve dietary choices and prevent nutritional problems in children.

Key words: SES, parental feeding practices, preschool children

Introduction

Developing a child's ability to make healthy dietary choices is vital for their growth and development, maintaining a healthy weight trajectory and preventing the development of chronic disorders. Children feeding practices are affected by a myriad of factors including biological, environmental and social factors (1). One set of factors that have an integral impact on children's dietary intake and choices is parental feeding practices. These are content-specific, goal-directed actions adopted by parents to control or modify their child's dietary intake (the 'how, what and when') (2).

Parental feeding practices are categorized into three senior-level models: coercive control, structure, and autonomy support. 'Coercive control' includes a set of behaviors used by parents to exert intrusive pressure over their child's will. These include practices such as restriction, pressure, warnings or incentives, and using food to manage the child's negative emotions (3&4). These behaviors are usually parent-centered and impair the child's ability to self-regulate their dietary intake (5)5). In contrast, 'structure' is a form of non-coercive parental control which includes parental enforcement of rules and limits, and the organization of the home environment to facilitate or limit a child's specific eating behaviors (6). 'Autonomy support' entails developing the child's sense of autonomy and ability to make informed decisions by providing them with age-appropriate nutrition education, giving them the opportunity to engage in discussions on rules and boundaries, and allowing them to share in the food decision-making process (3). Evidence from both laboratory-based and longitudinal studies supports the negative impact of early parental feeding restrictive practices and pressure to eat practices on children's dietary habits with these children consuming more tasty, high caloric foods than children exposed to less food control (7).

Due to their modifiable nature, parental feeding practices have been interesting and attractive to researchers as well as clinicians as they could act as intervention targets for indirectly modifying children's eating behavior (5). However, to tailor these interventions to those who need them the most, we need to identify families at higher risk of endorsing the less helpful parental feeding practices. Interestingly, research examining the relation between socioeconomic status (SES) and parental feeding practices is still limited and remains inconclusive, with most of these studies focusing on the role of parental education (8,9,10). Determining the association between SES and parental feeding practices is essential in identifying target populations for interventions aimed at enhancing children feeding practices.

Aim of the study: The study aimed to probe the association between the adopted parental feeding practices for children aged 3-5 years and their socioeconomic status.

Study design & setting: This was a cross-sectional study conducted over 1 year. Participants were recruited from the Clinical Nutrition Clinics at AbouElrish children hospital which although being in an urban area, serves for mothers coming from rural areas as well.

Study subjects: All the mothers of children 3-5 years old, attending AbouElrish Clinical Nutrition clinics willing to share in the study and not having any of the exclusion criteria were approached. Children with chronic or congenital diseases and mothers with mental or psychiatric diseases were excluded.

Sample size calculation: The sample size was calculated using Epi sample size calculator, under α error of 5% and at least a power of 80%, considering a workload of three days per week and on average 25 patients visiting the clinics per day, over a period of 1 year. Based on previous reported findings where 50% (with ± 5 % precision) of the preschool children don't meet the healthy eating practices and dietary recommendation (11) and after adding 15% for the potential non response, the minimal sample size of 712 mother-child pairs were included to achieve the study objectives. Mothers were selected using a systematic random technique along the working days of the week.

Data Collection Tools: Two structured anonymous questionnaires were used to obtain the data from the clinic's attendees.

1. El-Gilany et al. (2012) Socio-Economic Status (SES) scale (12):
This scale was used to assess participants' SES. The scale includes 7 domains (education and cultural, family, economic, occupational, family possessions, home sanitation, and health care domains) with a total score of 84. SES scores were classified into 3 subsets: low (≤ 42), middle (43-63) and high (64-84) levels.
2. The Arabic version (13) of Child Feeding Practices Questionnaire (14):
This questionnaire assesses maternal feeding practices. It consists of 49 questions grouped into 12 subscales that represent 12 different feeding practices. Questions are answered on a five-point scale. The final scores were added for each one of the 12 subscales and means of each subscale were used for comparison and data analysis.
Study field work-up: The actual working period to collect the data was 3 days per week for a period of 12 months, (June 2017 - June 2018), during the working hours of AbouElrish Clinical Nutrition outpatient clinics from (8-2pm), with an average of 7 mothers per day. After taking oral consent from the mothers the content of the questionnaires was explained then the personal interview with the mothers was performed in the waiting area of the clinic for 15 to 20 minutes for completing the questionnaires.

Data analysis: All completed questionnaires were revised. Coded data was entered using the Microsoft Office Excel Program for Windows. All statistical calculations were done using computer program statistical package of social science software program, SPSS version 21. Data

were statistically described in terms of mean ± standard deviation (± SD), minimum and maximum for quantitative variables. Number and percent for qualitative variables. Comparison between quantitative variables with more than two categories was done using nonparametric Kruskal-Wallis test which were not normally distributed. Comparison between qualitative variables was done using chi-square test. P value less than 0.05 was considered of statistical significance.

Ethical consideration

The study protocol was revised and approved by the members of the Family Medicine department at Kasr-Alainy Cairo University and approved by the research committee of the faculty. The approval for using the questionnaires was obtained from the authors via E-mail. Approval of the Head of AbouElrish Pediatric Nutrition Clinics was also obtained. A detailed consent was obtained from all the mothers before participation in the study according to Helsinki declarations of biomedical ethics. The participating mothers were reassured about the strict confidentiality of their data and that the study results would be used only for research purposes.

Results

The current study revealed that most of the parents are trying to make healthy balanced food intake at home. The mean age of the participating children was 3.75 ± 1.73 ranging from 2 to 14 years while, the mean mother's age was 28.90 ± 5.55 ranging from 20 to 52 years.

As represented in Table 1 most of the children were females 370 (52%). First or second order children represented 502 (70.5%) of the studied sample. Around 88% of mothers and 84% of fathers received education less than university. Of the participating mothers 623 (87.5%) were not working while, 709 (99.6%) of the fathers were working. Almost half of the studied participants 332 (46.6%) were of urban slum residence. Low social class represented 498 (69.9%) of the sample.

Table 2 represents the mean (SD) of all CFPQ domains. According to the results; the most common feeding practice adopted by the parents was Encourage balance and variety with mean (SD) 17.63 ± 2.88 where most of the participants (67.1%) encouraged healthy eating, 57.6% encouraged their child to try new foods, 61.5% encouraged to eat a variety of foods and 66.2% tell their child that healthy food tastes good.

The second most common feeding practice was Modeling with mean (SD) 15.97 ± 5.77 which means that parents eat healthy foods for the child's sake. More than half of parents (65.6%) agreed to model healthy eating for the child by eating healthy foods themselves, 59% of parents tried to eat healthy foods in front of their child even if they are not their favorite, 68% tried to show enthusiasm about eating healthy foods and 66.4% showed their child how much they enjoy eating healthy foods.

The third common adopted feeding practice was Environment with mean (SD) 15.93 ± 3.79 which means that parents make their homes healthy foods friendly. 64.5% agreed to keep healthy food in the house, 57.9% of parents kept different healthy foods available to the child at each served meal at home and 57% agreed to keep a lot of snack food and sweets in the house.

The least used feeding practice was emotional regulation with mean (SD) 5.26 ± 3.36 which means that parents use food to improve the child's emotional states. Most of the parents stated that they never offered the fussy (60.3%), bored (67.1%) and upset (67.3%) child something to eat or drink if they think s/he is not hungry.

Pressure, Restriction for health and Teaching nutrition practices were nearly used at a similar rate with mean (SD) 12.15 ± 5.21, 12.42 ± 4.26 and 12.14 ± 4.01 respectively. Pressure as a feeding practice, describes parents who pressure the child to eat more food. 28.4% disagree that the child should always finish his/her plate, 39.5% disagree to try to get the child to eat whether the child is hungry or not, 35.4% agree to try to get child to eat more and 39.9 % agree to try to get child to eat one more bite of food when he/she says he/she is finished eating. Restriction for health describes parents who decide the child's food intake for limiting unhealthy foods and sweets. 38.9%, 31.9% and 64.5% of parents disagree that they have to be sure that their child does not eat too much of his/her favorite foods, too many sweets and too many high-fat foods respectively.

With regards to teaching nutrition practice, most parents agreed to share information with their children about the importance of healthy foods (64.9%) and the nutritional value of foods (64.5%) while 61% of parents told children what to eat and what not to eat without explanation.

As demonstrated in Table 3, there were highly statistically significant differences (p-value=0.002) regarding child control and the three levels of social classes with the highest score reported in the low social class which means that they give their children whatever they want. There were highly statistically significant differences regarding Encourage balance (p-value=0.004) between the three levels of social classes with the highest score reported in the low social class which can be explained by that high social parent may encourage well-balanced food intake, with the variety of healthy food choices. There were highly statistically significant differences regarding restriction of weight (p-value=0.005) and the three levels of social classes with the highest score reported in the high social class which means that parents decide the child's food intake for decreasing or maintaining the child's weight. There were highly statistically significant differences regarding teaching nutrition and social level as p-value<0.001. There was no significant relation between the socioeconomic status and Emotion regulation, Environment, Food reward, Involvement, Modeling, Monitoring, Pressure and Restriction health.

Table 1: Sociodemographic data of the studied group

Characteristic	Category	Study group (n=712)	
		No.	%
Gender	Male	342	48
	Female	370	52
Child order	First	285	40
	Second	217	30.5
	Third	127	17.8
	Fourth or more	83	11.6
Mother's Education	Illiterate	113	15.9
	Read and write	39	5.5
	Any level of education	475	66.7
	University/Post graduate	85	11.9
Father's Education	Illiterate	93	13
	Read and write	55	7.7
	Any level of education	452	63.5
	University/Post graduate	112	15.7
Mother's Occupation	Not working	623	87.5
	Manual worker	31	4.3
	Professional	58	8.1
Father's Occupation	Not working	3	0.4
	Manual worker	428	60.1
	Professional	281	39.4
Residence	Urban slum	332	46.6
	Rural	162	22.8
	Urban	218	30.6
No of earning family members	0 member	1	0.1
	One member	628	88.2
	Two	77	10.8
	More than three	6	0.8
Socioeconomic status score (SES)	Low	498	69.9
	Medium	28.9	28.9
	High	8	1.1

Table 2: Mean & Standard deviation of the CFPQ domains

CFPQ domains	(Mean ± SD)	Minimum	Maximum
Child control	14.65 ± 3.39	5	20
Emotion regulation	5.26 ± 3.36	3	15
Encourage balance	17.63 ± 2.88	4	20
Environment	15.93 ± 3.79	4	20
Food reward	9.17 ± 4.15	3	15
Involvement	10.19 ± 4.28	3	15
Modeling	15.97 ± 5.77	4	20
Monitoring	11.42 ± 4.86	4	20
Pressure	12.15 ± 5.21	4	20
Restriction health	12.42 ± 4.26	4	20
Restriction weight	13.41 ± 8.85	3	15
Teaching nutrition	12.14 ± 4.01	3	15

Table 3: Relation between Comprehensive Feeding Practices Questionnaire and the Socioeconomic Status

Variables	Low (n=498) (Mean±SD) range	Medium (n=206) (Mean±SD) range	High (n=8) (Mean±SD) range	Test f	Test P value	Post Hoc
Child control	14.95±3.45 5-20	13.95±3.17 7-20	14.12±2.23 11-18	6.508	0.002	P1=0.001 P2=0.771 P3=0.989
Emotion regulation	5.37±3.57 3-15	4.93±2.70 3-13	7.25±4.86 3-15	2.695	0.068	P1=0.245 P2=0.261 P3=0.134
Encourage balance	17.41±3.02 4-20	18.18±2.48 4-20	18.13±2.23 15-20	5.480	0.004	P1=0.003 P2=0.762 P3=0.998
Environment	16.04±3.75 4-20	15.63±3.91 5-20	17.25±2.43 13-20	1.365	0.256	P1=0.382 P2=0.644 P3=0.460
Food reward	9.07±4.21 3-15	9.42±4.01 3-15	8.87±3.94 3-13	0.538	0.584	P1=0.566 P2=0.990 P3=0.929
Involvement	9.91±4.36 3-15	10.86±4.04 3-15	11.12±4.64 3-15	3.829	0.022	P1=0.020 P2=0.704 P3=0.984
Modeling	15.98 ±5.73 4-20	16.06±5.78 4-20	14±8.28 4-20	0.489	0.613	P1=0.985 P2=0.602 P3=0.584
Monitoring	11.21±4.85 4-20	11.90±4.85 4-20	12.25±5.23 6-19	1.567	0.209	P1=0.205 P2=0.822 P3=0.979
Pressure	11.95±5.29 4-20	12.74±4.89 4-20	9.5±7.19 4-20	2.752	0.064	P1=0.156 P2=0.384 P3=0.195
Restriction health	12.22±4.26 4-20	12.82±4.20 4-20	14.5±5.01 5-20	2.398	0.092	P1=0.208 P2=0.291 P3=0.518
Restriction weight	12.72±8.13 3-15	15.02±10.18 3-15	15.75±10.75 3-15	5.270	0.005	P1=0.005 P2=0.598 P3=0.971
Teaching nutrition	11.74±4.19 3-15	13.16±3.27 3-15	10.87±5.13 3-15	9.717	0.000	P1=0.000 P2=0.813 P3=0.247

Discussion

Parental feeding patterns and socioeconomic level (SES) are both important predictors of child growth. The family living environment, which includes parental attitudes and feeding patterns, has been proven to have a key influence in determining their eating habits (15).

The current study explored a complete range of feeding practices adopted by the mothers while feeding their children. In terms of frequency of the maternal feeding practices the most commonly used practices were Encourage Balance and Variety in their children's diet (mean (SD) 17.63 ± 2.88) followed by Modeling with mean (SD) 15.97 ± 5.77, while the least commonly used feeding practice was Emotional Regulation (mean (SD) 5.26 ± 3.36). Our results are consistent with a study carried out in Iran that involved 208 mother-child pairs to study the relation between the social factors and the feeding practices used with children from 3- to 6-year-old, Kalantari & Doaei, 2014 (16) found that the most commonly used approaches were creating a healthy environment during feeding, encouragement of balance and variety in diet, role modeling and teaching about nutrition and similarly the least commonly used practice was emotional regulation. What goes against our results in the Iranian study is that about a half of the sample reported using food as a reward and restriction for weight control which were among the least common practices in our study. It is possible that similarities in the feeding practices could be related to the same cultural background while differences could be related to specific maternal or child characteristics associated within the feeding process.

The results of the current study showed a significant relation between some feeding practices with the socioeconomic factors. There was highly statistically significant difference (p-value=0.002) regarding child control and the three levels of social classes with the highest score reported in the low social class. These findings are consistent with a study done by Cardel et al, 2012 (17) who found that, in comparison to children from better socioeconomic backgrounds, controlling child - feeding behaviours were more common in lower socioeconomic households.

There were highly statistically significant differences regarding Encourage balance (p-value=0.004) between the three levels of social classes with the highest score reported in the low social class. This is consistent with Entin et al, 2014 (18) who examined the association between parental feeding practices, diet quality, and weight among low-socioeconomic status pre-school children and found that among the healthy feeding practices, in the low SES, encouraging balance and food variety and modeling were mostly used and were associated with more vegetable eating and better weight.

There were highly statistically significant differences regarding restriction of weight (p-value=0.005) and the three levels of social classes with the highest score reported in the high social class. According to a research conducted by Fisher & Birch in 1999 (19), lower SES is attributed to more restriction and eating pressure. This restriction may decrease a child's ability to self-regulate food intake and limit choices focus on specific meals, leading to overconsumption when the restricted items become freely accessible. Parental food pressure, on the other hand, has been linked to decreased choice and intake of the pressured item, as well as reduced vegetables and fruits intake, fussy eating, and poorer weight in children.

Conclusion

Poor feeding practices in under-five children is a serious public health issue in Egypt. Apart from poverty, there are a number of additional factors that have a direct or indirect impact on children' nutritional condition. The parental feeding practices are changing according to the SES. These practices may be enhanced to improve diet quality and prevent nutritional problems in children.

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Perception, feedback regarding post-surgical complications of tracheostomy

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Abstract

Introduction: The standard treatment for managing long-term ventilator-dependent patients is still tracheostomy. Lower airway resistance, smaller dead space, less tube movement inside the trachea, greater patient comfort, and more effective suction are all benefits over endotracheal intubation.

Methods: In this cross sectional study, data was collected from the purposely constructed questionnaire. The questionnaire was composed of demographical data and questions related to the tracheostomy; ethical approval was obtained, and consent from the respondents was taken, The questionnaire was anonymous and was constructed by the panel of experts including subject specialist, researchers and language specialist.

Results: Out of a total 70 patients who underwent tracheostomy, 35% were male while 65% were females, mean (SD) of age was 48.5 (10.2). Table 1 depicts that 33% have no pain while 26% have mild pain, 20% moderate pain , and 11 (10 %) have severe pain controlled by narcotics and medication respectively. 29% have not noticed any change in their appearance.

Conclusion: We conclude that tracheotomy may be successfully conducted in this group of patients and that it provides significant practical and psychological benefits over other options.

Key words: Tracheostomy, patients, surgery, practical, tube

Introduction

The standard treatment for managing long-term ventilator-dependent patients is still tracheostomy. Lower airway resistance, smaller dead space, less tube movement inside the trachea, greater patient comfort, and more effective suction are all benefits over endotracheal intubation [1, 2]. Despite the debate about when to perform tracheostomy in critically ill patients, prospective studies indicate that early tracheostomy can be beneficial [3]. In the absence of clear evidence based on randomised controlled trials, the decision to place a tracheostomy is taken on the basis of the procedure's advantages versus risks. Tracheostomy has been linked to severe side effects such as tracheal stenosis, bacterial invasion, and fatal hemorrhage [4,5]. Many of the complications and benefits of tracheostomy remain unknown when it comes to morbidly obese patients.

In chronically ill morbidly obese patients, several reports have contrasted the protection and complications of percutaneous tracheostomy to open tracheostomy [6,7]. Increased complications to a similar safety profile have all been reported in these studies.

In intensive care units (ICUs) all over the world, surgical and percutaneous tracheostomy tube placement has become standard procedure. Percutaneous tracheostomy was first identified in 1957, but it gained prominence in the 1990s, leading to the publication of the first blinded randomised trial comparing PCT versus surgical tracheostomy in 1999 [1]. Tracheostomy is generally regarded as a mild operation with few complications [2, 3]. In the United Arab Emirates, however, we found that ICU treatment was provided to patients who were older, less functional, and had more comorbidities than those who had been studied in western studies.

The main Aim of the Study: To find out the Perceptions and obtain feedback regarding post-surgical complications of tracheostomy. The study had some Specific Objectives: One of the goals of this study was to determine tracheostomy complications; to gather feedback regarding the post-surgical complications of tracheostomy; to correlate the findings with gender; to find out the duration of the stay of the patients who underwent tracheostomy surgery.

Tracheostomy has been used for over 2,000 years all over the world. When done with the right indication and with the right surgical technique it can save a person's life. It is a standard treatment for relieving upper airway obstruction, intermittent positive pressure ventilation, and lung toileting these days [3].

The tracheotomy tube being obstructed is a common postoperative complication. It's normally caused by tube impingement on the posterior tracheal wall, partial displacement into the mediastinum, a blood clot, or a mucous plug if it happens within the first 24 hours. Hypoxemia occurs quickly in the morbidly obese patient who is lying supine and partly sedated as a result of diminished expiratory reserve volume.

The main objective is to find the perception and feedback regarding tracheotomy in Aseer region of Saudi Arabia.

Methods

In this cross sectional study, data was collected from the purposely constructed questionnaire. The questionnaire was composed of demographical data and questions related to the tracheostomy. Ethical approval was obtained, consent from the respondents was taken, the questionnaire was anonymous and was constructed by the panel of experts including subject specialist, researchers and language specialist. The questionnaire was composed in both Arabic and English languages. Study duration was Jan-2018 to April-2021. Study was conducted in the Aseer region of Saudi Arabia.

Data was coded and entered in SPSS ver.22 for analysis. Chi-Square test was used to measure the degree of association between variables and descriptive statistics were obtained. P- value less than 0.05 was considered as a significant value.

Results

Out of a total 70 patients underwent to the tracheostomy, 35% were male while 65% were females , mean (SD) of age was 48.5 (10.2). Table 1 depicts that 33% have no pain while 26% have mild pain, 20% moderate pain, 11 and 10 % have severe pain controlled by narcotics and medication respectively. 29% have not noticed any change in their appearance, while 20% have noticed minor changes. 30% have no changes in their exercise routine with 20% doing the same amount of exercise but feel more tired. 30% agreed that tracheostomy may not produce any impact on their neck movement while 20% stated that tracheostomy produced minor impact on their neck movement. 30% have no difficulties in swallowing while 20% have problems occasionally.

Table 2 depicts that when plugging the tube 55% of patients have no difficulties in understanding the procedure, 33% are not feeling anxious when sitting outside because of tracheostomy, 40% and 30% respectively find it not limiting and occasionally limiting their social activities. 29% and 27% respectively believe that people did not notice rarely noticed their tracheostomy.

Table 3 depicts that we did not observe any significant gender differences while comparing Tracheostomy care (P not less than 0.05).

As per Figure 1, 26% have changed their tube after every 6-8 months , while 20% and 20% have changed after 4-6 and 2-4 months respectively

As per Figure 2, 36% are very satisfied with tracheostomy, 7% were very unsatisfied while 21% were indifferent.

Table 1:

Variables	Frequency	Percentage
1. Pain		
I have no pain/discomfort	23	33%
There is mild pain/discomfort not needing medication	18	26%
I have moderate pain/discomfort- requires regular medication (not narcotic)	14	20%
I have severe pain/discomfort controlled only by narcotics	8	11%
I have severe pain/discomfort not controlled by medication	7	10%
2. Appearance		
I have not noticed any change in my appearance	20	29%
The change in my appearance is minor	14	20%
The change in my appearance bothers me, but I have not changed my daily activities because of my appearance	12	17%
I feel significantly disfigured and limit my activities because of my appearance	14	20%
I feel significantly disfigured and can not be with people because of my appearance	10	14%
3. Physical Activity		
1. Exercise tolerance		
There has been no change in my ability to exercise	21	30%
I am able to do the same amount of exercise, but am more tired	14	20%
My exercise tolerance has decreased, but I am still able to do my daily activities	15	21%
I do not have the energy to do my daily activities	14	20%
I am usually in bed or in a chair and house-bound	6	9%
ii. Limitations to moving neck –implications in daily life		
Tracheostomy does not limit my neck movement	21	30%
Tracheostomy limits my neck movement to a minor degree	14	20%
Tracheostomy limits my neck movement, but I am still able to do my daily activities without difficulty	15	21%
Tracheostomy limits my neck movement, and it prevents me from doing some my daily activities	14	20%
I am unable to move my neck because of the tracheostomy	6	9%
Swallowing		
I never have difficulties with swallowing	19	27%
I occasionally have difficulties with swallowing (less than once a week)	14	20%
I often have difficulties with swallowing (1-6 times per week)	12	17%
I have difficulties with swallowing on a daily basis	15	21%
I always have difficulties with swallowing	10	14%

Table 2 : Communication

When plugging my tracheostomy tube:	No.	%
People have no difficulties understanding my speech	38	55%
People occasionally have difficulties understanding my speech	14	20%
People understand my speech half of the time	10	14%
More often than not, people do not understand my speech	7	10%
I am unable to speak	1	1%
I feel anxious when I'm out in a public setting because of my tracheostomy		
Not at all	25	36%
Occasionally	24	34%
Half of the time	7	10%
Often	6	9%
All the time	8	11%
Social activity		
i. Does having a tracheostomy limit your social activity with friends and strangers?		
Not at all	28	40%
Occasionally	21	30%
Half of the time	12	17%
Often	7	10%
All the time	2	3%
ii. Does having a tracheostomy limit your interaction with your family?		
Not at all	28	40%
Occasionally	19	27%
Half of the time	8	11%
Often	8	11%
All the time	7	10%
iii. How easy is it to conceal your tracheostomy?		
People never notice my tracheostomy	20	29%
People rarely notice my tracheostomy	15	21%
People notice my tracheostomy about 50% of the time	15	21%
People almost always notice my tracheostomy	14	20%
People immediately notice my tracheostomy	6	9%

Table 3: Tracheostomy care

Tracheostomy care		
	Male	Female
How much time are you spending daily on tracheostomy care?		
5 minutes or less	21	10
5-15 minutes	15	7
15- 30 minutes	8	4
30 minutes to 1 hour	1	2
more than 1 hour	1	1
P (N.S)		

Figure 1

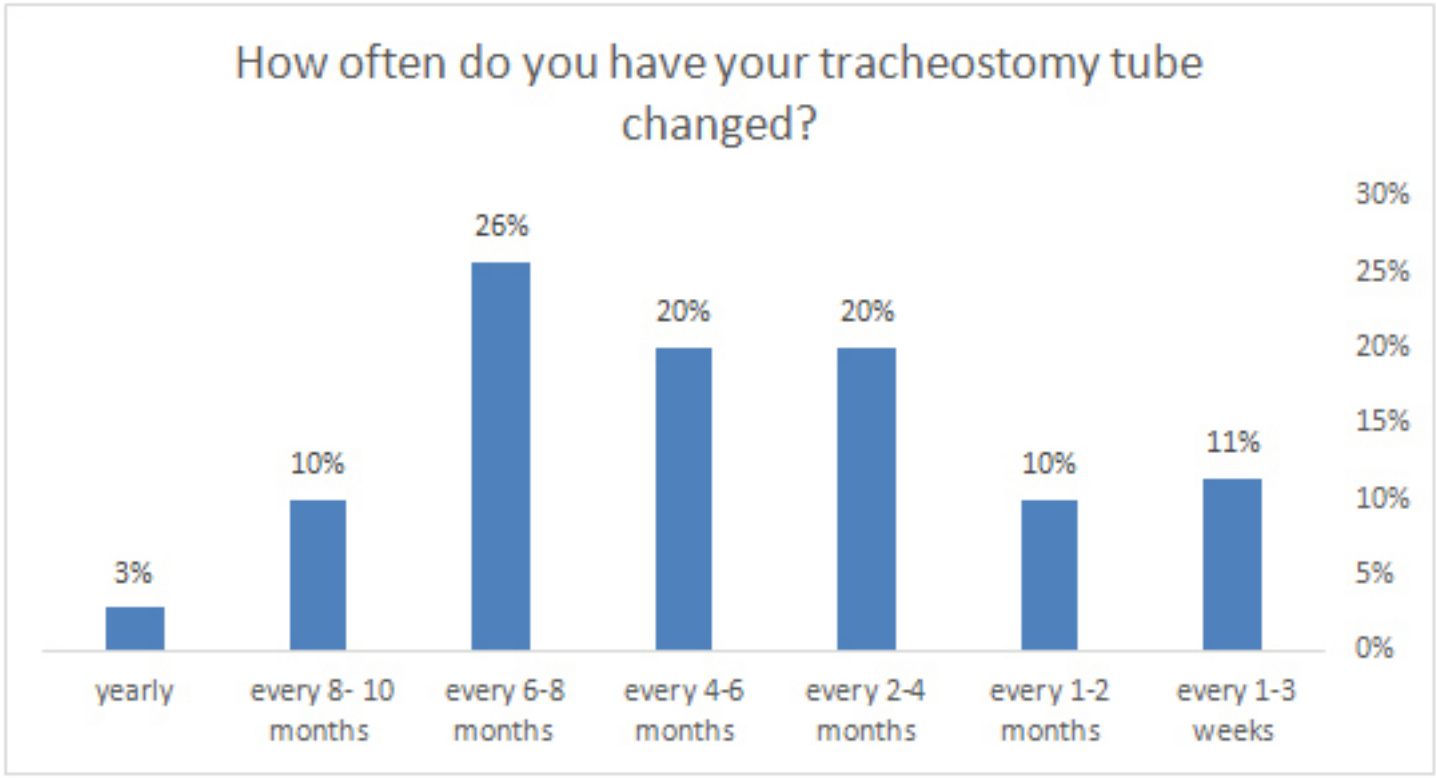
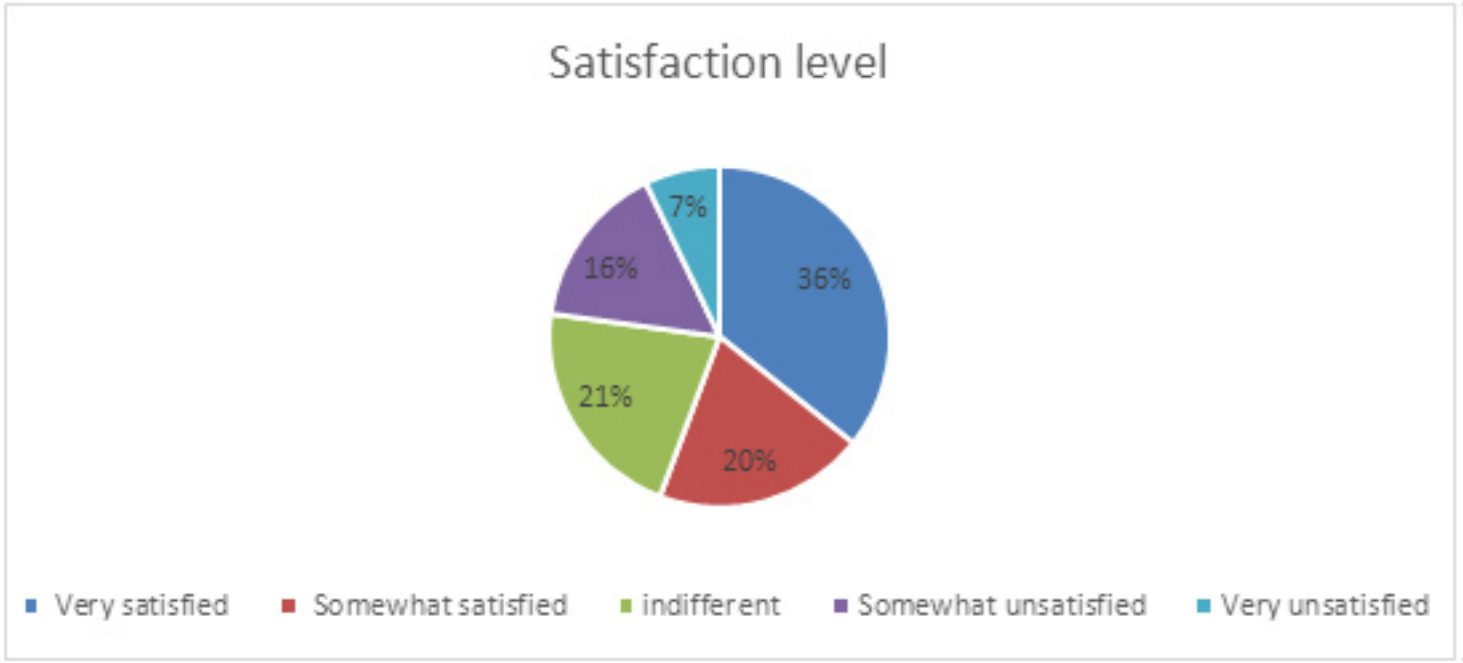


Figure 2



Discussion

Since this technique was first identified, the peri- and postoperative complications associated with surgical tracheostomy have been greatly reduced. However, special anatomic conditions in obese patients make this a difficult technique. In the current research, the prevalence of tracheostomy-related complications was 25% in morbidly obese patients, with a 2% mortality rate. The majority of these complications were minor; however, life-threatening complications were more common than in the comparator community, and were primarily due to the lack of airway accessibility.

Immediate resuscitation is needed to prevent anoxic encephalopathy. As a result, even though mechanical ventilation has been turned off, all morbidly obese patients in our health care facility are monitored in an ICU environment for at least 72 hours. Nonetheless, the risk of developing this complication remains beyond this time period, and the disastrous outcomes experienced by two of the three morbidly obese patients in our sample highlight the importance of close supervision. Despite the fact that the tracheostomy cuff was deflated prior to transfer to the ward in all three situations, the obstruction of the tracheostomy tube is believed to be partly due to the morbidly obese's distorted anatomical neck structure, which may restrict sufficient air entry. When a deflated cuffed Shiley tube is in use, it's possible that the relative narrowing of the cervical tracheal region compared to the non-obese [11-12] retains a tight seal. Submental fat deposition that extends below the sternal notch can obstruct the outer opening of a standard tracheostomy, making oxygenation extremely restricted or nonexistent. To get the chin out of the way, Simmons [13] suggested using an elastic bandage or a Barton bandage. Others also suggested attaching an extension to the outer opening [14]. On all morbidly obese patients with a well-formed tracheostomy tract, we have implemented a strategy of replacing the cuffed Shiley tube with a metal tracheostomy tube. We haven't had any catastrophic obstructive events since the policy was implemented.

Decannulation and reinsertion complications may occur when a tracheal tube is inserted too loosely. The fact that decannulation is correlated with 30% mortality in morbidly obese patients emphasises the seriousness of the situation. Patients that are morbidly obese and have a short, thick neck have so much soft tissue between the trachea and the skin. Blinded reintubation attempts that fail can result in tube misplacement in the pretracheal fascia, resulting in tracheal compression and respiratory arrest. To avoid this complication, some surgeons recommend performing a Björk flap during surgery [15]. In the anterior tracheal wall, between the second and fourth cartilaginous rings, an inverted U-shaped flap is incised. The flap is mirrored downward and outward, with the upper border sutured to the skin, forming a tracheal tissue bridge that directs tube replacement and prevents a false channel [15, 16] from forming. Opponents of this procedure have claimed that tracheal flaps are linked to a higher rate of tracheal stenosis after decannulation [17], but long-term studies have failed to support this claim [18]. Gross and colleagues [19] recommended a cervical lipectomy with tracheostomy as an alternative. There is no research that provides a definitive response as to whether morbidly obese patients would benefit from the implementation of these strategies in reducing the incidence of extratracheal placement. We have followed the use of an uncuffed endotracheal tube of a size that will pass into the internal diameter of the tracheostomy tube before a consensus is reached. The endotracheal tube's beveled tip aids in proper positioning and provides temporary ventilation control. A paediatric laryngoscope is used to examine the wound if the tube insertion is unsuccessful. After determining that there is no obstruction, the tracheostomy tube is advanced over the obturator airway.

One of the oldest procedures for treating airway obstruction is tracheostomy. Tracheostomy is depicted on Egyptian tablets dating back to 3600 BCE [1]. Following the introduction of a safer standardised procedure by Chevalier Jackson in the twentieth century [2], tracheostomy surgery was commonly used to alleviate upper airway obstruction during the polio epidemic. Later, tracheostomies were also recommended for sustained mechanical ventilation, and today, the vast majority of tracheostomies are performed for ventilator-dependent respiratory failure. Patients who need an endotracheal tube for more than 21 days [3] should suggest a tracheostomy, according to the American College of Chest Physicians. Reduced direct laryngeal injury, improved comfort, and improved daily living activities such as mobility, voice, and feeding, as well as shorter intensive care unit (ICU) and in-hospital stays are all advantages of establishing a tracheostomy rather than using an endotracheal tube [4-6].

In the United States, tracheostomies are conducted on an annual basis in excess of 100,000 [3] people. General surgeons and otolaryngologists are the most popular providers of this service. A tracheostomy operation may be performed using a variety of procedures, depending on the surgeon's choice [7]. Immediate complications including bleeding, pneumothorax, pneumomediastinum, airway fire, and posterior tracheal wall perforation with esophageal injury are uncommon, but they do happen and must be treated appropriately [8, 9].

For a number of reasons, a tracheostomy may be done surgically or percutaneously as an emergency or elective treatment. There is insufficient evidence to support one surgical or percutaneous procedure over the other [10-12]. In intensive care unit patients, a percutaneous dilatational tracheostomy is performed. It is a straightforward technique that can be completed at the bedside in a short amount of time [9, 13]. When conducting tracheostomy in critically ill adults, it is the preferred method. It is a basic process that can be completed at the bedside in a limited amount of time. Since it has a lower rate of postoperative complications than surgical tracheostomy, percutaneous dilatational tracheotomy is considered a better method [14]. Elective surgical tracheostomy should be done in the

operating room [15]. A sub thyroid incision of the trachea is made between the second and third tracheal rings in traditional surgical tracheostomy. Due to the initially recorded high incidence of subsequent complications, cricothyroidotomy has historically been used as an emergency treatment. This treatment causes subglottic stenosis, which necessitates a difficult surgical repair [16].

When it comes to perioperative and early postoperative complications, Heffner concluded that percutaneous dilatational tracheostomy is as healthy as the normal surgical technique, according to several articles and facts. In recent years, the morbidity and mortality associated with tracheostomy have been extremely low. Bleeding [18,19], subcutaneous emphysema[1,21], wound infection[20,22], tube displacement[1,21] and tube obstruction[21] are all early complications of tracheostomy, whether it is elective or emergency. Rare complications include pneumomediastinum[1], tracheoesophageal fistula[1], pneumothorax,[20,21] and persistent laryngeal nerve damage. The aim of this study is to compare the risks of emergency tracheostomy versus elective tracheostomy in our setting.

In our study most of the respondents were satisfied with the procedure which is matchable with other studies as tracheostomies can be safely performed in various types of intensive care patients, according to our retrospective chart analysis of tracheostomies performed in our hospital's Medical, Surgical, Neurological and Cardiac intensive care units.

In other studies, Delany et al. [4] looked at 17 RCTs in a meta-analysis of PCT versus surgical tracheostomies in 2006. They found that the average age of study participants ranged from 36 to 68.8 years which is in line with our findings, while our cohort had a median age of 71 years. In addition to their advanced age, more than half of our patients were bedridden prior to admission, owing to chronic medical conditions.

Putensen and colleagues looked at 14 RCTs that linked PCT to surgical tracheostomy in critically ill patients in another meta-analysis. They discovered that PCTs were completed more quickly and with a lower risk of stoma irritation or infection. The PCT group, on the other hand, had a higher risk of technical issues [5].

Our tracheostomies were performed on average 14 days after intubation, which agrees with the TrachMan trial's [6] findings that early tracheostomy has no effect on 30-day mortality. In a randomised study comparing early PCT versus prolonged intubation in patients following cardiac surgery (n = 216), Trouillet et al [7] found similar findings. Following this, a French expert panel on tracheostomy in the intensive care unit [8] advised that tracheostomy in the intensive care unit should not be done until the fourth day of mechanical ventilation. Our patients had low oxygen and PEEP requirements at the time of the tracheostomy, as well as acceptable haemoglobin, platelet, and white blood cell counts, as per the recommendations.

A variety of methods for reducing the morbidity associated with tracheostomy have been identified. Percutaneous dilatational tracheostomy is easy, saves operating room time, and has a lower complication rate, but its high cost and surgical experience are the only drawbacks in our situation. In contrast, traditional surgical tracheostomy has a higher rate of postoperative complications.

In our study average duration tracheostomies to discharge time was 21 days which was found to be associated with a substantial reduction in the duration of mechanical ventilation and ICU LOS in trauma ICU patients, without affecting patient outcome.

Conclusion

We conclude that tracheotomy may be successfully conducted in this group of patients and that it provides significant practical and psychological benefits over other options.

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Assessment of Health Care Workers' Knowledge and Practice Toward Infection Standard Precautions in Primary Health Care setting, Buraidah, Saudi Arabia

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Abstract

Background: This study aimed to assess knowledge of standard precautions (SPs) and infection control by healthcare workers (HCWs) at the primary healthcare level in Buraidah City, Qassim Region, Saudi Arabia.

Methods: A cross sectional study enrolled HCWs (doctors, nurses, lab workers) from 20 primary healthcare (PHC) centers in Buraidah. Two-hundred participants were selected randomly to participate in this study. Data was collected by a pretested, self-administered questionnaire, containing 29 items about basic knowledge of components of SPs and infection control including hand hygiene, personal protective equipment, sharps disposal, environmental sanitation and care of healthcare providers. Data was entered and analyzed using SPSS.

Results: The mean age of HCWs was 35.7 (SD±6.6) years. Females represented (51.5%) of the study participants. History of receiving formal training in standard infection control precaution in the last three years was mentioned by almost two-thirds (68.5%) of them. About 102 (51.0%) of the HCWs had adequate level of knowledge (>5 correct answers) regarding standard precautions(SPs) of infection control. The younger (p=0.020), non-Saudi healthcare workers (p<0.001), physicians (p<0.001); particularly consultants (p=0.018), were more knowledgeable than their counterparts. The barriers of improper use of PPEs reported by HCWs were uncomfortable (61.5%), some patients feel stigmatized when PPEs are used (60.5%), shortage in items at PHCC (54%) and workload due to patients' over-crowding (49%).

Conclusion: Generally the study finding revealed adequate knowledge of SPs among the study participants. However, inadequate knowledge particularly concerning the disposal of sharp instruments and hand hygiene were also detected. These findings highlighted the necessity of the provision of a comprehensive training program to ensure compliance with infection control measures by HCWs.

Key words: knowledge, practice, infection standard precautions, primary health care

Introduction

Healthcare workers (HCWs) play an important role in providing prevention, diagnosis, treatment, and care to people in diverse healthcare settings. According to the World Health Organization (WHO), HCWs are all people who are involved in activities that aim at enhancing health, include those who provide health services such as doctors, nurses, laboratory technicians, and pharmacists (1, 2). Health workers are exposed to a number of occupational hazards in healthcare settings, including biological, chemical, ergonomic, physical, and stress/violence (1, 3).

Health care-associated infections are considered the major cause of morbidity and mortality. Health care associated infections occur worldwide and affect all countries, and more than 90% occur in low-income countries. So, health care-associated infections may have severe consequences in primary health care (PHC) centers and transmission from former clients and healthcare workers may also lead to outbreaks in the community (4, 5). Healthcare workers at PHC centers are the first point of contact of consumers with health care system especially during this COVID-19 pandemic.

In the Kingdom of Saudi Arabia (KSA), one of the mitigation plans for COVID-19 pandemic containments is establishment of Tatammen Clinics at PHC level where suspected COVID-19 are screened and managed. This may increase the stress on standard precautions for medical professionals (6).

Health care worker's awareness regarding standard precautions (SP) measures is vital, as researches reported that compliance with these safety measures in health institutions may be related to the knowledge of health care staff (7).

Adherence of medical professionals to standard precautions protects patients and medical workers besides controlling the occurrence of hospital infections (8).

The study aims to assess the knowledge, and practice of primary health care workers in Buraidah regarding standard infection control precautions.

Subjects and Methods

A descriptive cross-sectional study was conducted at 20 PHC centers in Buraidah, Qassim Region, Saudi Arabia during a period from December 2019 to March 2020. From a total of 469 HCWs at PHC centers in Buraidah, 200 HCWs (Physicians, nurses and lab workers) were randomly selected to be enrolled in this study. The representation of them was 1 lab worker, 4 doctors and 5 nurses from each PHC center. After reviewing the pervious literature review -WHO (4), a pretested and self administered questionnaire was designed to collect data about the participants' knowledge, and practice towards standard precautions and infection control measures which include hand hygiene, injection safety and personal protective equipment (PPE) utilization with barriers of adherence to standard infection control precautions.

A score was created for the participants'` responses to knowledge questions and statements; correct answers were given a score of 1 whereas wrong answers were given a score of 0. Total score and its percentage were computed. The mean of the score percentage was estimated for each of the subscales as well as the overall knowledge. Participants who scored at or above the mean score percentage for each subscale as well as for the overall score were considered as having "adequate knowledge" and those who scored below the mean score percentage were considered as having inadequate knowledge. For the overall knowledge score, the mean percentage score was 71.66%.

Data analysis:
Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) software, version 26. Descriptive analysis was carried out as the mean and standard deviation (±SD) were calculated for quantitative variables; frequency and proportion were calculated for categorical variables. For comparisons, chi-square and t-test was used for categorical and quantitative variables respectively. P –value ≤ 0.05 was considered significant for all inferential analysis.

Results

The study participants' personal characteristics are summarized in Table 1. The mean age was 35.7 (SD ± 6.6) years. Females were 103 (51.5%). The majority of HCWs 163 (81.5%) were Saudi. Half of them were nurses 100 (50%), 80 (40%) were physicians and 20(10%) were lab workers. Their years of experience ranged between less than one years to 36 years with a mean of 9.8 (±SD 6.3) years. Almost two-thirds of the participants 137 (68.5%) received formal training in standard infection control precaution in the last three years.

Participants' Knowledge & practice about the standard precautions (SPs) of infection control
In this study, the overall level of the participants'` knowledge and practice regarding SPs of infection control was adequate 117(58.5%) as shown in Figure 1.The Participants' knowledge was assessed by dividing the standard precautions of infection control into 4 sections (Hand Hygiene, PPE, Disposal of sharp instruments, Cough and Sneeze Etiquette). Detailed information about participants' knowledge & practice was presented in Table 2.

Hand hygiene
Slightly more than half of the participants (51%) had an adequate level of knowledge and practice regarding hand hygiene as seen in Figure 2.

The majority of the participants could recognize that routinely using an alcohol-based hand rub is required for hand hygiene. Only 43% knew correctly that the main

route of cross-transmission of potentially harmful germs between patients in a health-care facility is health-care workers' hands when not clean. The five moments for hand hygiene were known by 62% of HCWs regarding immediately before a clean/aseptic procedure to 90.5% of them regarding before touching the patient. Most of the HCWs (74%) knew that hand rubbing is more rapid for hand cleansing than hand washing while 52.5% of them knew that hand rubbing is not more effective against germs than hand washing.

Regarding the procedures that should be avoided to decrease likelihood of colonization of hands with harmful germs, the highest known was damaged skin (83%) and the lowest known was wearing Jewellery (72%) (Table 2).
Personal protective equipments (PPEs)

The majority of the participants (61%) had an adequate level of knowledge and practice regarding PPE use as seen in Figure 2.

Components of the PPEs were known by the majority of the participants (84.5%). Wearing full PPE in case of a doctor who is working in Tetamman clinics either taking swab from suspected case of COVID-19 or treating a confirmed case could be recognized by 76% of the participants. The vast majority of the respondents (96.5%) knew that wearing gloves is important when handling patients, body fluids, cut skin and mucus membranes while 85% knew that the gloves should be changed if contacting a different patient. The correct sequence for wearing or removing PPE was properly recognized by 53% and 48.5% of the respondents, respectively (Table 2).

Reasons behind the low use of PPEs at PHC setting
In this study, respondents reported different reasons for the low use of the PPEs at the PHC level. The majority 172 (86%) were thought due to the lack of regular training in SPs, PPEs are uncomfortable 123(61.5%) and patient feels stigmatizes when PPEs used 121(60.5%). Facing shortage of equipment at PHC, workload due to patient overcrowding and beliefs like no infection can be acquired at PHCs were also mentioned by 108(54%), 98(49%) and 68(34%) of the participants, respectively (Figure 3).

The shortage in face masks (24%), and gloves (20%) were the commonest reported.

Disposal of sharp instruments
Less than half (43%) of the participants had an adequate level of knowledge and practice regarding disposal of sharp instruments as shown in Figure 2.

Most of the respondents (95.5%) recognized that disposal of needles should be in the sharp containers and contaminated needles should not be bent or recapped after usage (83.5%). However only 55% of them knew correctly that the sharp box is not only disposed of when it is full (Table 2).

Cough & Sneeze Etiquette
More than half of the participants (54%) had adequate level of knowledge and practice regarding cough and sneeze etiquette as seen in Figure 2.

The majority of the HCWs knew that the best place to practice cough etiquette is by using upper arm (92.5%). However, only 56.5% of them recognized that covering nose and mouth during coughing or sneezing by palm is against the SPs of infection control (Table 2).

Factors affecting the Participants' Knowledge and practice
The mean age of HCWs with adequate level of knowledge about standard precautions was significantly lower than those with inadequate level of knowledge [34.8(±6.4) versus 37.0(±6.8)], P=0.020. The majority of non-Saudi HCWs (86.5%) compared to Saudis (52.1%) had adequate level of knowledge, p<0.001. The majority of physicians (80%) compared to nurses (48%) and laboratory workers (25%) expressed adequate level of knowledge, p<0.001. Regarding doctors` qualifications, all consultants compared to general practitioners (53.8%) had adequate level of knowledge, P=0.018 (Table 3).

There was no significant statistical association between receiving formal training in standard infection control precautions and participants' knowledge/practice. Also no significant statistical association was found between participants' gender, years of experience and level of knowledge (Table 3).

Table 1: The Personal characteristics of the Study participants, (n=200).

Characteristics	Frequency (n)	Percentage (%)
Age Mean (±SD)	36 (±6.6) years	
Gender		
Male	97	48.5
Female	103	51.5
Nationality		
Saudi	163	81.5
Non-Saudi	37	18.5
Specialty		
Nurse	100	50.0
Doctor	80	40.0
Lab worker	20	10.0
Doctors` qualification (n=80)		
General practitioner	13	16.2
Resident	40	50.0
Specialist	24	30.0
Consultant	3	3.8
Nurses` qualification (n=100)		
Nurse register	37	37.0
Nurse assistant	3	3.0
Nurse Diploma	60	60.0
Experience from graduation		
Range	<1-36 years	
Mean ±SD	9.8(±6.3) years	
History of training in SPs in the last three years		
Yes	137	68.5
No	63	31.3

Table 2: Knowledge & practice assessment about standard precautions of infection control among HCWs at PHC level, (n=200).

Knowledge statements/questions	Correct answer	
	Frequency (n)	Percentage (%)
Hand hygiene		
Using routinely an alcohol-based hand rub for hand hygiene (Yes)	197	98.5
The main route of cross-transmission of potentially harmful germs between patients in a health-care facility; (Health-care workers' hands when not clean)	86	43.0
Which of the following hand hygiene actions prevents transmission of germs by following the 5 moment for the hand hygiene?		
-Before touching a patient (Yes)	181	90.5
-After touching a patient (Yes)	180	90.0
-Immediately after a risk of body fluid exposure (Yes)	169	84.5
-After exposure to the immediate surroundings of a patient. (Yes)	129	64.5
-Immediately before a clean/aseptic procedure (Yes)	124	62.0
Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true?		
-Hand rubbing is more rapid for hand cleansing than hand washing (True)	148	74.0
-Hand rubbing is more effective against germs than hand washing (False)	105	52.5
-Hand washing are recommended after hand rubbing (False)	113	56.5
-Hand washing and hand rubbing are recommended to be performed in sequence (True)	140	70.0
The minimal time needed for alcohol-based hand rub to kill most germs on your hands (20-30 seconds)	118	59.0
The minimal time needed for hand washing to kill most germs on your hands (40-60 seconds)	124	62.0
Which type of hand hygiene method is/are required in the following situations?		
-Before touching patient (examination or injection) (Rubbing)	121	60.5
-After removing examination gloves (Rubbing/washing)	188	94.0
-After visible exposure to blood (Washing)	142	71.0
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?		
- Wearing jewellery (Yes)	144	72.0
- Damaged skin (Yes)	166	83.0
- Artificial fingernails (Yes)	155	77.5
- Regular use of a hand cream (No)	110	55.0
Personal Protective Equipments (PPE)		
The components of PPE (Face Shields, Gloves, Mask, and Gowns)	169	84.5
What are the situations require wearing full PPE? -A doctor who contacts to a case have fever or acute respiratory symptoms during pandemic Covid-19.	93	46.5
-A doctor who is working in Tetamman either taking swab from suspected case of Covid-19 or treating a confirmed case.	152	76.0
Which of the following is the correct sequence for wearing PPE? (Gown-Mask-Goggles-Gloves)	106	53.0
Which of the following is the correct sequence for Removing PPE? (Gloves- Goggles- Gown-Mask)	97	48.5
The gloves should be changed if contacting the different patient. (Yes)	170	85.0
Wearing gloves is important when handling patients, body fluids, cut skin and mucus membranes. (Yes)	193	96.5
Disposal of Sharp Instruments		
Disposition of needles should be in the sharp containers. (Yes)	191	95.5
Contaminated needles should not be bent or recapped after usage. (Yes)	167	83.5
The sharp box is only disposed of when it is full. (No)	110	55.0
Cough & Sneeze Etiquette		
Following the SPs of infection control, during coughing or sneezing do you cover your nose and mouth by your palm of hand? (No)	113	56.5
The best tool to practice cough etiquette is upper arm? (Yes)	185	92.5

Table 3: Factors Affecting the HCWs Knowledge & Practice Towards the SPs of infection control, (n=200).

Characteristics	Overall knowledge/practice about standard precautions		P-value
	Inadequate (n=83) N (%)	Adequate (n=117) N (%)	
Age (years) Mean(±SD)	37.0 (±6.8)	34.8 (±6.4)	0.020*
Gender			
Male (n=97)	45 (46.4)	52 (53.6)	0.173
Female (n=103)	38 (36.9)	65 (63.1)	
Nationality			
Saudi (n=173)	78 (47.9)	85 (52.1)	0.001*
Non-Saudi (n=37)	5 (13.5)	32 (86.5)	
Specialty			
Nurse (n=100)	52 (52.0)	48 (48.0)	
Doctor (n=80)	16 (20.0)	64 (80.0)	0.001*
Lab worker (n=20)	15 (75.0)	5 (25.0)	
Doctors` qualification (n=80)			
General practitioner (n=13)	6 (46.2)	7 (53.8)	
Resident (n=40)	7 (17.5)	33 (82.5)	0.018*
Specialist (n=24)	3 (12.5)	21 (87.5)	
Consultant(n=3)	0 (0.0)	3 (100)	
Nurses` qualification (n=100)			
Nurse register (n=37)	19 (51.4)	18 (48.6)	
Nurse assistant (n=3)	1 (33.3)	2 (66.7)	0.791
Nurse Diploma (n=60)	32 (53.3)	28 (46.7)	
Experience from graduation (years) Mean (±SD)	10.3(±6.1)	9.4(±6.4)	0.299
Receiving training in SPs in the last three years			
No (n=63)	31 (49.2)	32 (50.8)	0.134
Yes (n=137)	52 (38.0)	85 (62.0)	

Figure 1: The overall level of the participants` knowledge and practice regarding SPs of infection control at PHC level.

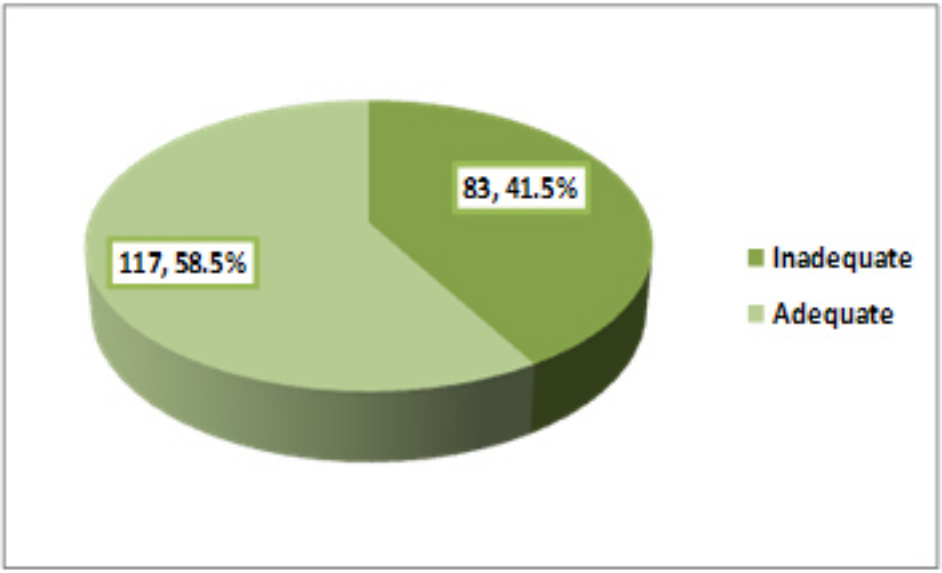


Figure 2: Level of the participants` knowledge and practice regarding elements of SPs of infection control at PHC level.

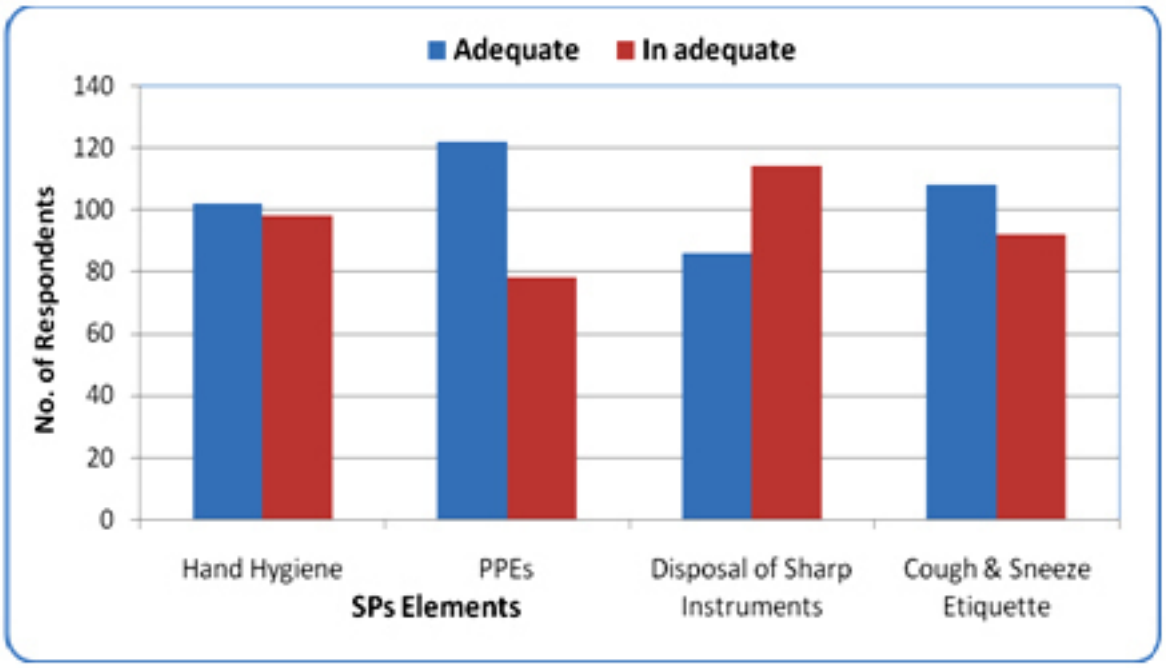
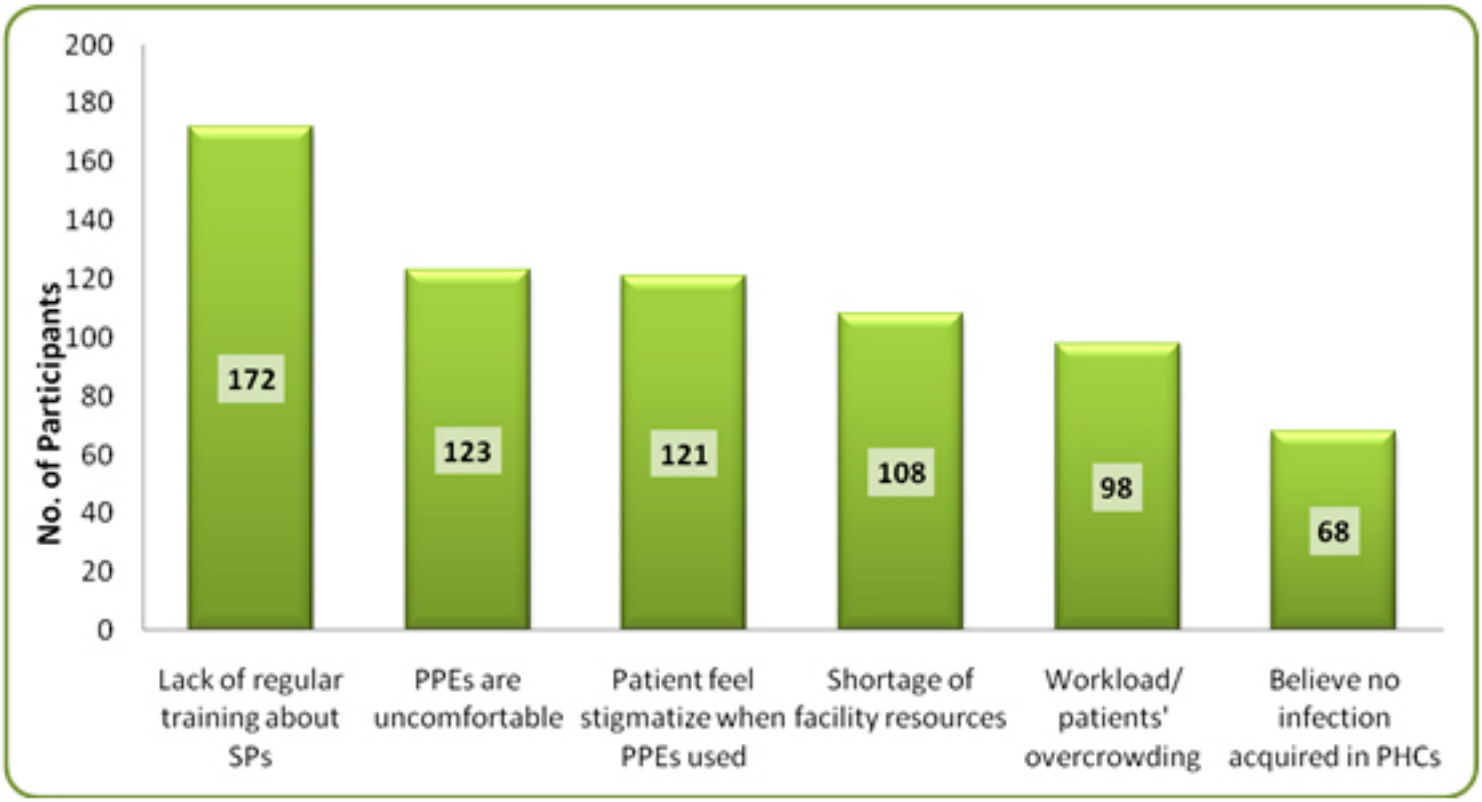


Figure 3: Reasons behind the low use of PPEs at PHC setting



Discussion

Evaluation of the knowledge and practice of standard precautions by HCWs is an essential step in starting and implementing a successful infection control program in any healthcare facility. Worldwide, many studies have shown that healthcare workers expressed variable levels of knowledge regarding SPs of infection control, with relatively limited studies having been carried out in the Kingdom of Saudi Arabia, Therefore, the present study was conducted to assess the knowledge, attitude and practice of primary health care workers in Buraidah regarding standard infection control precautions (9-15).
In the current study, receiving formal training in standard infection control precautions in the last three years was mentioned by almost two-thirds of the primary health care workers. The same has been reported in Al-Kharj (KSA) by Alotaibi et al (11), where 70% of the healthcare students had attended an infection control course. In Hofuf, (12) the majority of medical students believed that the current teaching and training regarding standard precautions is insufficient in providing them with the required knowledge and skills. Contrary to that, in Ethiopia, (13) 65.6% of HCWs had ever participated in training program in infection control. In the present study, despite most HCWs having attended training courses in infection control, this was not associated with having adequate knowledge regarding standard precautions of infection control, which raises a question regarding the quality and contents of such training occasions that may need reconsideration. In Makkah (14), the level of satisfactory knowledge, positive attitude, and good practice of studied HCWs toward MERS-CoV had improved after an interventional education program. So, we believe that adequate and well prepared training programs are essential in improving knowledge regarding standard precautions of infection control.

In the present survey, the level of overall knowledge and practice of SPs of infection control was adequate 58.5%, but only 41.5% of them expressed adequate level of knowledge; particularly regarding disposal of sharp instruments and hand hygiene while the highest level of knowledge was observed concerning PPEs. The same had been reported previously in Al-Hassa, KSA (11) where a deficiency in knowledge of components of SPs was demonstrated among PHC physicians; particularly concerning hand hygiene, sharps disposal, management of sharps injuries and environmental cleaning. In Hofuf (12) approximately one-quarter of clinical years medical students (26.7%) scored ≥ 24 (out of 41points) which was considered as an acceptable level. The least knowledge score were in the areas of sharp injuries and PPEs. In Al-Qassim (15), the average knowledge regarding guidelines of hand hygiene among HCWs was 63%. In Nigeria, (16) the overall median knowledge and attitude scores toward SPs were above 90%, but median practice score was 50.8% among HCWs (physicians, nurses and laboratory workers) of two tertiary hospitals. The majority of the HCWs had poor knowledge of injection safety and complained of inadequate resources to practice SPs. In another Nigerian study, (17) only 16.6% of HCWs (physicians and nurses) had knowledge of the basic concept of standard precautions and 42.2% knew potential sources of occupational exposure. Also in Nigeria, (18) almost half of HCWS (50.3%) had good knowledge regarding SPs. Physicians had the highest proportion with good knowledge, and porters the lowest, and 46.8% of them had good compliance to SPs. Regarding compliance to SPs practice, the highest proportion of nurses had good practice compliance. In India, (19), 79.9% of nurses had poor knowledge about standard precautions and 64.5% of them had inadequate knowledge about the transmission of blood-borne pathogens. In Ethiopia, Beyamo et al (20) revealed that 65% of HCWs had complied with standard precaution practices. Comparison between the aforementioned studies including the present one is not practical due to two main reasons; first, using different tools in assessing knowledge regarding SPs of infection control. Second, different characteristics of the participants in various studies as some of them were conducted among medical students, some among all HCWs and some others among specific HCWs.

The present study revealed that younger, non-Saudi healthcare workers and physicians; particularly consultants, were more knowledgeable about SPs of infection control compared to their peers. In another Saudi study, being female, holding a postgraduate degree and having more than 5 years of experience in PHC were the significant predictors for having adequate SPs knowledge (11). In Al-Kharj, (11) female medical students were more knowledgeable and compliant with SPs compared to males and also student`s academic level was significantly associated with knowledge and compliance regarding SP. In Al-Qassim, (15) health-care workers aged over 30 years and those at tertiary care hospitals were more knowledgeable than younger physicians and those working in secondary care hospitals. In Makkah, (14) older age, previous training, and experience were positively correlated with higher scores of knowledge among HCWs. In Ethiopia, (20) factors significantly associated with compliance to SPs practices among HCWs were experience of ≤5 years, training on SPs, having good hand hygiene and availability of PPEs. In Italy, (21) HCWs in emergency departments with less practiced years, those who worked fewer hours per week and who had received information from educational courses and scientific journals were more knowledgeable about the risk of acquiring Hepatitis C and HIV from a patient. In addition, nurses, respondents who knew that HCWs' hands are vehicles for transmission of nosocomial pathogens, those obtaining information from educational courses and scientific journals, and needing information were associated with a higher perceived risk of acquiring a hospital-associated infection. Again, different characteristics of the participants in various studies could explain the variations in factors affecting knowledge.

In the present study, the majority of the HCWs thought that they should be involved in regular training sessions about standard infection control precaution. The commonest reported challenges against practice of SPs as reported by them were PPEs are uncomfortable, the patient feels stigmatized when PPEs are used, facing any shortage of

facilities/resources for the practice of standard precautions in primary healthcare and workload or patient overcrowding. In a similar Saudi study, the commonest factors reported by HCWs for not applying SPs during routine work were lack of resources and training opportunities, and excessive workload, (22) which are quite similar to those reported in the present survey. In another study carried out in Nigeria, house officers, laboratory scientists and junior nurses had lower knowledge and compliance with SPs than more experienced doctors and nurses (23). In another study carried out also in Brazil, non-availability of the materials was the main factor reported for non-adherence to SPs (24). The most important factor influencing SPs practice was the lack of provision of adequate protective equipment. Other factors included carelessness, lack of display of standard precautions guidelines, emergency nature of the procedure, insufficient water supply, patient`s perceived to be at low risk of blood borne pathogens, pressure of time and standard precautions equipment interfering with technical skills (25).

Limitations of the study

Conduction of the study among PHC professionals working in MOH in one Saudi city could affect the generalizability of the study`s findings over other healthcare settings. Also, the cross-sectional design of the study is considered one of the limitations as it proves only association and not causality between independent and dependent variables. Finally, the nature of the questionnaire used as self-administered and assessing knowledge, practice and attitude at the same time is subject to bias. However, it is based on WHO criteria for SPs of infection control. Despite those limitations, the study could have an ultimate importance for decision makers to overcome barriers to implement effective infection control programs at PHC settings.

Conclusion and Recommendations

Generally: the study finding revealed adequate knowledge of SPs among the study participants. However, inadequate knowledge particularly concerning the disposal of sharp instruments and hand hygiene were also detected. These findings highlighted the necessity of the provision of a comprehensive training program to ensure compliance with infection control measures by HCWs."

Abbreviations

HCWs: Health Care workers
MOH: Ministry of Health
PHC: Primary Health Care
SPs: Standard persuasions
WHO: World Health Organization

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Special Editorial: Bashing and murder of doctors and health care workers in Myanmar

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In recent times we have seen doctors targeted in the wars of primitive brutal dictators across the globe. Even the Covid pandemic has been used by the lowest of the low to strengthen their personal power and wealth. What the dictators and despots in their delusional state call greatness is just the endless repetitive brutality of some ignorant men throughout our appalling and disgraceful human history.

These psychopaths in our midst have been the sole cause of human misery either directly by their own actions, - murder, torture and genocide – or through theft of national wealth and the consequent lack of social services and public health – the rights of all men. While it has happened forever, and is the biggest blot on any self-respect that the human race can muster, it does NOT represent all humanity. The equal and opposite also occurs. There are sane and decent, dedicated, hardworking and civilised humans who hold up a mirror to these brutes in our midst and their hired killers who happily do their paid torture, murder and genocide for them. Worse still, at this crucial time in the fight for survival of most species on planet earth, we have these brutes destroying the last food stocks and resources that we should be preserving for ongoing mutual survival.

The practice of Medicine is the exact opposite to the path the brutal dictators choose. It is an element of the ascent of man.

I have pleaded before for decency and the rights of people and the doctors who heal the array of injuries caused to them. The latest evil is in Myanmar. And it is not just the brutal Military dictatorship. This time I call on China and Russia who are backing this evil regime, for their own gain – to stop bashing and murdering doctors, nurses, children, babies and the gentle, decent people of Myanmar; stop deliberately herding them into jails to catch Covid-19; stop torturing; stop raping women and children. Stop taking other people's property and land and lives – and that includes genocide of the Uighur Muslims and the Tibetans - as well as oppression of the people of your own countries. Enough is enough. No-one in the world is fooled by staged propaganda videos, rather it is even more sinister behaviour - and they bring no-one back to life. The world has seen far too many evil barbarous men and now in a time we must all work together to survive – we have the worst of the worst, ganging up like schoolyard bullies and bringing shame and disgust on the entire human race – such is the legacy you have created for yourselves.

Choose your actions carefully - the universe is watching and waiting.

Prevalence, Awareness and Perception of Influenza Vaccine among Geriatrics in Abha region, Saudi Arabia

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Abstract

Background: Flu is an acute respiratory infection, caused by three types of, influenza virus. Flu symptoms occasionally worsen, leading to the onset of pneumonia. Flu epidemics cause three to five million cases of severe illness, while up to 500,000 persons die as a result. Surveys of older adults' knowledge relative to flu immunization have highlighted its relevance in the improvement of vaccination coverage. Many studies indicated that knowledge has a significant influence on attitudes and practices of flu immunization.

Aim: to assess prevalence of immunization against seasonal flu and to explore the knowledge related to influenza virus and flu immunization among elderly population in Abha sector.

Methodology: A descriptive cross-sectional approach was used targeting all accessible elderly population in Aseer region, Southern Saudi Arabia. Data were collected from participants using an electronic pre-structured questionnaire. The tool covered participants' socio-demographic data, Elderly medical and family history, and awareness and practice regarding seasonal influenza and vaccine.

Results: A total of 386 elderly aged 60-89 years old with mean age of 72.3 ± 5.8 years completed the study questionnaire. Males were 212 (54.9%). Exactly 82.3% of the elderly know about seasonal flu, 71.5% know that flu can spread from one person to another, and 60.4% reported that flu is the same as the common cold. Totally, 56.2% of the elderly had good awareness regarding seasonal influenza. About 91% of the participants had heard about it, 73.8% reported that it is safe, 60.9% know that influenza vaccine can prevent serious complications for elderly, and 50.8% know that influenza vaccine promotes immunity against the virus.

Conclusions: In conclusion, the study revealed that one third of the elderly received the seasonal influenza vaccine regularly during the last years and nearly two thirds of them received it last year. Higher coverage rate was higher among highly educated male elderly with sufficient income and at rural residences and those who were asthmatic and previously hospitalized due to flu.

Key words: Seasonal influenza, vaccine, flu, awareness, vaccination coverage, perception, elderly, barriers.

Introduction

Influenza which is also called "the flu", is a viral disease caused by an influenza virus (1). Symptoms range from mild to severe (2). Influenza mainly presents with high fever, runny nose, sore throat, muscle and joint pain, headache, coughing, and feeling tired (3, 4). The patient complaint symptoms mostly begin two days after exposure to the virus and most last less than a week (5). The cough, however, may last for more than two weeks (3). Complications of influenza may include viral pneumonia, secondary bacterial pneumonia, sinus infections, and worsening of previous health problems such as asthma or heart failure (6). Influenza (flu) can be serious for everyone but for those who are aged 65 years and older, the risk of flu-associated complications and morbidity is high (7). Immune systems decline with increased age. Older persons are at higher risk of severe flu and flu related complications including pneumonia and hospitalization (8). Also, flu increases the risk of heart attack by 3-5 times and stroke by 2-3 times in the first 2 weeks of infection for those 65 or above. The risk remains elevated for several months (9, 10). Mortality from flu and related complication also is higher by about 6 times if at the age of 65 years or older. Getting your flu vaccine lowers your risk of heart attack and stroke (11).

Annual influenza vaccination is recommended to minimize flu and flu-related complications. Certain vaccines are available to help boost immune response specifically in adults age 65 years and older (12). Research that has covered older adults' knowledge regarding flu immunization have proved its significance in the improvement of vaccination coverage (13, 14). Moreover, even though past flu vaccinations tend to be predictive of future vaccination, vaccine acceptance among older persons may vary across seasons (15). The current study aims to assess prevalence of immunization against seasonal flu and to explore the knowledge related to influenza virus and flu immunization among the elderly population in Abha sector.

Methodology

A descriptive cross-sectional approach was used targeting all accessible elderly population in Aseer region, Southern Saudi Arabia. All those with ages of 50 years or more living in Aseer region were invited to participate in the survey. A total of 480 individuals received the study survey. Exactly 386 respondents completed the study questionnaire with a response rate of 80.1%. After obtaining permission from Institutional ethics committee, data collection started. Data were collected from participants using electronic pre-structured questionnaire. The questionnaire was uploaded online using social media platforms by the researchers and their relatives during the period from 15th December 2020 till 30th of January 2021. All accessible and eligible elderly population in the study setting were invited to fill in the attached tool. The researchers constructed the survey tool after intensive literature review and expert's consultation. Tool was reviewed using a panel of 5 experts for content validity. Tool reliability was assessed using a pilot study of 30 participants with reliability coefficient (α-Cronbach's) of 0.78. The tool covered the following data: participants' socio-demographic data like age, gender, residence, education, income, and living condition. Participants' medical history and hospitalization was the second section of the questionnaire. Participants practice regarding receiving the seasonal influenza vaccine, causes of receiving and non-receiving the vaccine were included. Awareness regarding seasonal influenza, symptoms, and vaccine was assessed using 28 questions for the three domains.

Data analysis

After data were extracted, it was revised, coded, and fed to statistical software IBM SPSS version 22(SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was statistically significant. For awareness items, each correct answer was scored one point and total summation of the discrete scores of the different items at each of the three domains (seasonal influenzas, symptoms, and vaccine) besides the overall score were calculated. A patient with score less than 60% of the total domain score and overall score was considered to have poor awareness while good awareness was considered if they had a score of 60% of the total score or more. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, awareness items and elderly practice. Cross-tabluation was used to assess distribution of awareness and practice regarding seasonal influenza vaccine according to elderly bio-demographic and medical data. Relations were tested using Pearson chi-square test.

Results

A total of 386 elderly aged 60-89 years old with mean age of 72.3 ± 5.8 years completed the study questionnaire. Males were 212 (54.9%) and 240 (62.2%) were married. As for education, 289 (74.9%) had below secondary level of education while 2.8% were university graduated. Exactly 243 (63%) were from urban areas and 220 (57%) live with spouse (Table 1).

As for elderly medical history (Figure 1), DM was reported among 78% of the participants, followed by HTN (71%), cardiac disease (23%), and asthma (17%) while 19% had previously been admitted to hospital due to flu.

Table 2 shows awareness regarding seasonal flu and vaccine among the elderly. Exactly 82.3% of the elderly know about seasonal flu, 71.5% know that flu can spread from one person to other, and 60.4% reported that flu is the same as the common cold. Totally, 56.2% of the elderly had good awareness regarding seasonal influenza. As for flu symptoms awareness, runny nose was reported by 96.4% of the participants followed by cough (95.3%), sneezing and headache (92.7% for each), and fever (84.2%). Totally, 72.5% of the participants had good awareness level regarding symptoms. Regarding seasonal influenza vaccine awareness, 90.9% of the participants had heard about it, 73.8% reported that it is safe, 60.9% know that influenza vaccine can prevent serious complications for

elderly, and 50.8% know that influenza vaccine promotes immunity against the virus. Totally, 43.3% of the elderly had good awareness regarding the vaccine. In total, 221 (57.3%) of the elderly had good awareness regarding seasonal influenza and its vaccine.

Table 3 illustrates elderly practice and intake of seasonal influenza vaccine. Exactly 136 (35.2%) of the respondent elderly received the influenza vaccine regularly for the last five years and 66.6% received the influenza vaccine this year. Among those who had the vaccine, doctor advice was the main motive among 152 (59.1%) and 12.5% was their own decision. As for those who did not have the vaccine, believing that it is not necessary because flu is just a minor illness was the main barrier (34.1%) followed by thinking that people who had the vaccine still eventually had the flu (28.7%), have alternative protection (15.5%), and other reasons such as being unavailable, expensive, not safe were reported by 13.2% of the participants.

Table 4 demonstrates distribution of elderly awareness and practice regarding seasonal influenza vaccine by their bio-demographic data. Good awareness was detected among 71.2% of male participants compared to 40.2% of females (P=.001). Also, 83.3% of single participants had good awareness in comparison to 35.9% of the divorced group (P=.001). Exactly 90.9% of university graduated elderly had good awareness compared to 46.7% of those with basic level of education (P=.001). Also, good awareness was detected among 70% of those who live with spouse compared to 41.4% of those who live alone. Also, 78.6% of diabetic elderly had good awareness, 60.9% of those with asthma, 60.4% of those who had allergic rhinitis, and 73% of those who were admitted to hospital due to flu (P<0.05 for all). Regarding elderly practice, 41.5% of male elderly received the vaccine regularly compared to 27.6% of females (P=.004). Also, 60.5% of secondary educated elderly received the vaccine regularly in comparison to 27% of those with basic education (P=.001). Exactly 44.4% of those with high income received the vaccine regularly compared to 24.5% of those with low income (P=.006). Exactly 46.9% of elderly in rural areas received the vaccine regularly compared to 28.4% of those in urban areas (P=.001). Taking the vaccine regularly was reported by 23.4% of asthmatic elderly, 24.1% of elderly with allergic rhinitis, and 44.6% of those who were admitted to hospital due to flu.

Table 1. Bio-demographic characteristics of elderly, Aseer region, Saudi Arabia

Bio-demographic data	No	%
Age in years		
60-69	127	32.9%
70-79	196	50.8%
80-90	63	16.3%
Gender		
Male	212	54.9%
Female	174	45.1%
Marital status		
Single	18	4.7%
Married	240	62.2%
Divorced / widow	128	33.2%
Education		
Below secondary	289	74.9%
Secondary	86	22.3%
University/ above	11	2.8%
Monthly income		
Insufficient	94	24.4%
Just sufficient	150	38.9%
More than sufficient	142	36.8%
Residence		
Urban	243	63.0%
Rural	143	37.0%
Living with		
Alone	29	7.5%
Other	68	17.6%
Sibling	69	17.9%
Spouse	220	57.0%

Figure 1. Medical history of respondent elders, Aseer region, Saudi Arabia

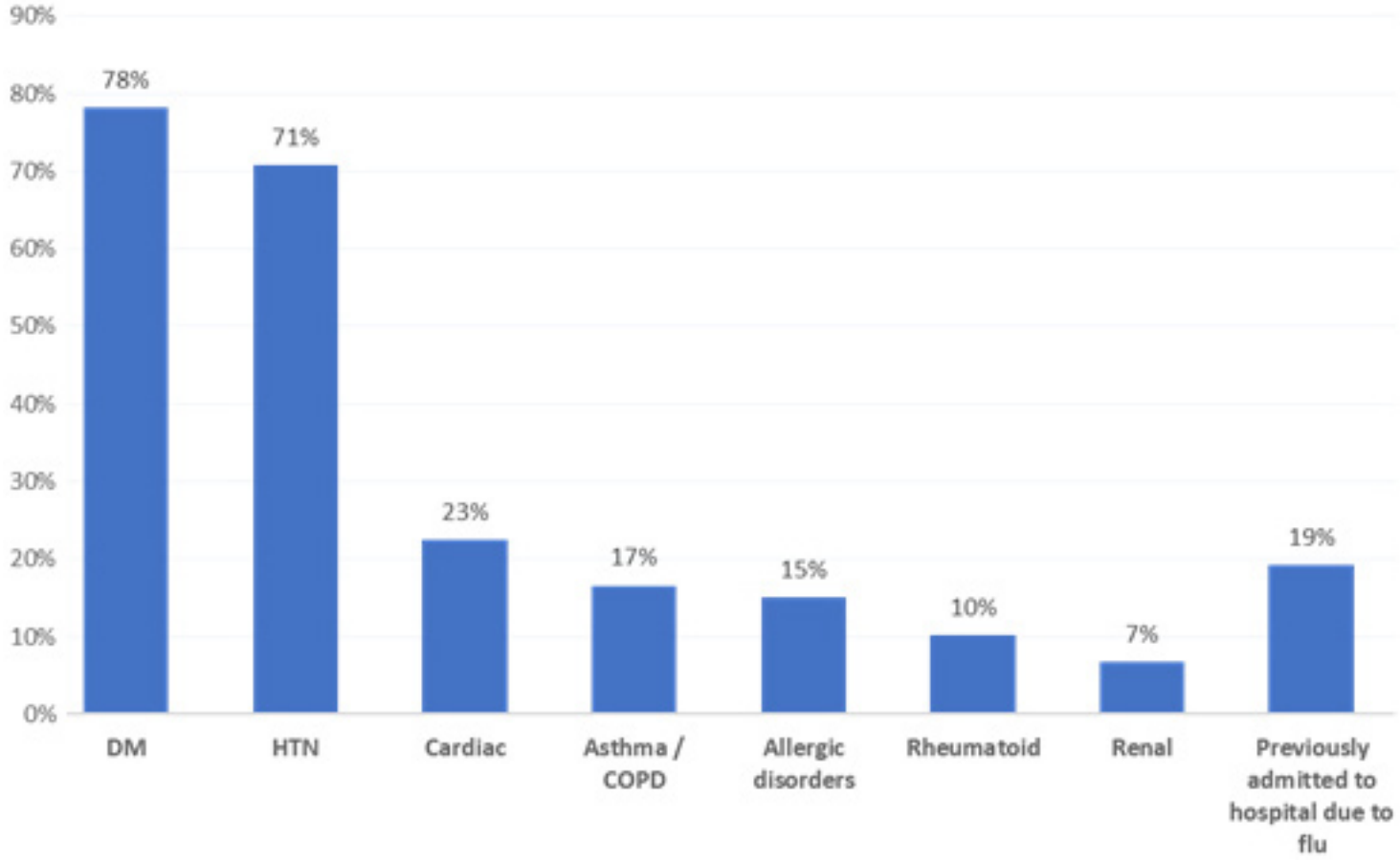

Table 2. Awareness regarding seasonal flu and vaccine among elderly, Aseer region, Saudi Arabia

Domain	Items	Yes		No		Don't know	
		No	%	No	%	No	%
Flue awareness	know about seasonal influenza	321	83.2%	42	10.9%	23	6.0%
	flu is caused by a virus	207	53.6%	40	10.4%	139	36.0%
	flu can spread from one person to another	276	71.5%	20	5.2%	90	23.3%
	flu has no vaccine	20	5.2%	247	64.0%	119	30.8%
	flu cannot be prevented	130	33.7%	85	22.0%	171	44.3%
	flu is the same as common cold	233	60.4%	64	16.6%	89	23.1%
	flu occurs at certain period of the year	222	57.5%	48	12.4%	116	30.1%
	flu symptoms are worse among disabled patients	211	54.7%	33	8.5%	142	36.8%
	flu can cause serious complications among elderly	231	59.8%	28	7.3%	127	32.9%
	Overall awareness level	Poor 169 (43.8%)			Good 217 (56.2%)		
Symptoms awareness	Runny nose	372	96.4%	2	.5%	12	3.1%
	Sneezing	358	92.7%	13	3.4%	15	3.9%
	Headache	358	92.7%	5	1.3%	23	6.0%
	Sore throat	337	87.3%	31	8.0%	18	4.7%
	Cough	368	95.3%	3	.8%	15	3.9%
	Vomiting	159	41.2%	105	27.2%	122	31.6%
	Fever	325	84.2%	18	4.7%	43	11.1%
	Muscle ache	245	63.5%	51	13.2%	90	23.3%
	Diarrhea	148	38.3%	113	29.3%	125	32.4%
	Abdominal pain	150	38.9%	111	28.8%	125	32.4%
	Overall awareness level	Poor 106 (27.5%)			Good 280 (72.5%)		
Vaccine awareness	Do you know about influenza vaccine	351	90.9%	14	3.6%	21	5.4%
	influenza vaccine is safe	285	73.8%	29	7.5%	72	18.7%
	influenza vaccine has side effects	89	23.1%	108	28.0%	189	49.0%
	influenza vaccine can prevent serious complications for elderly	235	60.9%	30	7.8%	121	31.3%
	influenza vaccine should be given in October each year	137	35.5%	28	7.3%	221	57.3%
	to have or not have the vaccine, no different	62	16.1%	142	36.8%	182	47.2%
	influenza vaccine promotes immunity against the virus	196	50.8%	29	7.5%	161	41.7%
	influenza vaccine should be given once and for ever	31	8.0%	179	46.4%	176	45.6%
	influenza vaccine does not work in some people	65	16.8%	51	13.2%	270	69.9%
	Overall awareness level	Poor 219 (56.7%)			Good 167 (43.3%)		
Overall flu and vaccine awareness level		Poor 165 (42.7%)			Good 221 (57.3%)		

Table 3. Elderly practice and intake of seasonal influenza vaccine, Aseer region, Saudi Arabia

Elderly intake of influenza vaccine	No	%
Received the influenza vaccine regularly for the last five years		
Yes	136	35.2%
No	250	64.8%
Received the influenza vaccine this year		
Yes	257	66.6%
No	129	33.4%
If yes who advised you to have the vaccine		
Doctor	152	59.1%
Friend \ family	36	14.0%
My self	32	12.5%
Social media	37	14.4%
If no, reasons for not having the vaccine		
I have alternative protection	20	15.5%
It has serious side effects	11	8.5%
It is not necessary because flu is just a minor illness	44	34.1%
People who had the vaccine still eventually had the flu	37	28.7%
Others	17	13.2%

Table 4. Distribution of elderly awareness and practice regarding seasonal influenza vaccine by their bio-demographic data

Factors		Good overall awareness level		P-value	Received the influenza vaccine regularly for the last five years		P-value
		No	%		No	%	
Age in years	60-69	73	57.5%		38	29.9%	
	70-79	118	60.2%	.213	69	35.2%	.091
	80-90	30	47.6%		29	46.0%	
Gender	Male	151	71.2%	.001*	88	41.5%	.004*
	Female	70	40.2%		48	27.6%	
Marital status	Single	15	83.3%		5	27.8%	
	Married	160	66.7%	.001*	98	40.8%	.013*
	Divorced / widow	46	35.9%		33	25.8%	
Education	Below secondary	135	46.7%		78	27.0%	
	Secondary	76	88.4%	.001*	52	60.5%	.001*
	University / above	10	90.9%		6	54.5%	
Monthly income	Insufficient	56	59.6%		23	24.5%	
	Just sufficient	79	52.7%	.344	50	33.3%	.006*
	More than sufficient	86	60.6%		63	44.4%	
Living with	Alone	12	41.4%		6	20.7%	
	Other	27	39.7%	.001*	18	26.5%	.016*
	Sibling	28	40.6%		20	29.0%	
	Spouse	154	70.0%		92	41.8%	
Residence	Urban	136	56.0%	.505	69	28.4%	.001*
	Rural	85	59.4%		67	46.9%	
DM	Yes	155	51.3%	.001*	100	33.1%	.098
	No	66	78.6%		36	42.9%	
HTN	Yes	157	57.5%	.875	104	38.1%	.067
	No	64	56.6%		32	28.3%	
Asthma / COPD	Yes	25	39.1%	.001*	15	23.4%	.031*
	No	196	60.9%		121	37.6%	
Allergic disorders	Yes	23	39.7%	.003*	14	24.1%	.055
	No	198	60.4%		122	37.2%	
Rheumatoid	Yes	22	56.4%	.911	9	23.1%	.094
	No	199	57.3%		127	36.6%	
Renal	Yes	15	57.7%	.963	13	50.0%	.103
	No	206	57.2%		123	34.2%	
Previously admitted to hospital due to flu	Yes	54	73.0%	.002*	33	44.6%	.049*
	No	167	53.5%		103	33.0%	

P: Pearson X2 test
* P < 0.05 (significant)

Discussion

The current study aimed to assess prevalence of immunization against seasonal flu and to explore the awareness and knowledge related to influenza virus and flu immunization among the elderly population in Abha sector. Also, to assess proportion of elderly annually vaccinated against seasonal influenza in Abha sector, and to list the main barriers against being vaccinated against seasonal influenza. Seasonal influenza results in substantial major global morbidity and mortality during winter months each year (16). In elderly with co-morbidities including asthma despite effective controllers, influenza infection can exacerbate asthma symptoms, which may result in asthma attacks requiring medical management and in many cases hospitalization.(17). Influenza infections precipitated about 80 % of asthma exacerbation (18). The World Health Organization (WHO) and national immunization programs recommend annual influenza vaccination in elderly patients as the main prophylactic measure against influenza (19). As influenza is highly infectious, the health effect of influenza active infection is not evenly dispersed. Many factors are modifying, including susceptibility to circulating virus, age, and associated co-morbidities. Among healthy adults, seasonal influenza usually does not progress to severe infection, but for the elderly, infection is a critical health concern. The incidence of influenza-associated mortality increases dramatically after 65 years of age (20-22). Elderly with high prevalence of co-morbidities had higher risk and severity of influenza in this age group. While infection is generally manageable among healthy adults under 50 years of age, influenza remains an essential cause of outpatient medical visits and lost productivity. In the elderly, complications are more reported, including inpatient hospitalizations (23).

The current study revealed that the majority of the respondents were males above 70 years old with low educational level. Also, diabetes and hypertension were the most reported co-morbidities among the elderly respondents.

As for elderly awareness regarding seasonal influenza and influenza vaccine, more than half of the respondents were knowledgeable regarding influenza, causes, method of transmission of influenza virus, and its effect on the elderly. Elderly also showed very high awareness level regarding seasonal influenza signs and symptoms (exceeding 70%). As for influenza vaccine awareness, less than half of the respondents had good awareness level. The highest awareness areas were for vaccine safety, efficacy in preventing serious complications, and importance to have the vaccine annually not just once and forever. In total, more than half of the elderly had a good awareness level (57%). Even though the high proportion of elderly, regardless of flu vaccination status, had a good level of seasonal influenza-related knowledge, certain disparities and fallacies were reported. For explanation, a high proportion of wrong / inappropriate answers in the current study were related to the side effects of the vaccine, misconception of having or not having the vaccine, no different, and lack of vaccine efficacy in all vaccinated persons.

These findings were consistent with what was reported by Gazibara T et al, (24) who found that about 62% of the sampled elderly showed good awareness regarding seasonal influenza and vaccination, whereas one third 29.8% demonstrated an excellent level of knowledge. In Saudi Arabia, Alotaibi FY et al, (25) estimated the level of awareness, sources of knowledge, and beliefs about the influenza vaccine in people ≥65 years. Authors found that unvaccinated individuals were significantly less likely to be aware of the Ministry of Health campaign against influenza, trust that influenza vaccine does not deteriorate the immune system, know that elderly people and people with chronic health problems should be regularly vaccinated against influenza. Also, they found that participants believe that the influenza vaccine was the best preventive measure for catching infection. Approximately 40% of the participants considered the influenza vaccine to be very effective and safe.

Regarding vaccination rate, the current study revealed that one third of the elderly received the seasonal influenza vaccine regularly and two thirds received the vaccine this year. This higher rate of receiving the vaccine this year is mostly attributed to the covid-19 pandemic where elderly as a high-risk group needed to avoid co-infection between seasonal influenza and covid. That coverage rate was lower than that reported by Gazibara T et al, (24) where 47.7% of included elderly were vaccinated regularly with the seasonal influenza vaccine and lower than 75% targeted by the World Health Organization (26). Also, higher coverage rates were reported in many studies in different countries including in Taiwan (43.7%,) (27) and in Spain (58.6%) (28). According to reports of Mereckiene et al, (29) the highest flu vaccination coverage in the European Union was observed in the Netherlands (82.1%) and in the UK (75%), reaching the proposed coverage threshold of 75% (30). In Saudi Arabia, Alotaibi FY et al, (25) reported that 47.8% of the elderly participants had been vaccinated against influenza which is higher than the current study estimated rate. On the other hand, the level of vaccine coverage was considerably similar (36.7%) in Riyadh City than elsewhere in the region (31). Also, influenza vaccine coverage research in Saudi Arabia conducted in 2017 found that 44.5% of the participants had been vaccinated (32). Other articles covering influenza vaccine coverage in the Middle East showed vaccination coverage rate of 27.5% (33) and Arabian Gulf countries (17%) had been vaccinated (34).

Conclusions and Recommendations

In conclusion, the study revealed that one third of the elderly received the seasonal influenza vaccine regularly during the last years and nearly two thirds of them received it last year. Higher coverage rate was higher among highly educated male elderly with sufficient income and at rural residences and those who were asthmatic and previously hospitalized due to flu. Nearly half of the elderly were knowledgeable regarding seasonal influenza and vaccine, especially vaccine safety and efficacy. These findings may help policy makers and health care planners to address gaps in healthcare. These results highlight the necessity for periodic health education and campaigns to improve the level of awareness of influenza vaccination.

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The pattern of diabetic foot and its complications in Albaha, Saudi Arabia

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Abstract

The progressive increase in the incidence of diabetes mellitus (DM), both worldwide and in Saudi Arabia, is associated with progressive complications rates development. Diabetic foot ulcerations and complications are major morbidities associated with progressions of DM neuropathies and vasculopathies. They contribute to marked health expenditure and efforts. Our study aimed at measuring the magnitude of the problem of diabetic foot in the special area of Albaha in Saudi Arabia.

Material and method: We included 53 patients who presented to the diabetic foot center in Al Baha, Saudi Arabia over 1 year. The included patients were assessed by meticulous clinical examination including eye examination and foot assessment for ulcer, neuropathy, skin manifestations like abscesses, and foot deformities. Investigations included fasting blood glucose, hemoglobin A1C (HbA1C), lipid profile, and Doppler Ultrasonography of the lower limbs.

Results: 52 (98.1%) had type II DM, duration of DM was 17.0 (10.0-25.0) years, fasting blood glucose 10.1 (7.6-14.8) mmol/L, and HbA1C 9.1±1.3%. Hypertension was found in 24 (45.3%), atherosclerotic cardiovascular disorders (ASCVD) in 27 (50.9%) and eye complications in 20 (37.7%) of cases. ASCVDs were found to be significantly higher (p 0.009) in patients aged >66 years (18 (69.2%)) in comparison to those <66 years (8 (30.8%)). Regarding foot complications; ulcers were found in 44 (83.0%), foot deformities in 4 (7.6%), skin complications in 28 (52.8%), infections in 20 (37.7%) and gangrene in 10 (18.9%) of cases. Interestingly, diabetic foot ulcers were found to be significantly higher (p 0.038) in patients aged <66 years (24 (88.9%)) in comparison to those aged >66 years (20 (76.9%)). Surgical management including debridement, abscess drainage, dressings, and a skin graft was required in 25 (47.2%) of cases and amputation in 7 (13.2%) of cases.

In conclusion; diabetic foot ulcers and complications are a major health problem contributing to devastating morbidities up to amputations. Poor glycemic control is a major contributing factor for diabetic foot problems. Good glycemic control, diabetic foot meticulous care, and early interventions are recommended health practice strategies.

Key words: Diabetes, Foot, ulcer, complications

Introduction

There is a relentless increase in the incidence of diabetes mellitus (DM) that is associated with increments in diabetic complications. The World Health Organization (WHO) and the International Diabetes Federation (IDF) warned that these complications, if untreated, can threaten many lives (1). Saudi Arabia, with a prevalence of DM of 25.4%, has ranked among the top ten countries with the highest DM prevalence (2). The prevalence of diabetic complications in Saudi Arabia is very high; with 82% for neuropathy, 32% for nephropathy, and 31% for retinopathy (3-5). It is estimated that diabetic foot complications are responsible for 24.4% of the total health care expenditure of the diabetics (6) with expenditures of about 456 million USD in the United Kingdom (7) and 11 billion USD in USA (8). It was estimated that the prevalence of diabetic foot complications among Saudi Arabia population was 3.3% with about 2% with foot ulcers and 0.19% with gangrene and amputation was performed in 1.06% (9).

Regardless of the type of diabetes; progression of age and longer duration of DM were associated with two to four folds increase in the risk of ulcerations and amputations (10). In comparison to patients without diabetic foot ulcers, patients with diabetic foot ulcers have more than two folds higher mortality rates and the main causes of death in the diabetic foot ulcer group are strokes and myocardial infarctions (11-13). Smoking, diabetic nephropathy, and male gender are among the other high-risk factors of mortality in patients with DM (12, 14). Diabetic foot ulcers can be prevented and programs aiming at reducing risk factors can result in up to 70% amputation prevention (10).

Albaha is an area in Saudi Arabia that has its special weather and circumstances. Albaha is located in the south-west of Saudi Arabia, and it is located in an area with elevations of up to 2450 meters above sea level which affects oxygen levels (15). The effect of this special case on the pattern of diabetic foot ulcerations and complications is unclear.

The aim of this study was to assess diabetic foot magnitude of the problem and its pattern in the special area of Albaha region.

Materials and Methods

This cross-sectional study was conducted at the diabetic center of Al Baha city, Saudi Arabia for the duration of 1 year; where diabetic foot patients, whether at their first, or at the follow-up visits, were assessed. This study included 53 patients with diabetic foot who were divided into two groups according to age (<66 years (27 patients) and >66 (26 patients) years) based on the fact of progressive increments of diabetic complications and atherosclerosis with age progression.

Inclusion criteria: patients with diabetes mellitus who presented to Albaha diabetic foot center with any diabetic foot manifestations.
Exclusion criteria: patients refusing to be included in this study.
The included cases were assessed according to the following parameters:

- **Basic data:** age, gender (male/female), body mass index (BMI) and smoking history.
- **Diabetic state:** type, duration, treatment (insulin, oral antidiabetics or combined), fasting blood glucose level and hemoglobin A1C (HA1C).
- **Other therapies:** aspirin, clopidogrel and angiotensin converting enzyme inhibitors (ACEIs) / angiotensin receptor blockers (ARBs).
- **Co-morbidities:** hypertension, kidney functions, eye examination, atherosclerotic cardiovascular disorders (ASCVD) and lipid profile (total cholesterol, low density lipoproteins (LDL), high density lipoproteins (HDL) and triglycerides (TG)).
- Diabetic foot:

1. Ulcer: if any and its/their site/s.
2. Skin abnormalities.
3. Foot deformities.
4. Doppler ultrasonography results.
5. Complications: infections (mild, moderate or severe) and gangrene.
6. Surgical management: if any.
7. Type of amputation: if any.
8. Foot prosthesis.

Data analysis
Data were analyzed using Statistical Package for Social Science software computer program version 26 (SPSS, Inc., Chicago, IL, USA). Data were presented in mean and standard deviation for quantitative parametric data and as median and interquartile range (IQR) for quantitative nonparametric data while qualitative data were presented as frequency (Number-percent). Student's t-test was used for comparing quantitative parametric data while Mann Whitney was used for comparing quantitative nonparametric data. Pearson's chi-square or Fischer's exact tests was used to compare the qualitative data for a table (2x2) and Monte-Carlo for tables with more than (2x2) when indicated. P value less than 0.05 was considered statistically significant.

Results

This study included 53 patients with diabetic foot who presented to the diabetic foot center at Albaha city. The basic characteristics of these cases showed that the mean age was 63.9±13.7 years (mean±SD), 43 (81.1%) of them were males and only 10 (18.9%) were females, MBI was 29.7±5.8 kg/M2 (mean±SD), most of them were non-smokers (48(90.6%)), only 3(5.7%) were smokers and 2(3.8%) ex-smokers (Table 1).

Table 1: Basic characteristics of the included cases:

Characteristic		Results (No / %)
Age in years (mean±SD)		63.9±13.7
Gender	Male	43(81.1%)
	Female	10(18.9%)
BMI(mean±SD)		29.7±5.8
Smoking	No	48(90.6%)
	Ex-smoker	2(3.8%)
	Yes	3(5.7%)

Of the included 53 patients; only 1 (1.9%) had type I DM and 52 (98.1%) had type II DM. The duration of DM in the included cases was 17.0 (10.0-25.0) years. Laboratory features assessing the diabetic status of the included patients showed that Fasting blood glucose was 10.1 (7.6- 14.8) mmol/L and HbA1C was 9.1±1.3% (mean±SD). Regarding drugs used for the treatment of DM and co morbidities; insulin was used in 37 (69.8%), oral anti-diabetics in 33 (62.3%), aspirin in 27 (50.9%), clopidogrel in 7 (13.2%), and ACEIs / ARBs in 10 (18.9%) of the included cases (Table 2).

Table 2: Diabetes Mellitus characteristics, treatment and other therapies of the included cases:

Characteristic			Results (No / %)
DM type		Type I	1(1.9%)
		Type II	52(98.1%)
DM duration (years)			17.0(10.0-25.0)
Fasting blood glucose (mmol/L)			10.1(7.6- 14.8)
HbA1C % (mean±SD)			9.1±1.3
Drugs used	Insulin	No	16(30.2%)
		Yes	37(69.8%)
	Oral antidiabetics	No	20(37.7%)
		Yes	33(62.3%)
	Aspirin	No	26(49.1%)
		Yes	27(50.9%)
	Clopidogrel	No	46(86.8%)
		Yes	7(13.2%)
	ACEIs / ARBs	No	43(81.1%)
		Yes	10(18.9%)

High arterial blood pressure (ABP) was found in 24 (45.3%) of the included cases. ASCVD was positive in 27 (50.9%) of the included cases (atherosclerosis 1 (1.9%), cardiomegaly 1 (1.9%), hypertension 8 (15.1%), hypertension 8 (15.1%), ischemic heart disease 9 (17%), combination of hypertension and ischemic heart disease 7 (13.2%) and stroke 1 (1.9%)). Eye manifestations were positive in 20 (37.7%) of the included cases (cataract 4 (7.5%), DME 1 (1.9%), double vision 1 (1.9%), glaucoma 2 (3.8%), IMSC 1 (1.9%), NPDR 7 (13.2%), PDR 2 (3.8%), pseudophakia 1 (1.9%) and total blindness 1 (1.9%)). Lipid profile of the included cases showed total cholesterol 4.2±1.2 mmol/L (mean±SD), LDL 2.5±.9 mmol/L (mean±SD), TG 1.9±.9 mmol/L (mean±SD) and HDL 1.0±.2 mmol/L (mean±SD) (Table 3).

Table 3: Comorbidities and dyslipidemia of the included cases

Disorder			Results (No / percentage)
High ABP on visits	No (Normal ABP)		29(54.7%)
	Yes (High ABP)		24(45.3%)
ASCVD	No		26(49.1%)
	Yes	Total	27(50.9%)
		Atherosclerosis	1(1.9%)
		Cardiomegaly	1(1.9%)
		HTN history	8(15.1%)
		IHD	9(17%)
		IHD + HTN	7(13.2%)
		Stroke	1(1.9%)
Eye manifestations	No		33(62.3%)
	Yes	Total	20 (37.7%)
		Cataract	4(7.5%)
		DME	1(1.9%)
		Double vision	1(1.9%)
		Glaucoma	2(3.8%)
		IMSC	1(1.9%)
		NPDR	7(13.2%)
		PDR	2(3.8%)
		Pseudophakia	1(1.9%)
		Total blindness	1(1.9%)
Lipid Profile	Cholesterol(mean±SD)		4.2±1.2
	LDL(mean±SD)		2.5±9
	TG(mean±SD)		1.9±9
	HDL(mean±SD)		1.0±2

ABP: Arterial Blood Pressure,
ASCVD: Atherosclerotic Cardio-Vascular Disorders,
HTN: Hypertension,
IHD: Ischemic Heart Disease,
MDE: Diabetic Macular Edema,
IMSC: immature cataract,
NPDR: Non-Proliferative Diabetic Retinopathy,
PDR: Proliferative Diabetic Retinopathy,
LDL: Low Density Lipoprotein cholesterol,
TG: Triglycerides,
HDL: High Density Lipoprotein cholesterol.

Of the included 53 cases; 44 (83.0%) had diabetic foot ulcer (left foot 26 (49.1%), right foot 15 (28.3%) and bilateral 15 (28.3%)), 49 (92.5%) had no foot deformity but only 4 (7.6%) were positive for foot deformities (cavovarus 2 (3.8%) and Charcot joint 2 (3.8%)); 28 (52.8%) had skin abnormalities (abscess 2 (3.8%), unilateral swelling 7 (13.2%), bilateral swelling 2 (3.8%), swelling & redness 1 (1.9%), bullae 1 (1.9%), abscess & swelling 1 (1.9%), bullae & swelling 1 (1.9%), cellulitis 3 (5.7%), swelling & cellulitis 1 (1.9%), cellulitis & abscess 1 (1.9%), delayed wound healing 1 (1.9%), dirty wound 1 (1.9%), pus collections 2 (3.8%), redness, swelling, pus and diabetic dermopathy 2 (3.8%) and wound 2 (3.8%)); 20 (37.7%) had infection with diabetic foot, 10 (18.9%) had gangrene in their foot and 50 (94.3%) showed diabetic foot complications. Doppler ultrasonography of the lower limbs showed bilateral limb ischemia in 1 (1.9%) of cases and diffuse atherosclerotic changes in 1 (1.9%) of the cases. On the other hand; ECHO showed Mild mitral regurgitation & trace aortic regurgitation in 1 (1.9%) of the cases and Mild diastolic dysfunction in 3 (5.7%) of the included cases (Table 4).

Table 4: Diabetic foot characteristics in the included cases:

Characteristic			Results (No / %)
Ulcer	No		9(17.0%)
	Yes (site)	Total	44 (83.0%)
		Left foot	26(49.1%)
		Right foot	15(28.3%)
		Bilateral	3(5.7%)
Foot deformity	No		49(92.5%)
	Yes	Total	4 (7.6%)
		Cavovarus	2(3.8%)
		Charcot joint	2(3.8%)
Skin abnormalities	No		25(47.2%)
	Yes	Total	28(52.8%)
		Abscess	2(3.8%)
		Unilateral swelling	7(13.2%)
		Bilateral swelling	2(3.8%)
		Swelling & redness	1 (1.9%)
		Bullae	1(1.9%)
		Abscess & swelling	1(1.9%)
		Bullae & swelling	1 (1.9%)
		Cellulitis	3(5.7%)
		Swelling & cellulitis	1 (1.9%)
		Cellulitis & abscess	1 (1.9%)
		Delay wound healing	1 (1.9%)
		Dirty wound	1 (1.9%)
		Pus collections	2(3.8%)
		Redness, swelling, pus and diabetic dermopathy	2 (3.8%)
		Wound	2(3.8%)
Infection	No		33(62.3%)
	Yes		20(37.7%)
Gangrene	No		43(81.1%)
	Yes		10(18.9%)
Complications	No		3(5.7%)
	Yes		50(94.3%)
Doppler US of the lower limbs and ECHO abnormalities	No		47(88.7%)
	Yes	Total	6 (11.3%)
		Bilateral limb ischemia	1 (1.9%)
		Diffuse atherosclerotic changes	1 (1.9%)
		Mild MR & trace AR	1 (1.9%)
		Mild diastolic dysfunction	3 (5.7%)

MR: Mitral Regurgitation, AR: Aortic Regurgitation.

Surgical management of the diabetic foot was required in 25 (47.2%) of the included cases (debridement 14 (26.4%), dressing 6 (11.3%), abscess drainage 3 (5.7%), compression with wet gauze 1 (1.9%) and skin graft 1 (1.9%)). Amputation was done in 7 (13.2%) of the included cases (right toe 3 (5.7%), left toe 2 (3.8%), disarticulation 1 (1.9%) and above the knee (left) 1 (1.9%)) (Table 5).

Table 5: Surgical management and amputations (if any) for the diabetic foot in the included cases

Surgical interference			No (%)
Surgical management	No		28(52.8%)
	Yes	Total	25 (47.2%)
		Debridement	14(26.4%)
		Dressing	6(11.3%)
		Abscess drainage	3 (5.7%)
		Compression with wet gauze	1 (1.9%)
		Skin graft	1 (1.9%)
Amputation	No		46(86.8%)
	Yes	Total	7 (13.2%)
		Right toe	3 (5.7%)
		Left toe	2 (3.8%)
		Disarticulation	1 (1.9%)
		Above the knee (left)	1 (1.9%)

There was no statistically significant difference between patients aged <66 years and those aged >66 years regarding BMI and smoking history. In respect of DM characteristics in the included group; there was no statistically significant difference between patients aged <66 years and those aged >66 years regarding the duration of DM, fasting blood glucose measurements, HbA1C percentage, and drugs used for the treatment of DM but there was a statistically significant positive history of usage of aspirin (19 (73.1%)- p value 0.002) and ACEIs/ARBS (8 (30.8%) - p value 0.039) in patients aged >66 years in comparison to those aged <66 years old (8 (29.6%) and 2 (7.4%) respectively) (Table 6 and Table 7).

Table 6: Association between basic characteristics of the included cases in relation to age groups:

Characteristic		Age (No / percentage)		P value
		<66 years	>66 years	
BMI		30.1±5.1	29.2±6.6	0.63
Smoking	No	24 (88.9%)	24 (92.3%)	0.85
	Ex-smoker	1 (3.7%)	1 (3.8%)	
	Yes	2 (7.4%)	1 (3.8%)	

Table 7: Association between Diabetes Mellitus characteristics, treatment and other therapies of the included cases in relation to age groups:

Characteristic			Age (No / percentage)		P value
			<66 years	>66 years	
DM duration (years)			14.5(10.0-20.0)	22.0(15.0-25.0)	0.13
Fasting blood glucose (mmol/L)			9.2(7.1-14.0)	11.3(8.3-15.7)	0.46
HbA1C % (mean±SD)			9.0±1.0	9.1±1.5	0.88
Drugs used	Insulin	No	8 (29.6%)	8 (30.8%)	0.9
		Yes	19 (70.4%)	18 (69.2%)	
	Oral antidiabetics	No	9 (33.3%)	11 (42.3%)	0.5
		Yes	18 (66.7%)	15 (57.7%)	
	Aspirin	No	19 (70.4%)	7 (26.9%)	0.002*
		Yes	8 (29.6%)	19 (73.1%)	
	Clopidogrel	No	25 (92.6%)	21 (80.8%)	0.25
		Yes	2 (7.4%)	5 (19.2%)	
	ACEIs / ARBs	No	25 (92.6%)	18 (69.2%)	0.039*
		Yes	2 (7.4%)	8 (30.8%)	

There was no statistically significant difference between patients aged <66 years and those aged >66 years in the included cases regarding comorbidities (hypertension and eye manifestations of DM) and dyslipidemia apart from ASCVD which was more common in the older patient's group (8 (30.8%) and 18 (69.2%) respectively - p value 0.009).

Table 8: Association between comorbidities and dyslipidemia of the included cases in relation to age groups:

Disorder		Age (No / percentage)		P value
		<66 years	>66 years	
High ABP	No (Normal ABP)	15 (55.6%)	14 (53.8%)	0.9
	Yes (High ABP)	12 (44.4%)	12 (46.2%)	
ASCVD	No	18 (66.7%)	8 (30.8%)	0.009*
	Yes	8 (30.8%)	18 (69.2%)	
Eye manifestations	No	16 (59.3%)	17 (65.4%)	0.6
	Yes	11 (40.7%)	9 (34.6%)	
Lipid profile	Cholesterol	4.4±1.2	4.1±1.3	0.6
	LDL	2.4±0.8	2.6±1.1	0.6
	TG	1.9±0.6	1.9±1.1	0.76
	HDL	1.0±0.2	0.9±0.3	0.58

In respect of diabetic foot characteristics; there was no statistically significant difference between patients aged <66 years and those aged >66 years regarding foot deformities, infection, gangrene, overall complications, and lower limb vascularity assessed by lower limb Doppler ultrasonography apart from diabetic foot ulcer which was significantly higher in the younger patient's group (24 (88.9%) and 23 (76.9%) respectively - p value 0.038).

Table 9: Association between diabetic foot characteristics in the included cases in relation to age groups:

Characteristic		Age (No / percentage)		P value
		<66 years	>66 years	
Ulcer	No	3 (11.1%)	6 (23.1%)	0.038*
	Total ulcers	24 (88.9%)	20 (76.9%)	
	Left foot	18 (66.7%)	8 (30.8%)	
	Right foot	6 (22.2%)	9 (34.6%)	
	Bilateral	0 (0.0%)	3 (11.5%)	
Foot deformity	No	24 (88.9%)	25 (96.2%)	0.6
	Cavovarus	2 (7.4%)	0 (0.0%)	
	Charcot's joint	1 (3.7%)	1 (3.8%)	
Skin abnormality	No	15 (55.6%)	10 (38.5%)	0.2
	Yes	12 (44.4%)	16 (61.5%)	
Infection	No	17 (63.0%)	16 (61.5%)	0.9
	Yes	10 (37.0%)	10 (38.5%)	
Gangrene	No	22 (81.5%)	21 (80.8%)	1.00
	Yes	5 (18.5%)	5 (19.2%)	
Complications	No	1 (3.7%)	2 (7.7%)	0.6
	Yes	26 (96.3%)	24 (92.3%)	
Doppler and ECHO abnormalities	No	24 (88.9%)	23 (88.5%)	0.58
	Bilateral limb ischemia	0 (0.0%)	1 (3.8%)	
	Diffuse atherosclerotic changes	1 (3.7%)	0 (0.0%)	
	Mild MR & trace AR	0 (0.0%)	1 (3.8%)	
	Mild diastolic dysfunction	2 (7.4%)	1 ((3.8%)	

There was no statistically significant difference between patients aged <66 years and those aged >66 years in the included cases regarding surgical management done for the included cases (debridement, dressings, abscess drainage, wet gauze compression, and skin grafts) and amputations done.

Table 10: Association between surgical management and amputations (if any) for the diabetic foot in the included cases in relation to age groups:

Surgical interference		Age (no / percentage)		P value
		<66 years	>66 years	0.75
Surgical management	No	13 (48.1%)	15 (57.7%)	
	Debridement	8 (29.6%)	6 (23.1%)	
	Dressing	4 (14.8%)	2 (7.7%)	
	Abscess drainage	0 (0.0%)	3 (11.5%)	
	Compression with wet gauze	1 (3.7%)	0 (0.0%)	
	Skin graft	1 (3.7%)	0 (0.0%)	
Amputation	No	24 (88.9%)	22 (84.6%)	0.09
	Right toe	3 (11.1%)	0 (0.0%)	
	Left toe	0 (0.0%)	2 (7.7%)	
	Disarticulation	0 (0.0%)	1 (3.8%)	
	Above the knee (left)	0 (0.0%)	1 (3.8%)	

Discussion

Diabetic foot complications are responsible for about 24% of health expenditure in patients with DM (6). These complications can lead to both morbidities and mortalities in diabetics and physiological and physical burdens are a consequence. To set better health programs; it is the role of health personnel and organizations to identify diabetic foot-related problems and set up prevention programs to avoid these complications (9).

Our study included 53 patients with diabetic foot who presented to the diabetic foot center in Albaha, Saudi Arabia. The mean age of the included cases is 64 years; most of them were males 43 (81.1%), BMI is 29.7±5.8 and most of them were non-smokers 48 (90.6%). Current smoking was shown to be a hazardous risk for diabetic complications (12). The low smokers' ratio in our study may be related to the high altitude in Albaha that makes smoking difficult with the low atmospheric oxygen tension. Nordström and colleagues found that the prevalence of DM was 14.6% in men and 9.1% in women (P < .001) and this was related to visceral obesity which was evidenced in our study with BMI of 29.7±5.8 (16).

The average DM duration in our study was 17.0 (10.0-25.0) years. It is well established that diabetic foot complications are directly related to the duration of DM (9, 10, 17). A longer duration of DM is associated with more risk of development of vasculopathy and neuropathy that are related to the development of diabetic foot complications and other diabetes-related complications. Poor glycemic control is significantly correlated with diabetic complications (18). Poor glycemic control in or study population was indicated by a high HbA1C of 9.1±1.3% and elevated fasting blood glucose of 10.1 (7.6- 14.8) mmol/L and this was manifested with their presentation to the diabetic foot center with diabetic foot, its complications, and other DM related complications. Poor control of DM management is composed of revision of dietary plans and exercise and drug management plans and revision. Insulin may be needed at some stages of type II DM. This was shown in our study; although 52 (98.1%) had type II DM, 37 (69.8%) used insulin therapy. Although only 8 patients had a history of hypertension, 10 patients were using ACEIs / ARBs. It was shown that ACEIs / ARBs reduce the risk of progressive renal diseases, microalbuminuria, and cerebrovascular event, even in normotensive people (19, 20) (Tables 2, 3).

Type II DM and hypertension are frequent comorbidities. In our study; although 8 (15.1%) had a history of hypertension, 24 (45.3%) were found to have hypertension at their presentation to the diabetic foot center (Table 3). The frequent coexistence of DM and hypertension is related to common pathophysiological mechanisms like obesity and insulin resistance. It was found that 50% of hypertensives can experience type II DM or insulin resistance. On the other hand, the San Antonio Heart Study found that 85% of patients with type II DM experienced hypertension in their fifties (21). Insulin resistance in conjunction with chronic hyperglycemia plays a major role in the development of vascular complications, both macrovascular and microvascular (22). In our study, atherosclerotic cardiovascular diseases were found in 27 (50.9%) ranging from atherosclerosis to stroke. It was found that the risk of cardiovascular events is increased even at the early stages of prediabetes and insulin resistance (23). Eye complications are a major problem related to morbidity and lifestyle compromise in patients with DM. In our study; eye manifestations were found in 20 (37.7%), non-proliferative diabetic retinopathy in 7 (13.2%), and proliferative diabetic retinopathy in 2 (3.8%). Diabetic retinopathy was found in 28% of type II DM patients in the United States (24). It is responsible for 10,000 cases of blindness worldwide every single year (25). Strict glycemic control with a HbA1C target of <6.0 % was shown to be significantly correlated with a lower rate of diabetic retinopathy progression according to the Action to Control Cardiovascular Risk in Diabetes (ACCORD) Trial (26). In our study; the blood levels of LDL cholesterol (2.5±.9 mmol/L) and triglycerides (TG) (1.9±.9 mmol/L) are marginally above the recommended lipid profile levels in diabetics (27, 28). Dyslipidemia associated with DM is characterized by low HDL, elevated LDL-cholesterol, and TG (29). There is an interplay between DM and dyslipidemia and it may not only be a consequence of impaired glucose metabolism but also cause it (30).

Diabetic foot ulcers are a devastating complication of DM and are usually associated with vasculopathy causing peripheral arterial disease or neuropathy. It is encountered in about 10% of the diabetic population (31). In our study; 44 (83.0%) of the cases are presented with active diabetic foot ulcers. This is related to the fact that the diabetic foot center is aimed at the management of diabetic foot complications. It was estimated that the prevalence of diabetic foot complications among the Saudi Arabia population was 3.3% with about 2% with foot ulcers and 0.19% with gangrene and amputation was performed in 1.06% (9). Generally; 10–15% of diabetic foot ulcers will remain active and limb amputation may be needed in 5-25% of these cases (32). In our study; amputation was done in 7 (13.2%) cases. Besides neuropathy and vasculopathy, structural foot deformities may also contribute to the development of diabetic foot ulcers and complications (33). Foot deformities were found in 4 (7.6%) of our study cases, 2 (3.8%) with Cavovarus deformity, and 2 (3.8%) with Charcot's joint. The dermatological examination is an important entity in the examination of diabetic foot. It includes a visual inspection of the skin of the legs and feet, particularly the dorsal, plantar, medial, lateral, and posterior surfaces, as well as a close examination of each toenail. It includes also the observation of skin fissuring, sensations, and complications (34). Skin complications were encountered in 28 (52.8%) of our cases, ranging from swelling and neuropathy to pus collections and abscess formation.

The gold standard for diabetic foot ulcer treatment includes debridement of the wound, management of any infection, revascularization procedures when indicated, and off-loading of the ulcer (35). Surgical management of diabetic

foot complications was required in 25 (47.2%) of our cases, debridement in 14 (26.4%), dressing in 6 (11.3%), abscess drainage in 3 (5.7%), wet gauze compression in 1 (1.9%) and skin graft in 1 (1.9%) of cases. Management of diabetic foot complications is a big challenge and implementations of its therapeutic plans are required.

The prevalence of diabetes-related complications shows continuous progression with aging; including neuropathy, vasculopathy, and foot deformities. This is manifested by increased diabetic foot ulcers and rates of amputations in the elderly (36). Based on this fact; we divided our cases into two groups according to age; <66 years (27 cases) and >66 years (26 cases). In our study; 18 (69.2%) of the older group cases had ASCVD in comparison to 8 (30.8%) in the group <66 years (p value 0.009). This was reflected on therapies where Aspirin and ACEIs / ARBs use was significantly used in patients >66 years in comparison to patients >66 years (p value 0.002 and 0.039 respectively). It was found that diabetes remains a risk factor for cardiovascular events and mortality in elderly populations (37). In our study; diabetic foot ulcers were found in 24 (88.9%) of patients aged <66 years in comparison to 20 (76.9%) in patients aged >66 years (p value 0.038) and there was no statistically significant difference between the two age groups regarding deformities, infections and skin and other abnormalities . The higher rate of foot ulcers in our study group is in opposition to most of the studies that show that the risk of ulcers is increased with age progress (36, 38). The age of the patient is not the sole factor affecting foot ulcers, other factors such as the duration of DM, glycemic control, the severity of infection, and pressure sites like heel are also ulcer effectors. Despite this higher rate of foot ulcers in patients aged <66 years in our study, no statistically significant difference was detected regarding surgical management required in these cases. Mahmoud and colleagues found that ulcer healing rate was higher in the younger age group than the older one (38).

Conclusion and Recommendations

In conclusion; diabetic foot ulcers and complications are a major health problem contributing to devastating morbidities up to amputations. Poor glycemic control is a major contributing factor for diabetic foot problems. A good glycemic control, diabetic foot meticulous care, and early interventions are recommended health practice strategies.

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Awareness regarding diabetic peripheral neuropathy and its risk factors among diabetics in Muhayil City, Saudi Arabia

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Abstract

Objectives: To assess the level of awareness regarding diabetic peripheral neuropathy (DPN) and its risk factors among diabetics in Muhayil City, Aseer Region, Saudi Arabia.

Subjects and Methods: A cross-sectional study was conducted from June to November 2020 in primary health care centers, Muhayil City, Saudi Arabia. Data were collected using an Arabic Language interview questionnaire, which included patient's demographics, in addition to awareness and knowledge items about DPN and its risk factors.

Results: This study included 367 diabetic patients. Their mean± SD age was 59±12 years. The mean±SD of diabetes duration was 8±5 years. Regarding participants' awareness grades about diabetes and its risk factors, 4.1%, 18.5%, and 77.4% had excellent, acceptable, and poor awareness levels, respectively. Prevalence of DPN was 10.1% based on the history part of the Michigan neuropathy screening instrument, and 12.3% based on the examination part of the Michigan neuropathy screening instrument.

Conclusions: Type 2 diabetic patients in Muhayil City have poor awareness about DPN and its risk factors. However, prevalence of DPN among them is relatively low.

Key words: Diabetes mellitus, diabetic peripheral neuropathy, awareness, Saudi Arabia.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease. It is characterized by elevated levels of blood glucose, which lead over time to serious complications, of which diabetic neuropathy is the most common complication (1-2).

Diabetic neuropathy is one of the most common long-term complications of diabetes and is the main initiating factor for foot ulceration, Charcot neuroarthropathy, and lower-extremity amputation (3). It is defined by the International Consensus Guidelines as: "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes" (4). In order to manage the serious complications of diabetes, it was recommended to screen for diabetic neuropathy at diagnosis and then every year afterwards (5).

Several studies from different parts of the world revealed that prevalence of diabetic peripheral neuropathy (DPN) was very high and ranged from 36.6%, in U.S. to 20% in the Middle-Eastern region (6). Among Saudi patients, after more than 10-years of diabetes, neuropathy prevalence was reported as high as 82%. Diabetic patients can play a vital role in early identification and reporting peripheral diabetic neuropathy to their physicians if they are aware about it. Despite that data on awareness about diabetic nephropathy in Saudi Arabia are scarce (7-8).

This study aimed to assess the level of awareness regarding diabetic peripheral neuropathy and its risk factors among diabetics in Muhayil City, Aseer Region, Saudi Arabia.

Methodology

This study was conducted during the period between June and November 2020. In Muhayil City, there are 26 primary health care centers serving 5612 diabetic patients.

Our sample size needed was calculated according to the Raosoft Sample Size Calculator (9) website to be 360 patients, with 5% error margin, 95% confidence level, 5,612 population size and 50% response distribution.

A simple random sampling technique was followed to select three primary healthcare centers with a total number of registered diabetic patients more than 400. Participant patients were interviewed and examined at the Chronic Diseases clinics of selected primary healthcare centers.

For data collection, the researchers used an interview questionnaire that has been developed by the researchers. It includes the following parts (in a simple Arabic language):

- **Personal characteristics:** age, sex, nationality, job, marital state, education level, smoking status, height, weight and Body Mass index.
- **Present history of diabetes:** Duration, types of received medications, last three readings of fasting blood glucose, and HbA1c.
- **Associated chronic diseases:** hypertension, ischemic heart disease, hyperlipidemia and renal disease.
- **Awareness items regarding DPN and its risk factors:** The researchers adopted a questionnaire that was adopted from the Canadian Diabetes Association about DPN (5). It comprised eight multiple choice questions that assess patients' awareness of DPN and its risk factors. A correct answer was assigned (1) point. The total score was 22 points. Accordingly, participants' total level of awareness was classified into 3 categories: "Poor" for patients who attained ≤60%, "Acceptable" for patients who attained 61%-79%, and "Excellent" for patients who attained ≥80%.
- **Screening for DPN:** This was done by using the validated Michigan Neuropathy Screening Instrument (10).

The Statistical Package for Social Sciences (IBM, SPSS version 25.0) was used for data entry and analysis. Descriptive statistics were calculated using frequency and percentage for qualitative variables, or mean and standard deviation for quantitative variables.

All necessary official and ethical approvals and permissions were fully secured before data collection. Collected data were kept strictly confidential and were used only for research purposes. The ethical approval of this study was obtained from the Ethical Committee of Scientific Research in King Khalid University (ECM#2019-104)—(HAPO-06-B-001) and was obtained on 25/12/2019.

Results

A total of 367 type 2 diabetic patients were enrolled in the present study. Table 1 shows that the mean±SD of participants' age was 59±12 years, with dominancy of the age group of 41-70 years old, which represented 278 (76%) of all participants. Males were slightly more than females (217, 59.1%, vs. 150, 40.9%, respectively). The majority were Saudi (361, 98.4%), and the largest proportion of patients were housewives (144, 39.2%). The most predominant education level was intermediate education (114, 31%), while 15.5% were current smokers.

Table 2 shows that the mean duration of diabetes mellitus was 8±5 years. Almost half of patients (45%) reported a disease duration between 6-12 years. Almost all patients were treated with metformin (365, 99.5%), followed by sulfonylureas (230, 62.7%) and DPP4 inhibitors (224, 61%). Hypertension was the most common comorbidity among patients (225, 61%), while 52.3% were obese. Regarding diabetes control, fasting blood sugar was <130 mg/dL in 18% of patients, while HbA1c was <7% in 3.5% of patients.

Table 3 shows that only 17.2% knew about DPN. Burning and tingling were the most frequently stated DPN symptoms (70% and 61%, respectively), while throbbing, and not feeling pain or hot/cold feet were the least stated (16.3% and 9.3%, respectively). High blood glucose levels were the most frequently stated risk factor for DPN (80.4%), while the least stated were high blood pressure and

elevated triglycerides (24.5% and 29.7%, respectively). Foot ulcers and missing minor cuts and sores were the most frequently stated complications of DPN (71.7% each), while amputation was the least frequently stated (56.7%). Most participants stated that DPN is diagnosed radiologically (62.7%), while 23.7% stated that it is diagnosed by special clinical tests. All participants stated that DPN can be prevented by proper foot care and strict blood glucose control. Only 11.2% stated that there are certain medications that decrease DPN pain.

Figure 1 demonstrates the patients' awareness levels about DPN, with 4.1% having an excellent grade of awareness, 18.5% having an acceptable grade, and 77.4% having a poor grade.

Table 4 shows that the participants' awareness grades did not differ significantly according to their diabetes control.

Table 5 shows that the prevalence of peripheral neuropathy among the diabetic patients was (10.1%) as indicated by using the history part of the Michigan Neuropathy Screening Instrument (MNSI).

Table 6 shows that the prevalence of peripheral neuropathy among the diabetic patients was (12.3%) among 45 patients by using the examination part of the Michigan Neuropathy Screening Instrument (MNSI).

Table 1: Diabetics demographic characteristics in Muhayil City, Aseer region, 2020, (n=367)

Sociodemographic Characteristics	No.	%
Age (Years):		
• ≤40	30	8.2
• 41-70	278	75.7
• ≥71	59	16.1
• Mean±SD	59.0±12.0	
Gender:		
• Male	217	59.1
• Female	150	40.9
Nationality:		
• Saudi	361	98.4
• Non-Saudi	6	1.6
Job:		
• Housewife	144	39.2
• Retired	133	36.2
• Teacher	23	6.3
• Military	8	2.2
• Other	51	13.9
• Unemployed	8	2.2
Education level		
• Illiterate	90	24.5
• Primary	36	9.8
• Intermediate	114	31.0
• Secondary	73	19.9
• University	54	14.7
Current smokers	57	15.5

Table 2: Diabetic patients' clinical characteristics in Muhayil City, Aseer region, 2020, (n=367)

Clinical Characteristics	No.	%
Duration of diabetes (in years):		
• ≤1	26	7.1
• 2 –5	111	30.2
• 6 –12	165	45.0
• ≥13	65	17.7
• Mean±SD	8.0±5.0	
Received medications:		
• Metformin	365	99.5
• Sulfonylureas	230	62.7
• DPP4 inhibitors	224	61.0
• Insulin glargine	75	20.4
• Humalog or Mixtard insulin	48	13.1
• Medications for foot pain	41	11.2
• Other Medications	20	5.4
Comorbidity:		
• Hypertension	225	61.3
• Cardiovascular disease	33	9.0
• Dyslipidemia	181	49.3
• Kidney disease	2	0.5
Obesity:		
• Overweight (BMI 25 to 29.9)	154	42.0
• Obesity class I (BMI 30 to 34.9)	192	52.3
• Obesity class II (BMI 35 to 39.9)	15	4.1
• Obesity class III (BMI ≥40)	3	0.8
Fasting blood sugar:		
• Controlled (≤130 mg/dL)	66	18.0
• Uncontrolled (≥131 mg/dL)	262	71.4
• Missing data	40	10.9
Glycated hemoglobin (HbA1c):		
• Control (≤7%)	13	3.5
• Uncontrolled (>7%)	118	32.2
• Missing data	236	64.3

Table 3: Knowledge of diabetic patients regarding diabetic peripheral neuropathy (DPN) and its risk factors in Muhayil City, Aseer Region, 2020, (n=367)

Knowledge items	Yes		No		Do not know	
	No.	%	No.	%	No.	%
Do you know what is DPN?	63	17.2	252	68.7	52	14.2
Exposure to high blood glucose levels over an extended period of time cause damage to peripheral nerves	149	40.6	96	26.2	122	33.2
Symptoms of DPN in the toes and feet:						
• Sharp, shooting pain	146	39.8	80	21.8	141	38.4
• Burning	257	70.0	80	21.8	30	8.2
• Tingling	224	61.0	66	18.0	77	21.0
• Pin pricked	135	36.8	118	32.2	114	31.1
• Throbbing	60	16.3	153	41.7	154	42.0
• Not feeling pain or hot/cold feet	34	9.3	88	24.0	245	66.8
Risk factors for DPN:						
• High blood glucose levels	295	80.4	27	7.4	45	12.3
• Elevated triglycerides	109	29.7	124	33.8	134	36.5
• Excess body weight	124	33.8	123	33.5	120	32.7
• Smoking	220	59.9	52	14.2	95	25.9
• High blood pressure	90	24.5	133	36.2	144	39.2
Complications of DPN:						
• Foot ulcers	263	71.7	20	5.4	84	22.9
• Not noticing minor cuts and sores	263	71.7	31	8.4	73	19.9
• Wounds infections and gangrene	244	66.5	44	12.0	79	21.5
• Amputation	208	56.7	30	8.2	129	35.1
	Radiological		Special clinical tests		Do not know	
	No.	%	No.	%	No.	%
How to diagnose diabetic peripheral neuropathy?	230	62.7	87	23.7	50	13.6
	Yes		No		Do not know	
How to prevent complications of DPN?	No.	%	No.	%	No.	%
• Proper foot care	367	100.0	0	0.0	0	0.0
• Strict blood glucose control	367	100.0	0	0.0	0	0.0
• Control risk factors	177	48.2	40	10.9	150	40.9
Are there certain medications that decrease DPN pain?	41	11.2	168	45.8	158	43.1

Figure 1: Participants' grades of awareness about diabetic peripheral neuropathy

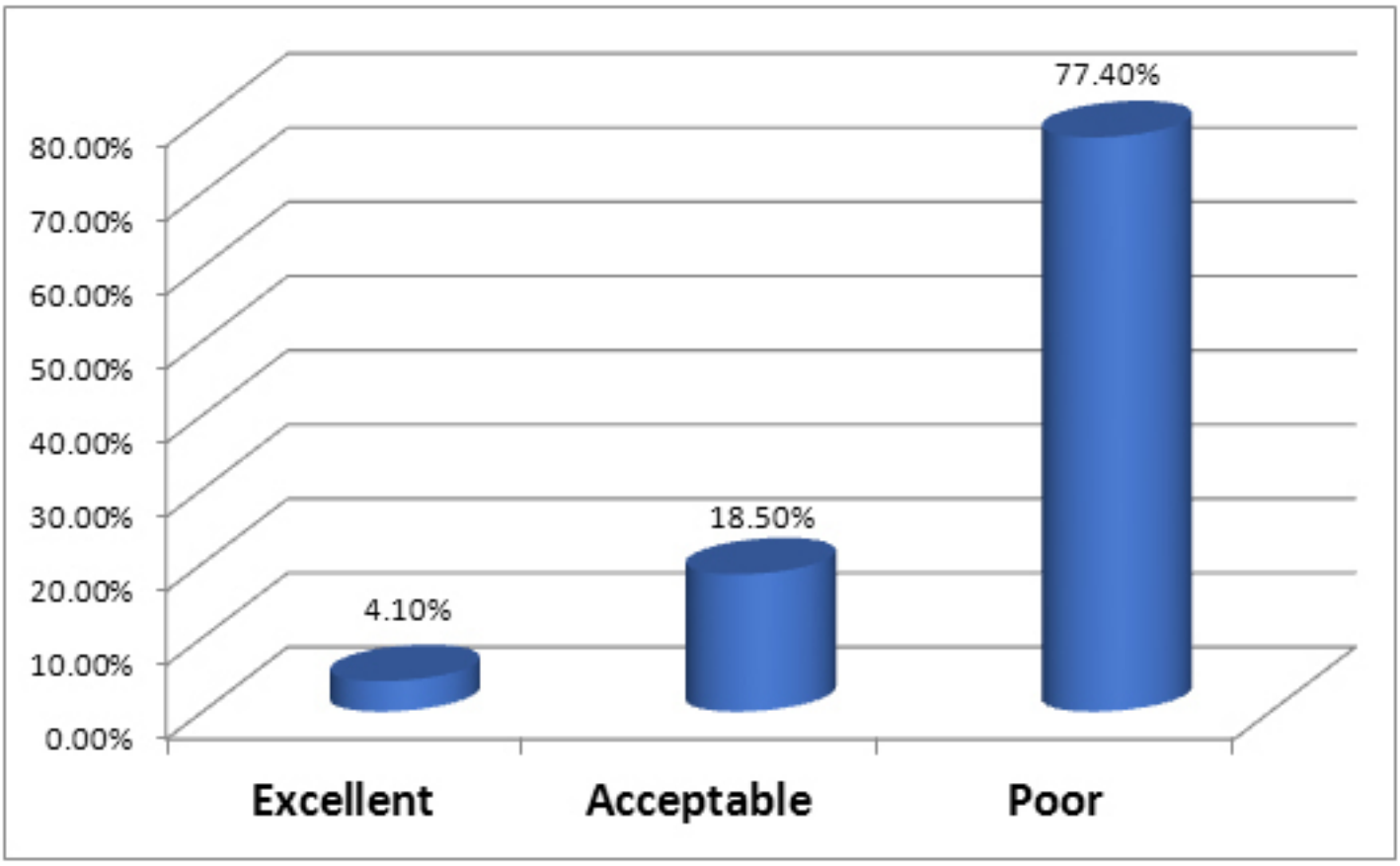

Table 4: The association between participants' diabetes control and their awareness grades regarding diabetic peripheral neuropathy

Awareness Grades	Controlled (HbA1c ≤7)	Uncontrolled (HbA1c >7)	P-value
Excellent	0 (0%)	7 (100%)	
Acceptable	1 (5.3%)	18 (94.7%)	0.473
Poor	12 (11.4%)	93 (88.6%)	

Table 5: Assessment of peripheral neuropathy in diabetic patients using history part of Michigan Neuropathy Screening Instrument

Questions	Yes		No	
	No.	%	No.	%
Are your legs and/or feet numb?	80	21.8	287	78.2
Do you ever have any burning pain in your legs and/or feet?	183	49.9	184	50.1
Are your feet too sensitive to touch?	28	7.6	339	92.4
Do you get muscle cramps in your legs and/or feet?	193	52.6	174	47.4
Do you ever have any prickling feelings in your legs or feet?	108	29.4	259	70.6
Does it hurt when the bed covers touch your skin?	38	10.4	329	89.6
When you get into the tub or shower, are you able to tell the hot water from the cold water?	353	96.2	14	3.8
Have you ever had an open sore on your foot?	221	60.2	146	39.8
Has your doctor ever told you that you have diabetic neuropathy?	25	6.8	340	92.6
Do you feel weak all over most of the time?	247	67.3	120	32.7
Are your symptoms worse at night?	118	32.2	249	67.8
Do your legs hurt when you walk?	35	9.5	332	90.5
Are you able to sense your feet when you walk?	358	97.5	9	2.5
Is the skin on your feet so dry that it cracks open?	29	7.9	338	92.1
Have you ever had an amputation?	1	0.3	366	99.7

Results	No.	%
• Positive (≥7)	37	10.1%
• Negative (≤6)	330	89.9%
Total	367	100.0%

Table 6: Assessment of peripheral neuropathy in diabetic patients using examinations part of Michigan Neuropathy Screening Instrument

	Findings					
Assessment	Normal		Abnormal			
Appearance of Feet:	No.	%	No.		%	
• Right	358	97.5	9		2.5	
• Left	360	98.1	7		1.9	
Ulceration:	Absent		present			
• Right	362	98.6	5		1.4	
• Left	367	100.0	0		0.0	
	Present		Reinforcement		absent	
Ankle Reflexes:	No.	%	No.	%	No.	%
• Right	356	97.0	10	2.7	1	0.3
• Left	354	96.5	13	3.5	0	0.0
Vibration at great toe:	Present		Decreased		Absent	
• Right	288	78.5	49	13.4	30	8.2
• Left	289	78.7	47	12.8	31	8.4
Monofilament:	Normal		Reduced		Absent	
• Right	202	55.0	117.0	31.9	48	13.1
• Left	199	54.2	116	31.6	52	14.2

Results	No.	%
• Positive (≥2.5)	45	12.3
• Negative (≤2)	322	87.7
Total	367	100.0

Discussion

Saudi Arabia is the second highest country in the Middle East and the seventh globally for rating diabetes according to the World Health Organization (WHO) (11). Diabetic peripheral neuropathy is a common complication in diabetic patients (12).

We aimed to investigate the awareness of diabetic patients regarding peripheral neuropathy and its risk factors.

Our patients' awareness about peripheral neuropathy was excellent among very few patients (4.1%), whereas the largest proportion (77.4%) had poor knowledge, and acceptable knowledge was found among 18.5% of patients. There was no significant difference between the knowledge of patients with controlled HbA1c and those with uncontrolled HbA1c.

Our results are in accordance with those of Alhashim et al. (13) in Al-Ahsa, Saudi Arabia, who found that only 7.2% of patients had high awareness, whereas 54.6% were not aware of DPN. Their patients' level of awareness differed significantly between patients who received health education about DPN by their healthcare providers and those who did not.

These findings confirm the importance of providing health education to diabetic patients regarding DPN and emphasizes the role of health education in increasing the level of awareness about DPN.

The diagnosis of DPN among our patients was based on both the history and examination parts of the Michigan neuropathy screening instrument (MNSI). The prevalence of peripheral neuropathy was 10.1%, 12.3% according to history and the examination respectively. The examination of the patients showed that 4.4% had abnormal appearance of feet and the most affected feet were the right feet. Ulceration was found among 1.4% of the patients, and all reported ulcers were in the right leg. The majority of participants had ankle reflexes, and most of the patients reported vibration sense at the great toe.

Higher prevalence of DPN was reported by several studies in Saudi Arabia. A study from primary care centers in Riyadh City showed that 35% of diabetic patients suffered from DPN (3). Another study reported a prevalence of 30.1% (14). A hospital-based study reported a high prevalence of DPN (69.2%) among type 2 diabetic patients (15). In Jeddah City, prevalence of DPN, based on a combination of neurological symptoms and reduced vibration perception was reported to be 19.9% (6).

A study on diabetic patients in US and Europe reported that prevalence of DPN ranged from 6% to 51%, based on the population studied (16). In India, prevalence of DPN was reported to be 47% in the Indian study, and it was associated with a longer duration of diabetes (17).

These wide variations in prevalence rates of DPN reported by different studies may be explained by that assessment of DPN prevalence depends on several factors, such as type of diabetes, study population, criteria for case definition, glycemic control and duration of diabetes. Prevalence of DPN can be reduced by provision of high health care and strictly controlling blood sugar (18).

Wang et al. (6) reported that prevalence of DPN among diabetic patients was associated with their glycemic control, duration of diabetes, and abdominal obesity. Aljohani et al. (15) noted that the risk factors for DPN include high HbA1c, patient's age, and duration of diabetes. Similarly, Akbar et al. reported that factors including poor glycemic control, longer duration of diabetes, smoking, and older age were reported to be risk factors for DPN among Saudi patients with T2DM (19).

In conclusion, this study revealed that type 2 diabetic patients in Muhayil city, Saudi Arabia, have poor awareness about DPN and its risk factors. Since diabetic patients are at high risk of developing such complications, it is necessary to conduct intensive health education about diabetes and its complications, that should start at the time of diagnosis to minimize the risk factors of DPN among these patients, and to maintain regular clinical assessment to detect DPN. Moreover, family physicians should be aware of DPN symptoms and complications for diabetic patients at the follow up clinics, and do annual screening for DPN. Diabetic patients should be trained to do proper foot self-care, and blood glucose control, to prevent and delay DPN as much as possible. Diabetic patients should be motivated to maintain healthy weight, do regular and annual investigations and screening, and to manage any associated chronic diseases.

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Prevalence, determinants and impact of migraine on quality of life of healthcare workers at primary healthcare centers in Abha City, Saudi Arabia

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Abstract

Objective: To assess prevalence, determinants and impact of migraine on health-related quality of life (HRQOL) among healthcare workers in Abha primary healthcare centers.

Methods: Following a cross-sectional research design, the present study was conducted on 212 healthcare workers at primary healthcare centers belonging to the Ministry of Health in Abha City, Saudi Arabia. A self-administered questionnaire was used for data collection.

Results: 51.9% were males and 38.2% were residents. The mean±SD of MIDAS score was 12±10.6, and the mean±SD score of HRQOL was 54.9±7.4. The migraine disability assessment (MIDAS) grades differed significantly according to gender (p=0.011), position (p<0.001), migraine attacks (P<0.001), and positive family history of migraine (p=0.006). The HRQOL was significantly associated with smoking habits (p=0.037), migraine attacks in the previous year (p<0.001), and accompanied symptoms (P=0.037).

Conclusions: Prevalence of migraine varies according to several factors. The attacks of migraine affected grades of migraine disability and health-related quality of life of healthcare workers.

Key words: Migraine, Health Care Workers, Quality of life, Saudi Arabia.

Introduction

Headache causes substantial disability [1] and it is one of the commonest reported neurological disorders seen in primary care settings [2]. The three disorders that are responsible for the majority of headache-attributed burden are tension-type headache, migraine, and medication-overuse headache (MOH) [3-7].

Migraine is characterized by unilateral, pulsatile attacks of headache, which is more present in the temporal area and its duration ranges between 4 and 72 hours [8-10]. It is more observed among females than males, which could be attributed to changes in the hormone levels [11]. Migraine could reduce work performance and daily activities, as most migraine sufferers reported reduction of activities during headache attacks [12-14].

Globally, migraine is a prevalent disorder with a prevalence of approximately 12% among the general population [15]. According to the World Health Organization (WHO), [16] it is ranked 19th among all diseases causing disability and is the 12th leading cause of years lived with disability among the general population of all ages worldwide. Migraine is generally considered a disease that can significantly reduce the quality of life (QOL) of affected individuals [17, 18].

Work-related stress is considered an important environmental cause of migraine [19]. Healthcare workers (HCWs) have a stressful work environment, are frequently exposed to emotional stress, are often on rotating work shifts because of their job demands [20, 21]. Almost half (45%) of HCWs, particularly physicians and nurses, reported highly stressful workdays [22].

The prevalence of migraine among HCWs is variable. In Taiwan, [23] it is approximately 29% among nurses, whereas in Northern China, [24] it is nearly 15% in nurses. In Norway, it is 19.6% among nurses [25]. However, prevalence of migraine among HCWs remains to be explored.

The aim of this study was to assess prevalence, determinants and impact of migraine on primary healthcare workers' quality of life in Abha City, Saudi Arabia.

Methodology

Following a cross-sectional study design, the present study was conducted during the period from February 2020 till December 2020. Healthcare workers at the primary healthcare (PHC) centers in Abha City belonging to the Ministry of Health constituted the study population (N=491 in 52 PHC centers).

The sample size was calculated to be 193, using the single proportion equation in Raosoft Sample Size Calculator website, [26] at 95% confidence intervals, expected frequency 29%, and 5% accepted margin of error. However, the study sample was increased to 212 to compensate for any drop out.

A simple random sampling technique was applied. The total sample (n=212) was proportionally distributed among physicians and nurses (164 nurses and 48 physicians). A total of 23 primary healthcare centers were selected by simple random sampling technique from a list that included all 52 primary care centers. In a selected center, all healthcare workers in the selected centers were invited to participate until the required sample size could be fulfilled.

A self-administered questionnaire was used for data collection. It included demographic data and details of migraine headache using the Headache Assessment Questionnaire throughout the period of the past 12 months. To measure the impact of headache on a person's daily functioning, the valid and reliable Migraine Disability Assessment (MIDAS) test was applied [27]. Moreover, the abbreviated World Health Organization Quality of Life (WHOQOL-BREF) questionnaire was applied to assess the quality of life among participants. It is a validated tool assessing quality of life in the domains of physical health, psychological health, social relationships and environment. This tool has been tested across cultures including in the general Arabic population and showed very good psychometric properties, such as construct validity and internal consistency with Cronbach's alpha superior to other QoL assessment tools. Scores ≤ 45 were considered as "poor" HRQOL; scores 46–65 were considered as "moderate" HRQOL; and scores > 65 were considered as "high" HRQOL [28-32].

Migraine was defined as recurrent headache, lasting 4 to 72 hours, with at least 2-4 of the following quality of pain features: unilateral, pulsatile, or throbbing; moderate to severe headache; exacerbating on movement; and associated with gastrointestinal symptoms (either nausea or vomiting) or photophobia/phonophobia. However, no attempt was made by the researchers to differentiate between the different forms of migraine [33].

A pilot study was applied on 10 participants (5 physicians and 5 nurses), whose responses were not included into the main study. The purpose of the pilot study was to assess the validity and reliability of the study questionnaire, and to identify the necessary modifications that were carried out accordingly.

A self-administered questionnaire sheet was given by the researchers to all participants after clearly describing the study objectives to them. The questionnaire sheets were collected immediately after being filled.

The Statistical Package for Social Sciences (SPSS, Inc, Chicago, IL, USA for Windows version 25.0) was used for data entry and analysis.

All the necessary official and ethical approval permissions were fully secured before data collection, including the ethical approval [(ECM#2020-134)-(HAPO-06-B-001)]. Collected data were kept strictly confidential and were used only for research purposes. The study did not receive any financial support, and the authors do not have any conflict of interest.

Results

A total of 212 healthcare workers were included in this study. The mean ±SD of their age was 32±7 years. The demographics of the participants and the pattern of migraine are shown in Table 1. The number of males was slightly higher compared to females; (110, 51.9% and 102, 48.1%, respectively. Residents were dominant among participant HCWs, 81 (38.2%). More than ahalf of the HCWs (112, 52.8%) reported experience in PHC of 1-5 years. Less than one-half 95 (44.8%) reported doing shift work. More than one-half of the HCWs reported daily drinking of coffee 129 (60.8%) and were not smokers 135 (63.7%).

The mean±SD of the duration of migraine without using any medication was 4.8±10.2 hours. Regarding patterns of migraine, the number of most prevalent attacks was 1-4 attacks as reported by 92 (43.4%) who reported having 1-7 attacks of migraine during the previous 12 months. More than half of HCWs (125, 59%) reported having family members having migraine. The most common frequency of migraine was reported to be monthly (60.7%), followed by weekly (26.8%), and daily (12.5%). The pulsatile and throbbing pain was the most common type of pain (35.1%), followed by sharp and stabbing pain (23.2%). Half of participants with migraine (50%) reported that it is accompanied by nausea, vomiting, or loss of appetite. The migraine pain was mild in 39.9%, moderate in (37.5%), and severe in 22.6%. The determinants of migraine were working for long hours (41.1%), lack of sleep (89.3%), exposure to sunlight, (23.2%), drinking coffee and tea, (24.4%), exercise (14.3%), working on computers (41.1%), and some medications (79.8%). Almost two thirds (64.4%) consulted a physician for their migraine, 70.2% used medication for management of their migraine, commonly based on self-medication (47.5%), as shown in Table 2.

Figure (1) shows that prevalence of migraine headache among HCWs in Abha City was 20.8%.

The mean ±SD of MIDAS score was 12±10.6. The migraine disability grade of 71 participants (33.5%) was little, that of 45 (21.2%) was mild, that of 50 (23.6%) was moderate, and that of 46 (21.7%) was severe, as shown in Figure (2).

Table 5 shows HRQOL of HCWs. The mean± SD of physical health, psychological health, social relationship, and environment scores were 12.9±2.2, 13.4±2.2, 14.2±2.8, and 14.4 ±2.2, respectively. The mean±SD scores of WHO QOL-BREF was 54.9±7.4. According to the HRQOL grades, 19 (9%) had high HRQOL, 183 (68.3%) had moderate HRQOL, and 10 (4.7%) had poor HRQOL, as shown in Figure (3).

Participants' MIDAS grades according to HCWs personal characteristics are shown in Table 3. There were significant differences according to HCWs' gender (P=0.011), and position (P<0.001).

Table 4 shows MIDAS grades according to migraine characteristics of HCWs. Significant differences in MIDAS grades were present according to the number of migraine attacks during the previous 12 months (P<0.001), family history of migraine (P=0.006), frequency of migraine (P<0.001), type of migraine (P=0.003), and severity of the migraine (P=0.002).

Table 5 shows the HRQOL of HCWs as assessed by the WHO QOL-BREF questionnaire. Table 6 shows that their HQROL differed significantly according to their personal characteristics, such as smoking status (P=0.037). Table 7 shows that their HQROL differed significantly according to their migraine characteristics, such as number of migraine attacks during life (P<0.001), number of attacks during the last 12 months (P<0.001), and accompanying symptoms (P=0.037).

Table 1: Personal characteristics of healthcare workers

Personal characteristics		No.	%
Gender	Female	102	48.1
	Male	110	51.9
Position	Nurse	77	36.3
	Resident	81	38.2
	Specialist	21	9.9
	Consultant	8	3.8
	Pharmacist	12	5.7
	Other	13	6.1
Years of experience in primary healthcare	1-5 years	112	52.8
	6-10 years	60	28.3
	> 10 years	40	18.9
Shift work	No	117	55.2
	Yes	95	44.8
Daily coffeedrinking	No	83	39.2
	Yes	129	60.8
Smoking habits	Nonsmoker	135	63.7
	Smoker	77	36.3

Figure 1:

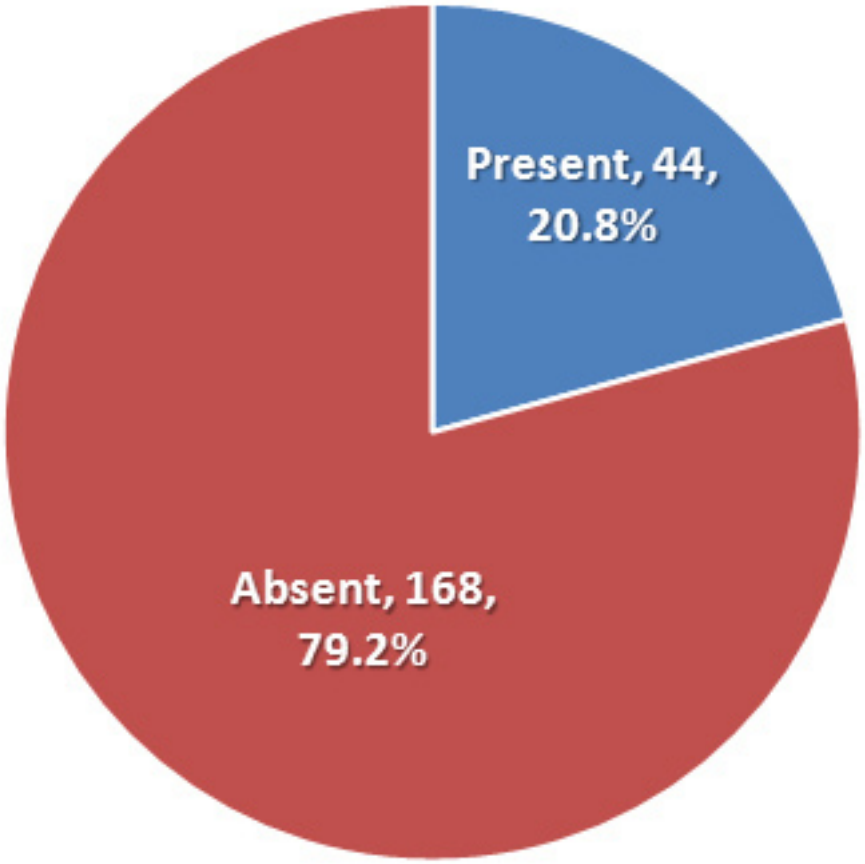

Figure 2: Participants' Migraine Disability Assessment (MIDAS) grades

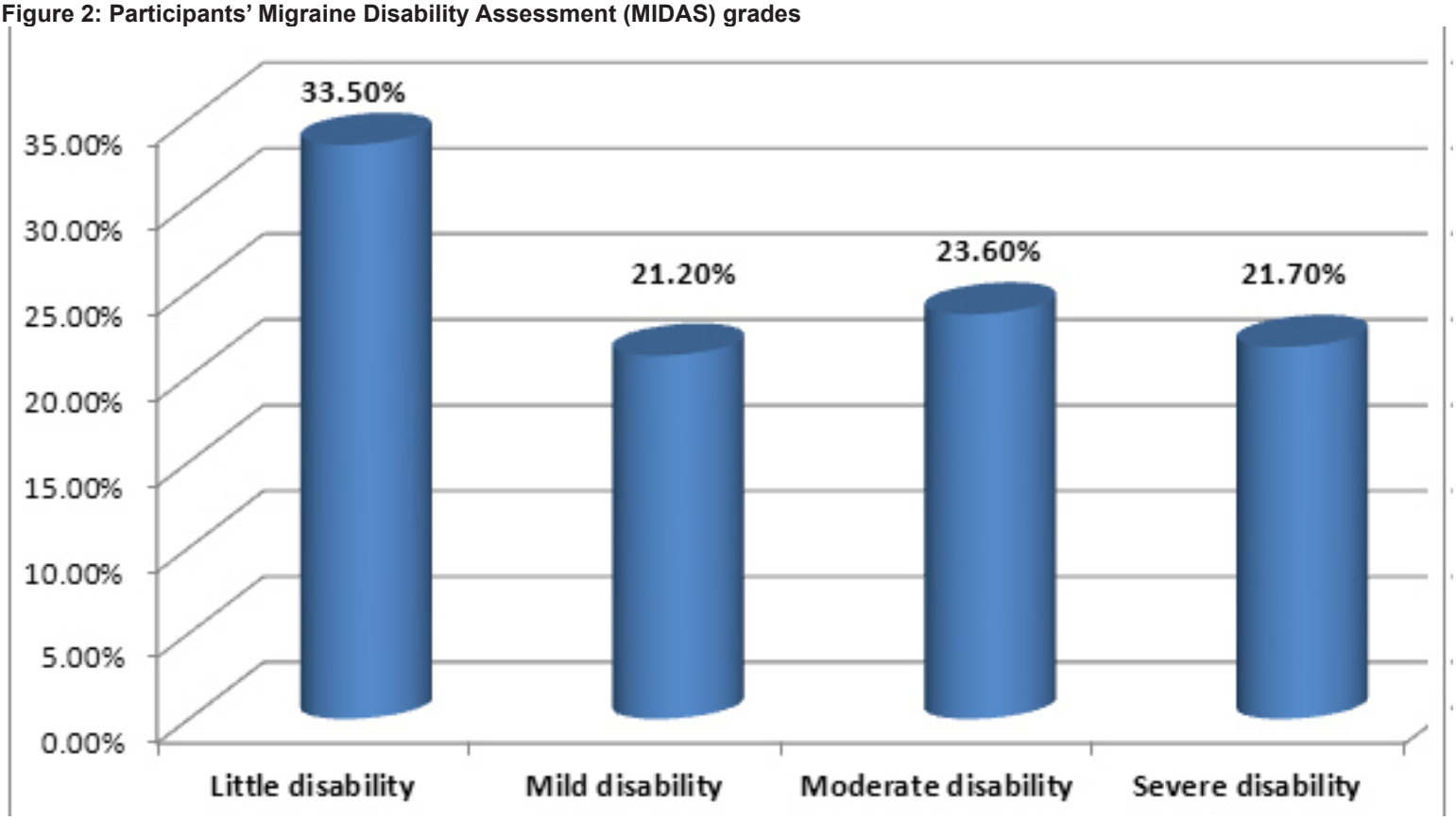

Figure 3: Participants' Health-Related Quality of Life grades

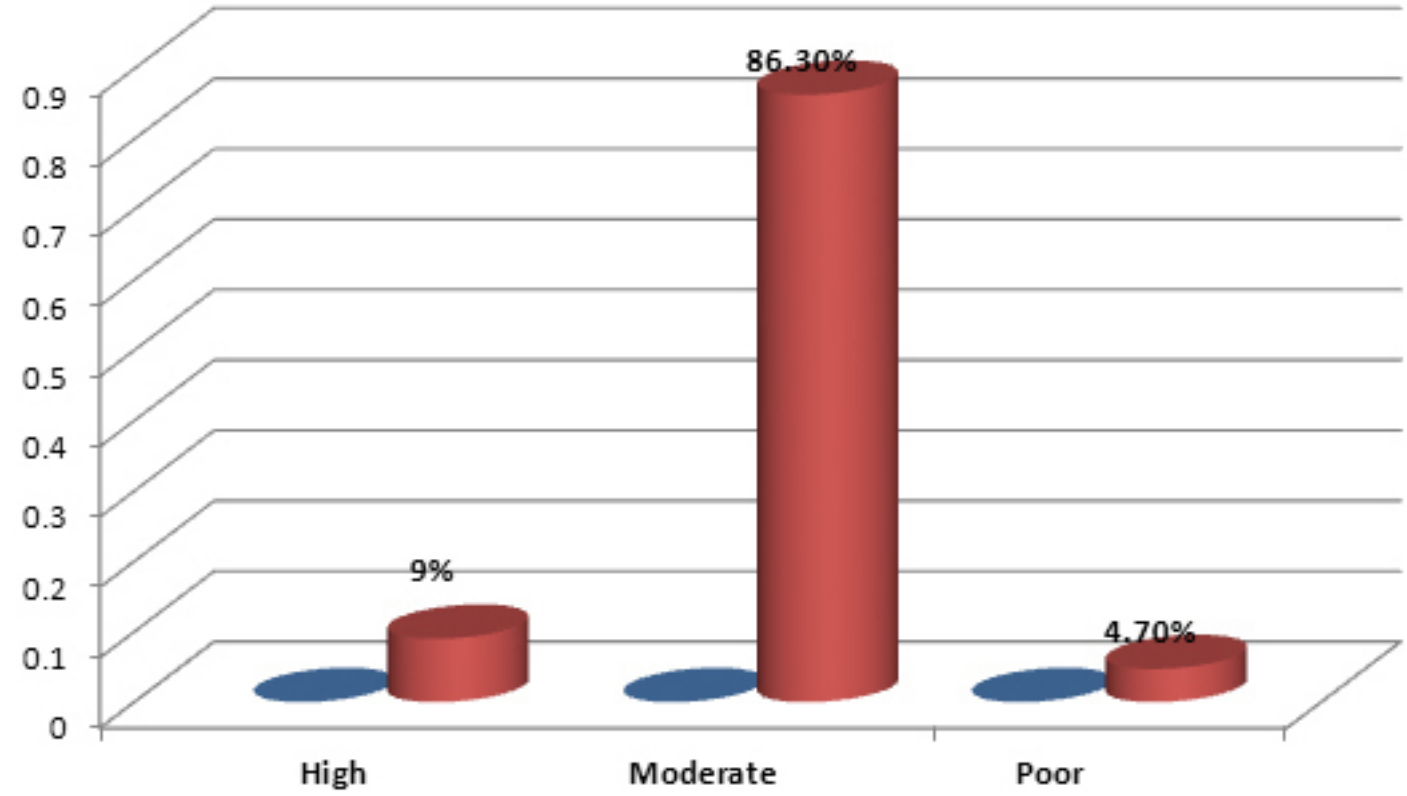

Table 2: Characteristics of migraine among healthcare workers

Personal characteristics		No.	%
How many days during the last 12 months have you suffered from migraine headache?	None	44	20.8
	1-7 days	92	43.4
	8-14 days	46	21.7
	15-31 days	25	11.8
	31-180 days	5	2.4
Are there any family members having migraine?	No	87	41.0
	Yes	125	59.0
Frequency of migraine	Daily	21	12.5
	Weekly	45	26.8
	Monthly	102	60.7
Type of pain	Heavy feeling	31	18.5
	Pulsatile/throbbing	59	35.1
	Sharp/stabbing	39	23.2
	Tightness/pressing	27	16.1
	Other	12	7.1
Is your migraine headache accompanied by nausea, vomiting, or loss of appetite?	No	84	50.0
	Yes	84	50.0
Severity of pain	Mild	67	39.9
	Moderate	63	37.5
	Severe	38	22.6
Triggers of migraine	Lack of sleep	150	89.3
	Exposure to sunlight	39	23.2
	Drinking coffee or tea	41	24.4
	Exercise	24	14.3
	Working on computers	69	41.1
	Long working hours	94	56.0
	Medication	134	79.8
	Others	5	3.0
Consulting a doctor for migraine headache		78	64.4
Using medication for management of Migraine	No	50	29.8
	Yes	118	70.2
If yes, which?	Prescribed medication	47	39.8
	Self-medications	56	47.5
	Traditional medication	15	12.7

Table 3: MIDAS grades according to their personal characteristics of health care workers

Characteristics		MIDAS grades of disability								P value
		Little (n=71)		Mild (n=45)		Moderate (n=50)		Severe (n=46)		
		No.	%	No.	%	No.	%	No.	%	
Gender	Female	37	52.1	15	33.3	20	40.0	30	65.2	
	Male	34	47.9	30	66.7	30	60.0	16	34.8	0.011
Position	Nurse	29	40.8	19	42.2	16	32.0	13	28.3	
	Resident	34	47.9	15	33.3	15	30.0	17	37.0	<0.001
	Specialist	0	0.0	4	8.9	12	24.0	5	10.9	
	Consultant	1	1.4	0	0.0	1	2.0	6	13.0	
	Pharmacist	2	2.8	1	2.2	4	8.0	5	10.9	
	Other	5	7.0	6	13.3	2	4.0	0	0.0	
Years of experience in primary healthcare	1-5	37	52.1	26	57.8	25	50.0	24	52.2	
	6-10	18	25.4	16	35.6	15	30.0	11	23.9	0.370
	> 10	16	22.5	3	6.7	10	20.0	11	23.9	
Shift work	No	39	54.9	22	48.9	30	60.0	26	56.5	
	Yes	32	45.1	23	51.1	20	40.0	20	43.5	0.740
Daily coffee drinking	No	27	38.0	21	46.7	20	40.0	15	32.6	
	Yes	44	62.0	24	53.3	30	60.0	31	67.4	0.580
Smoking habits	No	52	73.2	30	66.7	27	54.0	26	56.5	
	Yes	19	26.8	15	33.3	23	46.0	20	43.5	0.110

Table 4: MIDAS grades according to migraine characteristics of health care workers

Characteristics		MIDAS grades of disability								P value
		Little (n=71)		Mild (n=45)		Moderate (n=50)		Severe (n=46)		
		No.	%	No.	%	No.	%	No.	%	
How many days during the last year have you suffered from migraine headache?	0	24	33.8	12	26.7	5	10.0	3	6.5	<0.001
	1-7	37	52.1	22	48.9	17	34.0	13	28.3	
	8-14	6	8.5	10	22.2	18	36.0	14	30.4	
	15-31	4	5.6	1	2.2	6	12.0	15	32.6	
	31-180	0	0.0	0	0.0	4	8.0	1	2.2	
Are there any family members having migraine?	No	39	54.9	20	44.4	12	24.0	16	34.8	0.006
	Yes	32	45.1	25	55.6	38	76.0	30	65.2	
Frequency of migraine	None	24	33.8	12	26.7	5	10.0	3	6.5	<0.001
	Daily	3	4.2	7	15.6	6	12.0	5	10.9	
	Weekly	7	9.9	10	22.2	14	28.0	14	56.5	
	Monthly	37	52.1	16	35.6	25	50.0	24	32.6	
Type of pain	None	24	33.8	12	26.7	5	10.0	3	6.5	<0.001
	Heavy feeling	8	11.3	8	17.8	10	20.0	5	10.9	
	Pulsatile/throbbing	19	26.8	17	37.8	17	34.0	6	13.0	
	Sharp/stabbing	10	14.1	6	13.3	12	24.0	11	23.9	
	Tightness/pressing	6	8.5	1	2.2	5	10.0	15	32.6	
	Other	4	5.6	1	2.2	1	2.0	6	13.0	
Is your migraine headache accompanied by nausea, vomiting, or loss of appetite?	No migraine	24	33.8	12	26.7	5	10.0	3	6.5	0.410
	No	32	45.1	10	22.2	22	44.0	20	43.5	
	Yes	15	21.1	23	51.1	23	46.0	23	50.0	
Severity of pain	No migraine	24	33.8	12	26.7	5	10.0	3	6.5	0.002
	Mild	22	31.0	16	35.6	19	38.0	10	21.7	
	Moderate	19	26.8	8	17.8	11	22.0	25	54.3	
	Severe	6	8.5	9	20.0	15	30.0	8	17.4	

Table 5: Health related quality of life of healthcare workers as assessed by the WHO QOL-BREF questionnaire

Variables		No.	%
How would you rate your quality of life?	Good	77	36.3
	Neutral	72	34.0
	Poor	5	2.4
	Very good	49	23.1
	Very poor	9	4.2
How satisfied are you with your health?	Dissatisfied	14	6.6
	Neutral	90	42.5
	Satisfied	75	35.4
	Very dissatisfied	14	6.6
	Very satisfied	19	9.0
To what extent do you feel that physical pain prevents you from doing what you need to do?	Not at all	36	17.0
	A little	72	34.0
	A moderate amount	68	32.1
	Very much	28	13.2
	An extreme amount	8	3.8
How much do you need any medical treatment to function in your daily life?	Not at all	38	17.9
	A little	46	21.7
	A moderate amount	59	27.8
	Very much	60	28.3
	An extreme amount	9	4.2
How much do you enjoy life?	Not at all	8	3.8
	A little	38	17.9
	A moderate amount	40	18.9
	Very much	101	47.6
	An extreme amount	25	11.8
To what extent do you feel your life to be meaningful?	Not at all	5	2.4
	A little	34	16.0
	A moderate amount	49	23.1
	Very much	80	37.7
	An extreme amount	44	20.8
How well are you able to concentrate?	A little	40	18.9
	A moderate amount	57	26.9
	Very much	96	45.3
	An extreme amount	19	9.0
How safe do you feel in your daily life?	Not at all	12	5.7
	A little	16	7.5
	A moderate amount	31	14.6
	Very much	90	42.5
	An extreme amount	63	29.7
How healthy is your physical environment?	Not at all	4	1.9
	A little	9	4.2
	A moderate amount	89	42.0
	Very much	78	36.8
	An extreme amount	32	15.1
Do you have enough energy for everyday life?	Not at all	11	5.2
	A little	17	8.0
	Moderately	81	38.2
	Mostly	85	40.1
	Completely	18	8.5

Table 5: Health related quality of life of healthcare workers as assessed by the WHO QOL-BREF questionnaire (continued)

Are you able to accept your bodily appearance?	Not at all	16	7.5
	A little	63	29.7
	Moderately	41	19.3
	Mostly	68	32.1
	Completely	24	11.3
Have you enough money to meet your needs?	Not at all	3	1.4
	A little	43	20.3
	Moderately	56	26.4
	Mostly	49	23.1
	Completely	61	28.8
How available to you is the information that you need in your day-to-day life?	Not at all	2	0.9
	A little	51	24.1
	Moderately	66	31.1
	Mostly	58	27.4
	Completely	35	16.5
To what extent do you have the opportunity for leisure activities?	A little	32	15.1
	Moderately	82	38.7
	Mostly	40	18.9
	Completely	58	27.4
How well are you able to get around?	Not at all	7	3.3
	A little	53	25.0
	Moderately	62	29.2
	Neutral	1	0.5
	Mostly	45	21.2
	Completely	44	20.8
How satisfied are you with your sleep?	Very dissatisfied	6	2.8
	Dissatisfied	20	9.4
	Neutral	84	39.6
	Satisfied	85	40.1
	Very satisfied	17	8.0
How satisfied are you with your ability to perform your daily living activities?	Very dissatisfied	5	2.4
	A little	1	0.5
	Dissatisfied	20	9.4
	Neutral	66	31.1
	Satisfied	80	37.7
	Very satisfied	40	18.9
How satisfied are you with your capacity for work?	Very dissatisfied	3	1.4
	Dissatisfied	13	6.1
	Neutral	82	38.7
	Satisfied	78	36.8
	Very satisfied	36	17.0
How satisfied are you with yourself?	Very dissatisfied	5	2.4
	Dissatisfied	12	5.7
	Neutral	55	25.9
	Satisfied	84	39.6
	Very satisfied	56	26.4
How satisfied are you with your personal relationships?	Very dissatisfied	8	3.8
	Dissatisfied	24	11.3
	Neutral	71	33.5
	Satisfied	86	40.6
	Very satisfied	23	10.8

Table 5: Health related quality of life of healthcare workers as assessed by the WHO QOL-BREF questionnaire (continued)

How satisfied are you with your sex life?	Very dissatisfied	14	6.6
	Dissatisfied	20	9.4
	Neutral	81	38.2
	Satisfied	66	31.1
	Very satisfied	31	14.6
How satisfied are you with the support you get from your friends?	Very dissatisfied	6	2.8
	Dissatisfied	4	1.9
	Neutral	75	35.4
	Satisfied	62	29.2
	Very satisfied	65	30.7
How satisfied are you with the conditions of your living place?	Very dissatisfied	8	3.8
	Dissatisfied	15	7.1
	Neutral	67	31.6
	Satisfied	82	38.7
	Very satisfied	40	18.9
2 How satisfied are you with your access to health services?	Very dissatisfied	5	2.4
	Dissatisfied	23	10.8
	Neutral	60	28.3
	Satisfied	99	46.7
	Very satisfied	25	11.8
How satisfied are you with your transport?	Very dissatisfied	4	1.9
	Dissatisfied	23	10.8
	Neutral	69	32.5
	Satisfied	62	29.2
	Very satisfied	54	25.5
How often do you have negative feelings such as blue mood, despair, anxiety, depression?	Never	51	24.1
	Seldom	53	25.0
	Quite often	33	15.6
	Very often	52	24.5
	Always	23	10.8

Table 6. HRQOL grades of healthcare workers according to their personal characteristics

Characteristics		WHOQOL-BREF grades						P value
		High (n=19)		Moderate (n=183)		Poor (n=10)		
		No.	%	No.	%	No.	%	
Gender	Female	6	31.6	89	48.6	7	70.0	0.130
	Male	13	68.4	94	51.4	3	30.0	
Position	Nurse	12	63.2	64	35.0	1	10.0	0.190
	Resident	6	31.6	69	37.7	6	60.0	
	Specialist	0	0.0	20	10.9	1	10.0	
	Consultant	0	0.0	7	3.8	1	10.0	
	Pharmacist	1	5.3	10	5.5	1	10.0	
	Other	0	0.0	13	7.1	0	0.0	
Experience years in primary health care	1-5	7	36.8	98	53.6	7	70.0	0.400
	6-10	8	42.1	51	27.9	1	10.0	
	> 10	4	21.1	34	18.6	2	20.0	
Shift work	No	11	57.9	99	54.1	7	70.0	0.590
	Yes	8	42.1	84	45.9	3	30.0	
Daily coffee drinking	No	10	52.6	70	38.3	3	30.0	0.390
	Yes	9	47.4	113	61.7	7	70.0	
Smoking habits	No	17	89.5	113	61.7	5	50.0	0.037
	Yes	2	10.5	70	38.3	5	50.0	

Table 7: HRQOL grades of healthcare workers according to their migraine characteristics

Characteristics		WHOQOL-BREF grades						P Value
		High (n=19)		Moderate (n=183)		Poor (n=10)		
		No.	%	No.	%	No.	%	
How many days during the last12 months have you suffered from a Migraine headache?	0	13	68.4	28	15.3	3	30.0	<0.001
	1-7	5	26.3	85	46.4	3	30.0	
	8-14	0	0.0	43	23.5	3	30.0	
	15-31	3	15.8	20	10.9	2	20.0	
	31-180	0	0.0	4	2.2	1	10.0	
Are there any family members having migraine?	No	10	52.6	72	39.3	5	50.0	0.440
	Yes	9	47.4	111	60.7	5	50.0	
Frequency of Migraine	No migraine	13	68.4	28	15.3	3	30.0	0.180
	Daily	5	26.3	16	8.9	0	0.0	
	Weekly	1	5.3	41	22.8	3	30.0	
	Monthly	0	0.0	98	54.4	4	40.0	
Type of pain	No migraine	13	68.4	28	15.6	3	30.0	0.320
	Heavy	4	21.1	27	15.0	0	0.0	
	Pulsatile/throbbing	2	10.5	55	30.6	2	20.0	
	Sharp/Stabbing	0	0.0	38	21.1	1	10.0	
	Tightness/pressing	0	0.0	25	13.9	2	20.0	
	Other	0	0.0	10	5.6	2	20.0	
Is your migraine headache accompanied by nausea, vomiting or loss of appetite?	No migraine	13	68.4	28	15.6	3	30.0	0.037
	No	5	26.3	76	42.2	3	30.0	
	Yes	1	5.3	79	43.9	4	40.0	
Severity of pain	No migraine	13	68.4	28	15.6	3	30.0	0.380
	Mild	5	26.3	58	32.2	4	40.0	
	Moderate	1	5.3	60	33.3	2	20.0	
	Severe	0	0.0	37	20.6	1	10.0	

Discussion

The mean age of our participants was 32 years, which was close to the findings of the previous Saudi study conducted on migraine patients, where the mean age of patients was 34.21 years [34]. Pradeep et al. reported that migraine was more frequent among young and middle-aged individuals [35].

The present study revealed that prevalence of migraine headache among HCWs in Abha City was 20.8%, with significantly higher grades of severity among females and residents. Moreover, 44.8% of participant HCWs reported shift work, and most of them (89.3%) suffered lack of sleep.

These findings are in accordance with those reported by several studies. El-Metwally et al. reported that prevalence of migraine among the general population of the Arab countries ranged between 2.6% and 32%. The prevalence rates ranged from 12.2% to 27.9% among medical students, and ranged from 7.1% to 13.7% among school children. Females were more susceptible to migraine compared to males [36].

These results indicate that migraine prevalence may be affected by the work or the position of the individual. Hospital workers are exposed to work for several shifts in the hospital, which renders them at an increased risk for headache due to the frequent changes in their work times with sleepless nights [37].

The present study showed that almost half of HCWs reported attacks of 1-7 during their previous year. The highest frequency of migraine was reported as monthly with pulsatile and throbbing pain, followed by sharp and stabbing pain. The largest percentages of the HCWs reported mild pain, followed by moderate pain. Half of HCWs stated that their headache is associated with nausea and vomiting, while more than half of participants had a positive family history of migraine

Similarly, one Saudi study that enrolled hospital staff [38] reported that more than half of emergency department staff had weekly headaches, while nausea and vomiting were mostly associated with headache. Moreover, migraine was found to run in families [39]. It was observed that when both parents have migraine attacks, the risk of descendant disorder ranges from 60% to 90%, whereas when the mother only suffers migraine attacks, the risk of migraine is 72%. However, the risk falls to 30% if the father only suffers migraine attacks [40]. Moreover, if someone is suffering migraine, the mother has four-folds probability for having a migraine history than the father [41]. All these findings enhance the suggestion that migraine may be attributed to genetic factors.

Regarding determinants of migraine, our participants reported lack of sleep as the major trigger of migraine, followed by medications, working for long hours, working on computers, drinking coffee and tea, and exposure to sunlight, while smoking was significantly associated with poor HRQOL. Alzahrani et al. [38] found that 57.4% of migraine patients reported performing physical activity. Moreover, Zivadinov et al. suggested that physical activity is one of the commonest triggers of headache [42].

Taylor [43]; Ibrahim et al. [44] and Lopez-Mesonero et al. [45] reported that smoking is a common triggering factor among migraine sufferers. In addition, several studies reported that lack of sleep is a major trigger for migraine [44,46-47].

The present study showed that the largest proportion of HCWs had little disability, followed by those with moderate disability, severe disability, and finally those with mild disability. The grades of disability were affected by several factors, including duration of migraine, gender, position, the number of migraine attacks, family history, frequency of migraine, type of pain, and severity of pain. Males tended to experience mild and moderate disability, whereas females tended to be affected by little and severe disability. Nurses were more prone to suffer mild and moderate disability. Increasing the number of attacks was associated with higher grades of disability among HCWs. Having family members with migraine was significantly associated with higher grades of disability. Weekly migraine attacks were also associated with severe disability, whereas the monthly attacks were associated with lower grades of disability. Moreover, mild pain was associated with lower grades of disability, whereas moderate pain was associated with severe disability. In addition, tightness and pressing feeling of pain were associated with severe disability.

It has been reported that migraine disabilities have an acute impact on the performance of the job and outcome, as 31% of migraine patients lost one workday in a period of three months and absented an average of 10.7 days per year [23,48-49].

In Malaysia, severe disability was reported among 73% of migraine patients, which was higher than that shown by our study. In accordance with our study, severe disability was significantly associated with increasing duration of migraine [18].

Alzahrani et al. found that headache had a severe effect on the job performance and the life of emergency department staff [38]. Moreover, HRQOL and psychological conditions were found to be lower with migraine [50].

Our study revealed that the majority of the HCWs (86.3%) had moderate HRQOL. The main negative impact of migraine was on HCWs' physical health, but it was the least on the environment domain. The main factors that affected HCWs' HRQOL were smoking, experiencing migraine attacks, and experiencing no accompanying symptoms, which were significantly associated with high and moderate HRQOL. This indicates that more attacks of migraine are associated with poorer HRQOL, which confirms the negative impact of migraine on the HRQOL.

Similar results were reported by AlHarbi et al. [34], where the HRQOL was significantly associated with frequent migraine attacks. In Malaysia, migraine patients showed a significantly lower score of WHO QOL-BREF, physical and psychological health domains, compared to non-migraine individuals [18]. Lower total QOL was also reported among migraine patients in the USA [51] and among the Dutch population [52], with lower social functioning, physical health [51], diminished functioning, and well-being [52]. Similarly, the total HRQOL, psychological and physiological health were found to be significantly low in France [53], the US [54], India [55], and Italy [56].

Conclusions

Frequency of migraine attacks varies between HCWs with variations in triggers of migraine. Migraine attacks affect the grade of disability and health-related quality of life of the HCWs. Higher number of migraine attacks are associated with severe disability and poorer quality of life among HCWs.

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Burnout among the Directors of the Internal Medicine Residency Training Program in Saudi Arabia

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Abstract

Overview: Burnout and depression symptoms are extremely common among internal medicine physicians including program directors. Burnout is defined as work-related syndrome characterized by emotional exhaustion, depersonalization and a sense of reduced personal accomplishment.

Nearly 50% of physicians experience burnout. Hence, this increasing problem has a major impact on a director's physical and mental health, thereby not only causing danger to the physician's health but also affecting a patient's health and putting a strain on the healthcare system.

Methods: This was a descriptive, cross-sectional study conducted from March 2018 to October 2019. There are more than 60 training centers offering internal medicine programs all around the Kingdom of Saudi Arabia. This study was approved by the Quality Committee, which follows the Scientific Council for Internal Medicine at Saudi Commission of Health Specialties. All participants were informed about the study objectives and confidentiality of survey responses, and they provided informed consent.

Results: Among 40 program directors who participated in this survey, (85%) were stressed out. Moreover, 27.5% expressed lack of support from the hospital's administration, 23.1% claimed that the department head interfered with the training process, 30% were frustrated with their uncooperative colleagues, and 82.5% denied receiving any financial benefit other than training allowance. Finally, 95% were satisfied with their performance as program directors.

Conclusion: Similar to other physician groups, program directors experience burnout. Nevertheless, more studies should be conducted to better understand stress and its possible causes. Further, such investigations can help identify the reasons behind the lack of support, in addition to protection of program director's encouragement.

Key words: burnout, residency training program, Saudi Arabia

Introduction

Burnout is a chronic stress condition associated with emotionally intense work demands for which resources are inadequate (1). Moreover, it is defined as a work-related syndrome characterized by emotional and physical exhaustion, sense of reduced personal accomplishment, and personality changes (2). It affects all individuals in the medical training system regardless of specialty. These include residents, specialists, consultants, and programs directors (PD) (3).

A national study in the United States showed that PDs have generally more severe symptoms correlated with occupational burnout than medical students, practicing physicians, internal medicine residents, internal medicine clerkship directors, and medical school deans. These symptoms include burnout, depression symptoms, reduced quality of life, and work–life imbalance (3).

Previous studies conducted in the United States revealed that about 50% of physicians generally present with burnout (4–6). Data from other countries worldwide are limited. However, some reviews showed that similar problems are affecting individuals in most countries worldwide (7,8).

Therefore, this study aimed to assess occupational burnout and distress among internal medicine program directors based on the prevalence of symptoms. Moreover, it investigated the association between the lack of support and burnout, which can affect the training process and healthcare system in general.

Methods

This was a descriptive, cross-sectional study conducted from March 2018 to October 2019. The participants were selected from the program directors of the Internal Medicine Training Program (IMPD) in Saudi Commission of Health Specialties (SCFHS). There are more than 60 training centers offering internal medicine programs all around the Kingdom of Saudi Arabia. This study was approved by the Quality Committee, which follows the Scientific Council for Internal Medicine at SCFHS. All participants were informed about the study objectives and confidentiality of survey responses, and they provided informed consent.
Several instruments have been used in previous studies regarding physicians, and some studies about burnout have focused on the presence of three major characteristics (9,10). We used direct questions correlated with the duties and responsibilities of PDs.

Data were collected via a personal interview of 18 program directors, and the rest took an on-line survey. In this study, statistical analysis was performed using the IBM Statistical Package for the Social Sciences software version 20.0. We used descriptive statistics to calculate means, standard deviation, median, and interquartile ranges. Moreover, the chi-square test was used to assess the correlation between two variables. Bar charts were utilized for data visualization.

Results

The survey questionnaire was administered to 62 directors of the IMPD who were registered at the SCFHS website. In total, 40 physicians who are directors of the internal medicine training program in Saudi Arabia responded to the survey.

About 90% of participants were part of the IMPD in governmental sector hospitals. Meanwhile, 10% were in private sector hospitals. Approximately 62.5% have been program directors for less than 2 years and 37.5% for more than 2 years (Table 1, Figures 1 and 2).

Figure 1: Distribution of program directors among different sectors.

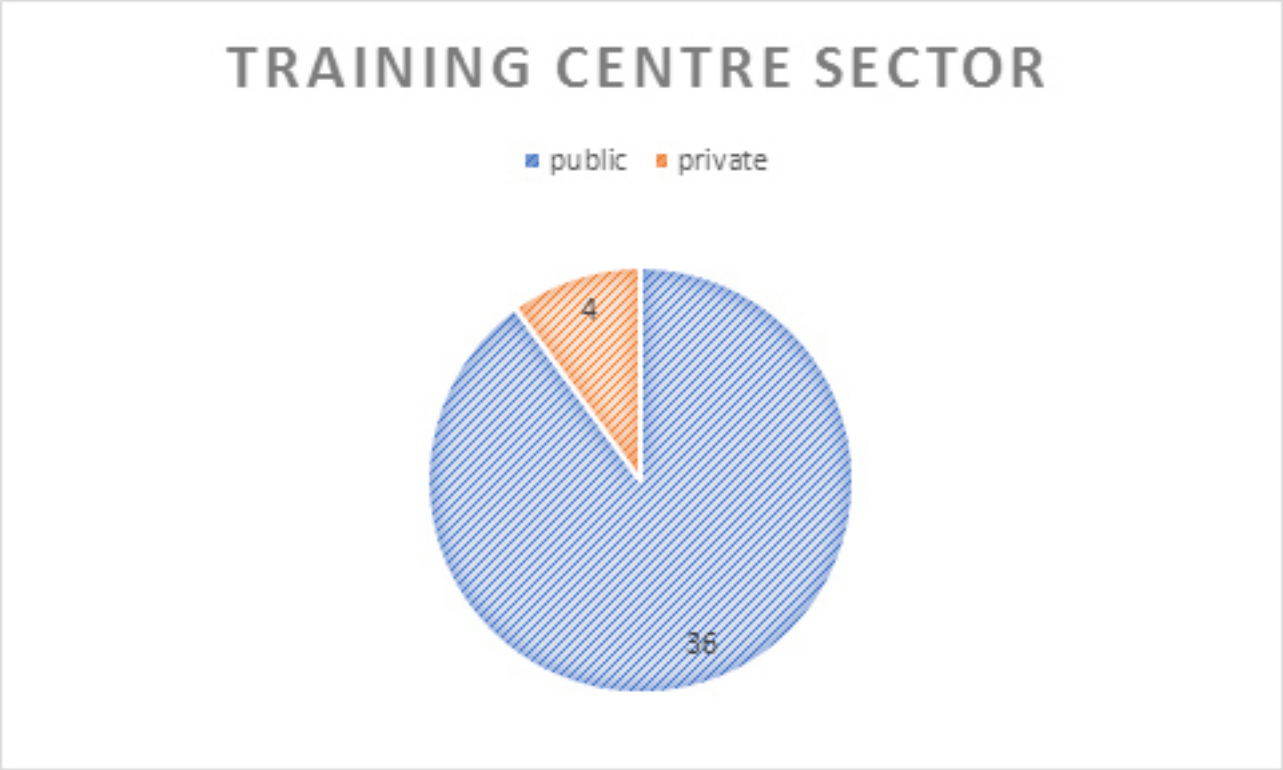


Figure 2: Years of experience as a program director

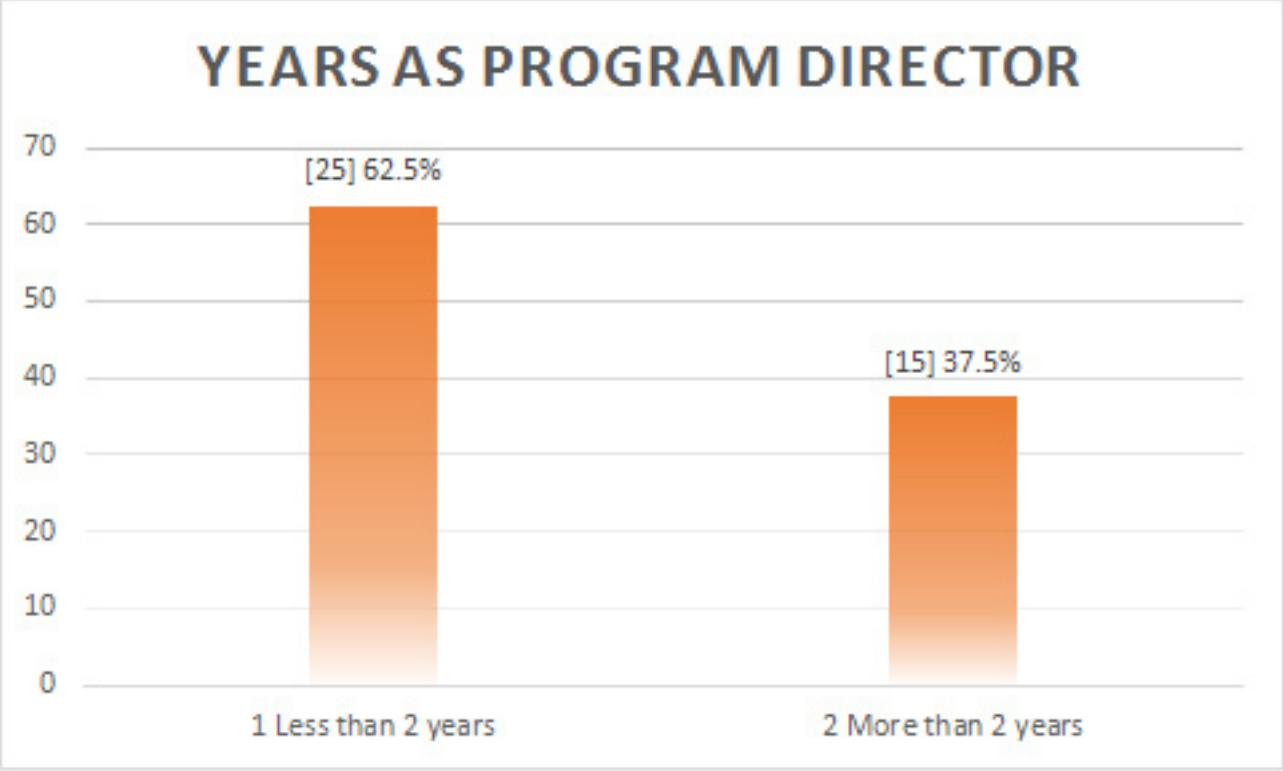


Table 1: Related sectors and years of experience as a program director

Type of hospital	Frequency	Percentage
Governmental	36	90.0
Private	4	10.0
Total	40	100.0
Years of experience as a program director	Frequency	Percentage
Less than 2 years	25	62.5
More than 2 years	15	37.5
Total	40	100.0

The participants were asked about their feelings toward higher administrative support for the program. Approximately 90% expressed that they received support from the department chairman, 87.5% from the academic affair department of the hospital, and 72.5% from the hospital administration. Only 23.1% claimed that the department head interfered with the training process (Table 2 and Figure 2).

Table 2: Program question responses from the participants.

Higher administrative support for the program	No	Yes
	%	%
Did the department head interfere with the training process?	76.9	23.1
Did you receive any support from the department chairman?	10	90
Did you receive support from the academic affairs department of the hospital?	12.5	87.5
Did you receive support from the hospital administration?	27.5	72.5

There was a significant difference between the groups in terms of years of experience as program directors (more/less than 2 years). The median significantly differed (p-value = 0.018, Table 3 and Figure 3).

There was a significant difference between the groups in terms of years of experience as program directors (more/less than 2 years). The median significantly differed (p-value = 0.018, Table 3 and Figure 3).

Figure 3: Higher administrative support for the program.

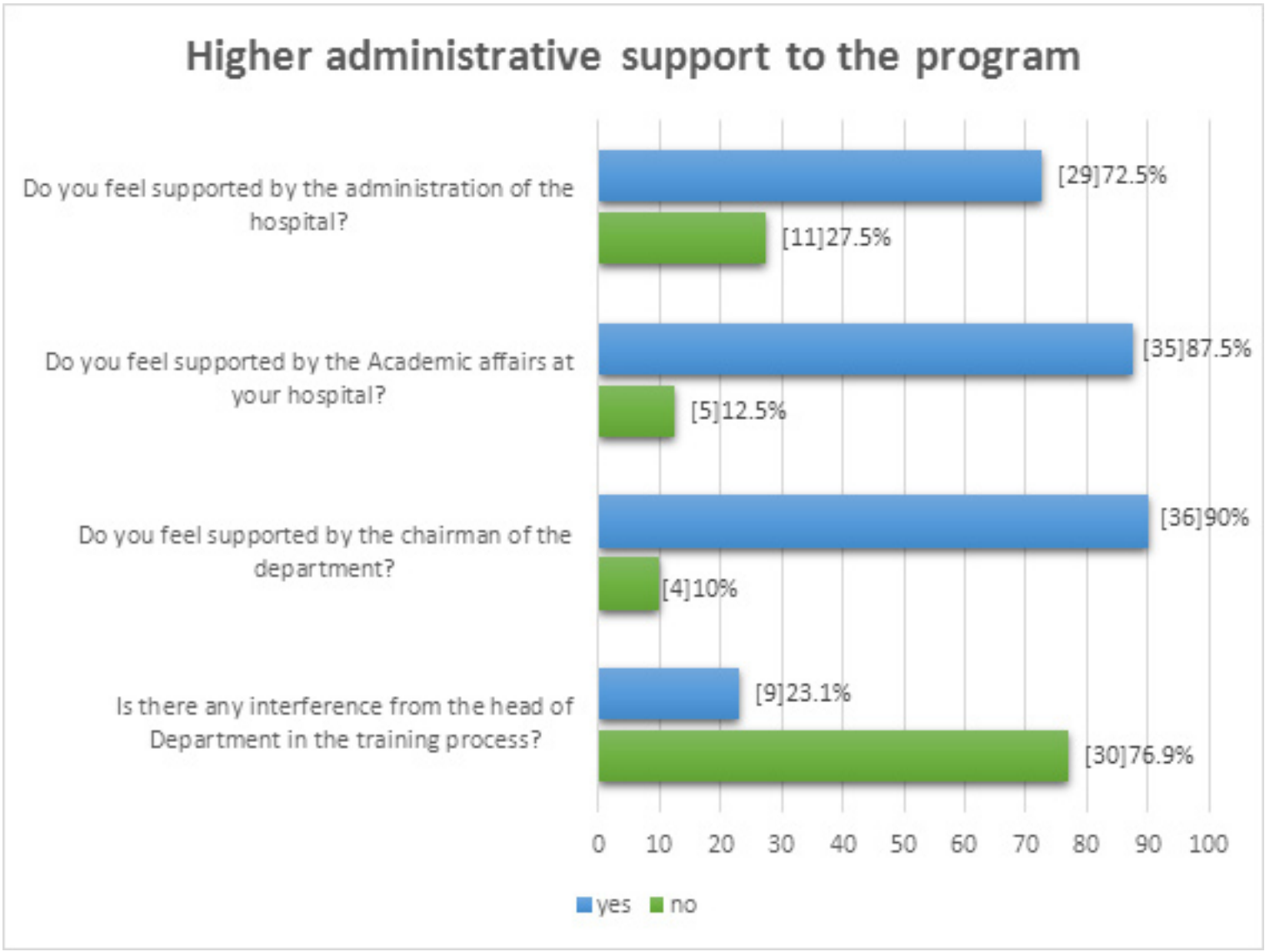


Table 3: Difference in terms of support between the less/more than 2 years groups.

Higher administrative support for the program			
Less than 2 years	N	Valid	25
		Missing	0
	Mean		3.72
	Median		4.00
	Standard deviation		1.339
	Range		5
	Minimum		0
	Maximum		5
	Percentiles	25	3.00
		50	4.00
		75	5.00
More than 2 years	N	Valid	14
		Missing	1
	Mean		4.57
	Median		5.00
	Standard deviation		.852
	Range		3
	Minimum		2
	Maximum		5
	Percentiles	25	4.00
		50	5.00
		75	5.00

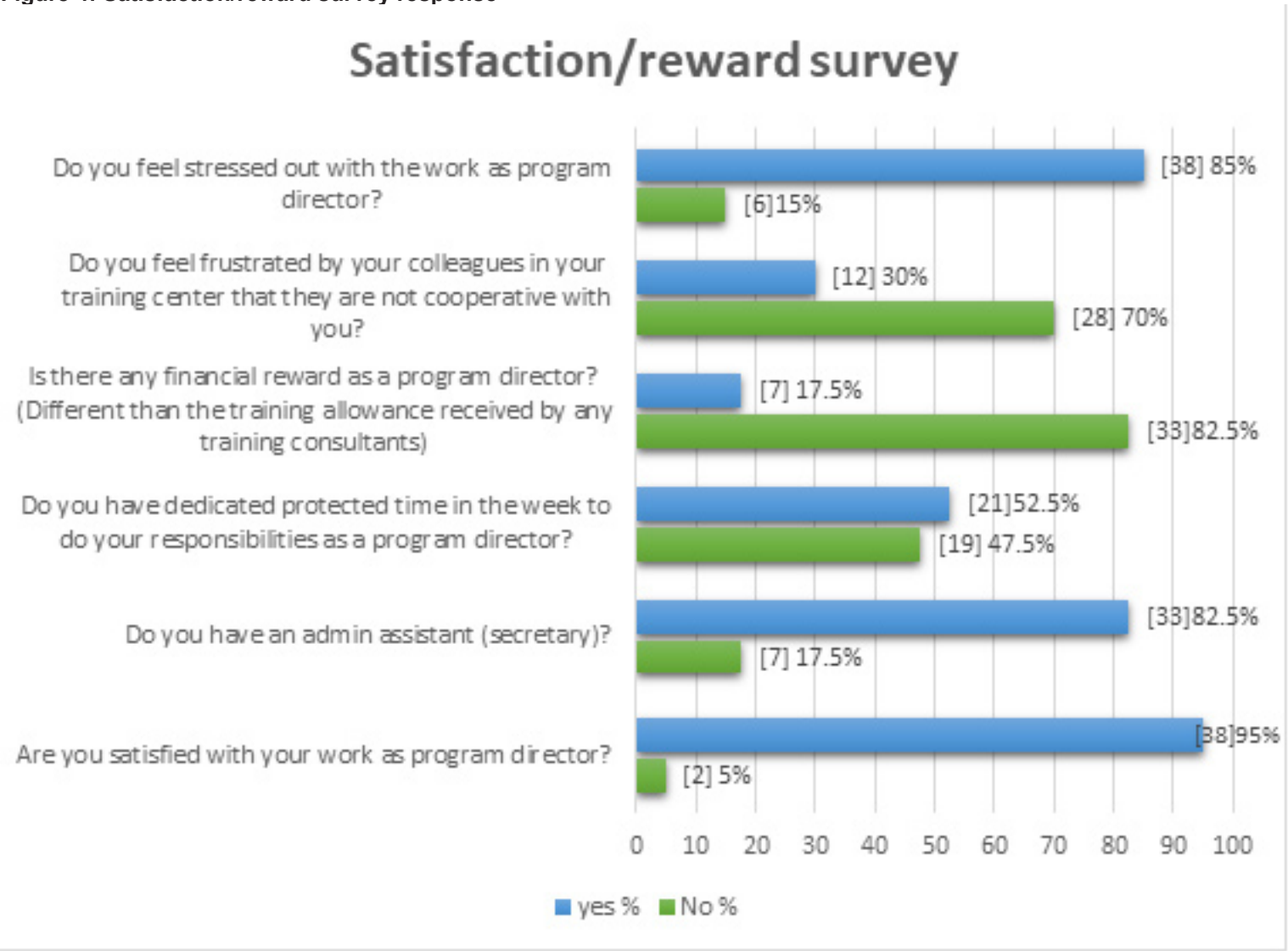
The satisfaction and reward feelings of the participants were assessed. About 95% were satisfied with their work as a program director.

About 82.5% had an assistant hired by the hospital, 52.5% dedicated a specific time during the week for their responsibilities as program directors, in addition to their clinical duties. Approximately 82.5% declared no financial reward for working as a program director. Moreover, 30% of the participants felt frustrated with their uncooperative colleagues. Finally, 85% of the participants were stressed due to the nature of the job (Table 4).

Table 4: Satisfaction/reward survey responses

Satisfaction/reward survey	No	Yes
	%	%
Are you satisfied with your work as a program director?	5	95
Do you feel stressed out working as a program director?	15	85
Do you have an administrative assistant (secretary)?	17.5	82.5
Do you have a dedicated time during the week for your responsibilities as a program director?	47.5	52.5
Is there any financial reward as a program director (other than the training allowance received by training consultants)?	82.5	17.5
Do you feel frustrated with your uncooperative colleagues in your training center?	70	30
Do you feel stressed out working as a program director?	15	85

Figure 4: Satisfaction/reward survey response



Discussion

In general, burnout among medical staff has been widely investigated. Previous studies have mainly focused on residents and practicing physicians. Results showed that similar to residents and practicing physicians' groups in different studies, program directors are affected by burnout, anxiety, and depression symptoms (4,11). However, this study evaluated program directors.

Burnout is commonly attributed to the job requirements of program directors and their associated stressors. These include different academic activities, in addition to duties as attending physicians, which should meet the standards required by the scientific commission in the country to ensure regulating the training process (3).

This pressure can affect program directors physically and mentally, and it has a direct effect on a patients' health. Moreover, these responsibilities have some degree of interference with patient care as burnout among physicians is associated with decreased productivity and strain on the healthcare system (12–14).

Other factors associated with stress among program directors were work environment and lack of support from the department head, academic affair department of the hospital, and/or hospital administration.

The lack of support, as expressed by 27% of participants, and interference in the training process or frustration with other colleagues can cause disappointment. Further, 85% of program directors in this study were found to be stressed.

Frustration/stress can result in resignation, which leads to a high program director turnover, thereby affecting the quality of training process. There are also other factors correlated with resignation. That is, it was strongly correlated with burnout (15). A high percentage of directors who were burned out and who continued to work as a program director met the criteria for the condition after several years. In addition, approximately half of the directors considered resigning in the following year (15),
By contrast, 95% of participants expressed satisfaction with their work as program directors. Based on a previous study, the top priority of directors is program leadership alongside being in work with personal meaning with education and mentoring other physicians, which reflects on self-satisfaction (16).

In this study, about 82.5% of participants denied receiving any additional financial benefits other than training allowance. Thus, satisfaction with their role as medical directors is also correlated with other factors, not just income. However, this notion must be further explored.
The current study had some limitations. Only a small sample size was included, and this is attributed to the low proportion of internal medicine directors. This can affect the overall accuracy of results and may change the actual impact of burnout among program directors.

Nevertheless, further studies must be conducted to explore dilemmas and possible interventions for burnout and to understand and promote the source of satisfaction among medical directors.

Conclusion

Similar to other physicians, program directors experience burnout. Moreover, this condition causes stress, frustration, and possibility health issues among directors for training programs. Thus, awareness and further measures for controlling burnout and its effect on the healthcare system are important.

Program directors require a strong support system to help them fulfill their responsibilities. This will reflect on both the quality and outcomes of healthcare and training process.

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Barriers to Premarital Thalassemia Screening in Asia

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Abstract

Thalassemia is a genetic disorder of hemoglobin synthesis. Every year 70,000 infants are born with beta thalassemia globally. Its incidence can be reduced by premarital thalassemia screening This review aims to focus on barriers to premarital thalassemia screening and to observe the current thalassemia practices in Asian countries.

This study was conducted on six countries of Asia based on economic status according to World Bank criteria. High income states included Kingdom of Saudi Arabia, and Oman, Iran constituted an upper middle-income country and in lower middle-income category Sri Lanka, Pakistan and Bangladesh were considered. Search engines like PubMed, Research Gate and Google scholar were used to look for relevant articles from 2005 to 2019. A total of (89) articles were reviewed and (61) articles were finally selected to be included in this review.

In Saudi Arabia, major obstacles for premarital thalassemia screening included planned weddings (43%), fear of social disgrace (21%), pressure from family (17%), and religious factors (14%). While in Oman, 4% of the people feared positive results and also considered it as an insult. Amongst the Iranian population, financial burden on couples, disease phobia, fear of positive results, difficulty in accessibility, tribal variances and sociodemographic factors were frequent hindrances to a screening program. Religious factors, financial constraint and lack of awareness cause reluctance in Pakistan and Bangladesh. Moreover, in Sri Lanka, factors like cancellation of marriage and sociocultural norms were identified as negative outcomes of the screening.

In conclusion, a negative attitude and reluctant response to premarital thalassemia screening was observed in people belonging to all the countries included. Major contributing factors were religious misconceptions, social stigma, varying ethnicities, low financial status and poor accessibility to screening programs.

Key words
Beta thalassemia, thalassemia screening, premarital screening, consanguineous marriage, social impact

Introduction

Global Overview

Thalassemia is a genetic disorder of hemoglobin synthesis, in which there is a decreased production of one or more globin chains. It is classified into alpha and beta-thalassemia which are further grouped into thalassemia major and thalassemia minor(1). Abnormal hemoglobin synthesis results in asymptomatic to clinically apparent severe anemia. Thalassemia major poses a huge economic burden on families individually and on the government as a whole(2). The goal of mass screening for this hereditary disorder is to reduce its incidence by identifying individuals at risk(3).

Worldwide, every year around 70,000 infants are born with beta-thalassemia. About 270 million carriers of haemoglobinopathies exist globally. Beta-thalassemia is mostly prevalent among individuals of Mediterranean countries, as well as in Southeast Asia, India, Africa, Central America, and the Middle East. According to the World Health Organization (WHO) guidelines, published in 1998, genetic screening should not be compulsorily carried out. However, some countries including Iran, Saudi Arabia, Palestinian Territories, and Cyprus now have mandatory premarital screening laws for hemoglobin disorders for all couples before marriage. Successful awareness programs have been carried out in countries like Greece, Italy, and Cyprus to reduce high carrier rates(3).

Developed Countries

The incidence in Turkey is 2.1% for beta-thalassemia trait (4). In Malaysia, 1/20 of people are carriers of ßeta-thalassemia trait with a prevalence of 6-10%(5). In Greece, the average frequency is 7.4% for carriers of Beta-thalassemia(6). The Turkish Parliament passed a law in 1993 for the determination of inherited disorders. Since 2003, premarital screening services are provided at forty-one centers in provinces with the highest prevalence of hemoglobinopathies (4). In 2004, Malaysian thalassemia registry was founded and voluntary screening was introduced at primary health centers, where the response in the population was 94% (7). Moreover, in Greece, a countrywide screening program was implemented approximately forty years ago for recognition of carriers, which is providing promising outcomes(6).

In Malaysia, the reasons behind the reluctance to screen are poor availability of screening tests, fear of positive results, and social stigma (8). Whereas in Greece and Turkey, the Ministry of Health has played an important role in the prevention of thalassemia(6-9).

Developing Countries

In Yemen, the prevalence of Beta-thalassemia trait is 4.4%(10). In Lebanon, the prevalence rate of thalassemia major is 64%(11). In the Tunisian population, the estimated carrier incidence rate is 4.48% for the thalassemia trait. Mandatory premarital services are available in Tunisia since 1995 and in Lebanon (11, 12). While in Yemen optional premarital screening services are available, although it is not practiced commonly(10). The obstacles towards this program can be due to marriages among relatives, influenced by many religious and cultural factors (10, 11, 13).

Asian Countries

The approximate prevalence of beta-thalassemia major was 0.7/1000, 12.9/1000 for the trait, and 13.6/1000 calculated in total for beta-thalassemia in Saudi (14). Oman shows a 2.4% prevalence rate of thalassemia(15). WHO reported that the carrier rate in Iran is estimated to be 4% which means about 2 to 3 million people have been affected by the syndrome in Iran (16). In Pakistan an estimated 9.8 million carriers have been reported (17) with a carrier rate of 5.3% and greater than 4,000 cases of beta-thalassemia observed annually(18). In Bangladesh, WHO estimates a 3% carrier rate of beta-thalassemia and more than 7,000 children are born with thalassemia each year(19). There are half a million carrier cases and over 3,500 children affected with thalassemia in Sri Lanka (20) and gene frequency of thalassemia was observed as 2.8% in Sri Lanka (21).

Saudi Arabia, in 2003 made premarital screening a compulsory procedure before marriage (22). Similarly, Iran also implemented premarital screening in all provinces in 1997(23). Voluntary premarital services are widely distributed in Oman (24). Screening practice has also been started in the states of Pakistan, Sri Lanka and Bangladesh (25-27).

Regional Countries

The prevalence rate of β thalassemia carriers is 3–4% in India(28) , 2.21% in China (2), 4% in Iraq (29), and 16-18% in the Maldives(30).

Prevention programs have been started in India almost 3 decades ago (31). Whereas the first premarital screening program in China was conducted in 1986(32). In Iraq, a mandatory premarital screening program for hemoglobinopathies was set up in 2008 in the Kurdistan region in Northern Iraq(29). In the Maldives, the non-governmental organization, Society for Health Education (SHE) started thalassemia screening and awareness program in 1992. According to the law implemented in 2012 for thalassemia screening, every individual under the age of 18 has to be tested for thalassemia and it is compulsory to provide the results before marriage (30).
Various factors have contributed as a hindrance factor in implementing thalassemia screening programs, globally. In India, it has been observed that pre-marital screening of partners is usually not accepted because marriage decisions are influenced by family members, and due to the social stigma caused by calling off a marriage(31). In China, some people showed a negative attitude towards screening; reasons included fear of tests, lack of knowledge, dislike towards hospitals (32). In Iraq limitations to this program were consanguineous marriages and other social factors(33). The main reasons influencing marriage decisions and thalassemia screening in the Maldives were social and religious factors, lack of awareness, and some personal misbeliefs (30).

Rationale

This review aims to study the literature available on premarital thalassemia screening surveys, carried out in six different countries of Asia according to their economic status(34). We grouped countries into three levels, high income, upper-middle income, and low-middle income state. High-income countries include Saudi Arabia and Oman, upper-middle-income comprises Sri Lanka and Iran, while low-middle income includes Pakistan and Bangladesh. This selection will allow us to compare the impact of social and financial aspects, availability, and accessibility of health care services that vary accordingly with the class of the country. Through this study, we aim to identify various communal perspectives, traditional practices, and different causative factors that lead to the negative perception and poor compliance of the public to the premarital screening test. Suggestions regarding premarital screening laws, awareness campaigns, and future genetic counseling are targeted goals to conduct this review article.

Objectives

1. To observe the current thalassemia screening practices in the selected countries.
2. To identify the social, religious, and cultural barriers that adversely affect response and behavior towards thalassemia screening.

Inclusion criteria:
• Published literature between 2005 – 2020 in peer-reviewed research journals.
• Published articles related to selected countries.

Exclusion criteria:
•Articles published before 2005.
•Data not published in research journals.
•Reports of the local clinics.

Materials and Methods

Our study is a systematic review of the literature regarding premarital screening of thalassemia. We selected six countries of Asia based on the level of economic status as defined by WHO(34). We grouped countries into three levels, high income, upper -middle income, and low-middle income states. High-income countries include Saudi Arabia and Oman, upper-middle-income comprises Sri Lanka and Iran, while low-middle income includes Pakistan and Bangladesh. The literature search was carried out in PubMed, Research Gate, and Google Scholar websites to find relevant published articles in English. It is a simple analysis. Relevant articles in reference lists of published articles were also searched. We collected and retrieved a total of (89) publications out of which we selected a total of (61) references. Data were independently extracted from each article, evaluated, and further processed.

Results

1 Premarital screening
Premarital screening is a method for examining couples before marriage for the diagnosis of communicable and non-communicable diseases. In this regard, Saudi Arabia, in 2003 made premarital screening compulsory in order to reduce the incidence of disease (22). In Oman premarital screening has been in action since 1999 and is available voluntarily and free of cost at all governmental healthcare centers (24). In 1991, the Iranian screening program was started and through later years, was carried out in all provinces of Iran (23). Similarly, Pakistan, Bangladesh, and Sri Lanka, also started practicing premarital screening. Although the government of Pakistan is working to make pre-marital screening mandatory, still very few studies are found regarding pre-marital thalassemia screening and work is still in progress(25). In Sri Lanka, thalassemia screening is proposed for teenagers from 15 years of age(35). According to AL Farsi, 89.3% of adults of Oman were aware of premarital screening while 30.5% were strictly against this test (24). A study conducted on youngsters regarding premarital screening in Pakistan showed around 60.9% were aware of this screening test, while 60.4% wished to get screened before marriage. (36). Results compiled from a Sri Lankan study showed that the number of individuals who had gone through screening was 17%; 14% of partners have been tested and 79% had not taken the screening test(26). Several procedures have been proposed in different countries including CBC, Hb, Electrophoresis, and PCR based analysis. In a South Asian rural area one tube fragility test (OF) associated with dichlorophenol indophenol (DCIP) dye test is used to detect the presence of Hb E (27). For B Thalassemia, the technique which is effective is electrophoresis or high-pressure liquid chromatography (HPLC), recommended by Cao et al. Nowadays PCR is used to detect thalassemia. Screening policy is made at the national level in Sri Lanka where the government provides accessible screening by MCV and MCH analysis. HPLC technique is used (26). The screening method in the Islamic Republic of Iran is by performing a complete blood count (CBC) and many variables in the report are evaluated without specific measures or standard criteria (37). Although Saudi Arab has a mandatory screening program it was unable to minimize both the incidence of disease as well as the rate of high-risk patients' marriage. It was believed to be due to the late stage of screening when couples were already committed and engaged(22). In Oman and Sri Lanka, premarital screening facilities are provided at low cost and sometimes free of charge, but still, people are not motivated to practice screening(24, 26).

2 Practice of premarital screening
Saudi Arabia and Iran have mandatory premarital thalassemia screening laws for couples. They believe that by making screening mandatory, the practice of premarital screening would be more effective(3). Iranian Ministry of Health passed an obligatory screening policy at the national level for premarital testing; all couples

were screened who registered themselves for marriage (38). From a study conducted at Taif University, 95.3% of students had a positive attitude and good intended practices toward premarital screening (39). The results observed from a study conducted in Oman in 2010 showed that 2.9% of people had undergone screening before marriage(40) . In Sri Lanka, a study conducted, on medical students, showed that only 10.2% had tested their blood for thalassemia and only 4.6% had screened their siblings (26). The results from a study performed in Dhaka showed a dearth of knowledge and practice among parents. The percentage of individuals who practiced thalassemia screening was merely 13.37%. However, the knowledge and practice among the prosperous and literate families were significantly high(27). Data from Saudi Arabia and Oman revealed that premarital screening was not practiced properly despite having mandatory screening(24, 41). In Pakistan and Bangladesh people were reluctant mostly because of financial constraints, lack of awareness regarding thalassemia and some simply ignored screening despite being advised by doctors(27, 42). Furthermore, in Sri Lanka premarital screening was not practiced significantly despite adequate knowledge about thalassemia and free diagnostics facilities(43).

2: Barriers

2.1 Consanguineous Marriages

The culture of consanguinity is common in all the countries of the Middle East, with a prevalence rate from 10.6% to 67.7%. A study from Saudi Arabia, comparing the rate of consanguineous marriages among two generations, indicated the total consanguinity (first and second cousins) was 29.7% in the parents. Consanguinity was significantly higher among the daughters than the parents, where 37.9% of married women had consanguineous marriages. The prevalence of consanguinity among the second generation is relatively high compared to the first (44). The prevalence of first-cousin marriages is about 35% of Omani marriages(15). In Iran, about 88% of participants (marriage partner volunteer) were reported to be blood-related (45). Another study carried out in 2016 to determine the prevalence of consanguinity among Iranian Mandaeans living in Khuzestan Province, south-west Iran, showed that the overall frequency of consanguinity was 50.7% in urban and 86.2% in rural areas. First cousin marriages (51.8%) were the most common type of marriages, reported in the study. (46). Pakistan also has a prevalence of consanguineous marriages. The study conducted in District Bannu indicated the rate of consanguineous marriages among B- thalassemia major patients is about 74% (47). A study conducted on Bangladeshi children in 2015-2016 indicates a consanguineous marriage prevalence rate in 14% of parents(27). In Oman, a study in (2010-2012) compared results from previous studies which indicated that no remarkable change is found in prevalence rates of consanguineous marriages. Furthermore, studies clearly described more prevalence of first cousin marriages among individuals as compared to second cousin marriages. There is a prevalence of Arab culture and customs, of consanguineous marriages and they still prefer consanguinity regardless of the rising risk of autosomal disorders and congenital defects(48). Cultural, racial factors, and insufficient knowledge regarding consanguineous marriages have an important role in the high prevalence of consanguineous marriages in Iran(45). In summary, the main factors behind consanguineous marriages are social and cultural reasons, not religious beliefs (49). To the best of our knowledge, we could not find evidence of the culture of consanguineous marriages among Sri Lankan families. By far the most common practice of consanguinity was observed in Muslim societies.

2.2 Culture

A study conducted on university students in Taif, Saudi Arabia showed that according to most of the participants the major barriers to premarital carrier screening were found to be the fear of positive results and religious misconceptions which may lead to termination of a planned marriage (39). The major barriers to the Saudi premarital screening programs were found to be pressure from society, family, and religious factors. Although a majority took the screening test before the marriage, 52% of them agreed to marry despite the unfavorable results, mainly due to expensive wedding preparations (50). A study in Oman showed overall barriers that included young age, female gender, single status, and poor literacy (40). Data from Iran showed that in Sistan and Baluchistan province there is a high prevalence of thalassemia due to their tribal variances and misconceptions regarding premarital screening (45). Studies conducted in Pakistan in 2013 (36) and 2018 (42) on non-medical university students and Thalassemia Centre of Pakistan Institute of Medical Sciences, Islamabad respectively, concluded that due to the religious and cultural factors people usually show reluctance for screening. A review on Bangladesh also showed a similar pattern of consanguinity as seen in Saudi, Oman, and Iran. Furthermore, some individuals accept it as a fortune resolute by God and take the risk of having a thalassemic baby (51). In Sri Lanka, marriage is largely determined by parents and stakeholders, and it is very hard to cancel a planned marriage due to disgrace and social and cultural norms (35).

2.3 Social

In Saudi Arabia, a lot of sociocultural factors influencing premarital screening are found such as inability to find another compatible match, the loyalty of the couple, or negligence of the health staff to provide sufficient knowledge to couples. According to Alswaidi et al, the main barriers to the Saudi premarital screening included planned weddings (43%), fear of social disgrace (21%), pressure from family (17%), and religious factors (14%). The timing of screening also plays an important role in the success of this program (22). In Oman, a study showed that 4% of the people feared that the test results may be positive; some considered it as an insult (4%). Similarly, about 3% thought that positive results would cause difficulties in the continuation of their wedding, the remaining 1% were apprehensive about the cancellation of their engagement(52). A study in Iran concluded that premarital screening results in financial burden on

couples, they get disease phobia, the stigma associated with the condition, fear of positive results, difficulty in the accessibility of screening and other socio-demographic factors i.e. ethnicity, sex, and language(53). In Pakistan, premarital screening programs are more successful in urban areas in comparison to the rural areas, mainly because of differences in financial status and accessibility of programs(54) . In Sri Lanka, A survey showed that marriage is a sensitive matter in the country, where decisions are taken by parents. So, at the time just before marriage, couples won't agree on screening due to stigma and other social and traditional beliefs attached to it(35). A review on Bangladesh premarital screening programs, concluded some strong social and cultural norms influence the decision to get tested and accept the results, which include religious beliefs, consanguineous marriages, literacy rate, and reduced intervention programs(51).

2.4 Religious

Data from Saudi Arabia showed that around 14% of the population make wedding decisions according to the religion (55). As demonstrated by a study in Oman, a minority of the participants refused this program, because they believed that they would be intruding with God's will by doing so, and almost a quarter of these patients decided to continue with the marriage(52). A similar study in Nawabshah, Pakistan showed that religious factors have a strong influence on deciding about premarital screening(56). In Iran, these programs are not successful, which may be due to religious and cultural issues(23).A literature review on Bangladesh also showed a negative attitude towards screening due to religious views(51). According to two studies in Sri Lanka (Mudiyanse RM et al 2015 and Mudiyanse RM 2015)(36), cessation of pregnancy is illegal and disagreeable due to religious reasons, so a safe marriage program was implemented as a preventive measure(35).

Discussion

Inherited hemoglobin disorders are arising as a global health burden. Roughly 320,000 babies are born annually with clinically important hemoglobinopathy. About 80% of these births take place in developing countries(57).
The international perspective of thalassemia was reviewed. In India, it is observed that premarital screening is usually not accepted because marriage decisions are influenced by family members(31). In China, some people showed a negative attitude towards screening; reasons included fear of tests, lack of knowledge, and some people considered it unnecessary(32). In Iraq limitations to this program were arranged and consanguineous marriages, late timing of screening, and other social factors(33). In Malaysia, the reasons behind reluctance for screening were lack of adequate knowledge, poor availability of screening tests, fear of positive results, and social stigma (8).

We reviewed published literature to determine barriers towards premarital thalassemia screening in Asia. Perceived barriers observed in Saudi Arabia are level of education, cultural, religious factors, different ethnic groups, and psychological issues (45, 58, 59). Different studies showed a positive attitude of the participants regarding premarital screening in order to prevent further disease transmission to the next generations (52, 60). The Oman population showed a poor response due to fear of test results, resulting insult, cancellation of marriage, and other socio-cultural aspects (24, 52). Rural areas in Iran also showed a negative attitude towards screening programs(59). The negative attitude found in Pakistan was based on fear of discrimination, a rise in the abortion rate, and some stress factors(60). In Sri Lanka, people considered it as inhuman advice(35). However, in Bangladesh, attitude is affected by a lack of knowledge (27). In Saudi Arabia and Oman premarital screening has not been practiced properly (24, 41). In Pakistan and Bangladesh, people refused premarital screening advice by health care practitioners because of financial constraints and insufficient knowledge about thalassemia (27, 42). However, in Sri Lanka also, premarital screening was not practiced significantly despite having adequate knowledge and free facilities(43).

The first premarital thalassemia screening was conducted in 1975 by Silverstroni and colleagues in Latium, Italy as a component of a school prevention program. Nationwide screening programs also started in Canada, Cyprus, Greece, Italy, and the UK during the 1970s. In Cyprus, Greece, and Italy, premarital thalassemia screening has been practiced for a long time due to the high consanguinity rate. Similar preventive programs have been initiated in Bahrain, China, India, the Islamic Republic of Iran, Indonesia, Malaysia, the Maldives, Singapore, and Thailand, and later in Saudi Arabia and the United Arab Emirates. Prenatal diagnosis is also available in the UK, Northern Ireland and other northwest European countries, and facilities for abortion as a prevention strategy(53).
Mandatory screening programs have been practiced in Saudi Arabia and Iran (22, 23). Voluntary screening services are available in Oman (24). Similarly, Pakistan, Bangladesh, and Sri Lanka, also started practicing premarital screening (25-27). Screening policy was made in Sri Lanka at a national level with easy accessibility(26).
Through studies, we perceived different social, cultural, and religious factors regarding premarital screening which result in financial burden on couples, the stigma associated with the clinical condition, difficulty in the accessibility of screening, and other socio-demographic factors. The culture of consanguineous marriages is high among Muslim countries because it is considered as a way to retain the wealth, to increase the compatibility between partners, and reduce the incidence of divorce, to preserve the relationships within a tribe.

We apprehended that in developed countries Saudi Arabia and Oman, although premarital screening services are offered nationwide, still the response is unsatisfactory because they prefer their religious customs over screening results. In middle-income countries like Pakistan and Iran, awareness is insufficient mostly in rural areas due to inadequate literacy rate, low financial status, and poor accessibility. In lower-income countries like Sri Lanka,

practice is insufficient to reduce the burden of thalassemia. Bangladesh is a country with low socioeconomic status and low literacy rate, where the success of the thalassemia prevention program is undermined due to a lack of awareness and screening policies.

Premarital screening is helpful for couples to decide regarding their future and building up a healthy family (24). In Islamic communities, abortion is considered as murder. Even in Sri Lanka abortion is illegal, so here premarital screening plays an important role in the prevention of a thalassemic child(26). Premarital screening can be a method for having safe motherhood for females, it can prevent psychosocial effects related to an affected child and can also lower the incidence of thalassemia and other hereditary disorders in the country(61).

Conclusion

The prevalence of thalassemia is high in Muslim countries due to consanguinity. Preventive management of thalassemia comprises premarital screening and genetic counseling. A good level of knowledge regarding screening was observed in Sri Lanka, Saudi Arabia, and Oman, a satisfactory level in Pakistan, while the level of knowledge in Iran and Bangladesh was not significant. Insufficient knowledge and negative attitude were observed in people due to religious misconceptions as they didn't want to interfere with God's will and various socio-cultural factors including timing of screening, and social stigma faced by the families, while breaking off a planned marriage, different ethnicities, low financial status, poor accessibility of programs and other various perceived barriers. A combination of these factors led to inadequate practice.

Recommendations

By reviewing different works of literature, we observed that the prevalence rate of thalassemia and the perception of people regarding premarital thalassemia screening is different in each country. In countries where lack of knowledge was reported, we recommend that more awareness should be provided by making it a part of the curriculum in schools, and mass awareness programs should be carried out through educational campaigns and media like TV, newspapers, and internet. As the timing of screening is an important determinant in the success of screening programs, so it is recommended that the test should be performed at an early stage, prior to engagement when it is easier for people to make a decision about their marriage. For this purpose, health education needs to be aimed at adolescents to change their opinion regarding genetic counseling. In Muslim countries, negative perceptions due to religious misbeliefs need to be addressed to increase the effectiveness of this program, and support from religious scholars is required in order to increase the trend of screening. People should be counseled about consanguineous marriages, which is an important factor in having thalassemic births in Muslim countries. The program should be made free of cost for its long term applicability. We recommend that premarital screening should be made mandatory in countries where it is not compulsory yet, as it seems a valuable measure to reduce the risk of thalassemia in high prevalence societies. Doctors and educated people of the society should participate in increasing awareness among people. The laws regarding screening programs should be in accordance with the social, cultural, traditional, and religious factors to be more effective.

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