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Editorial

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This is the first issue of the New Year that we hope it will be a successful year for the World in terms of peace, prosperity and elimination of poverty. This issue is rich with a large number of papers from the MENA Region and the United Kingdom.

Almazrou., et al., did a cross-sectional study. All data was collected using an online self-designed questionnaire that contained demographic data, such as the patient's age, gender and level of education. The aim was looking at the prevalence of self-medication use, and the attitude and practices toward traditional eye medicines regarding eye symptoms. The most common self-prescribed medications were anti-allergic and antibiotics. The results revealed that 148 respondents had previously used TEMs (16.4%).. The majority of respondents (86.6%) preferred medications over TEM to treat eye diseases.

Zahrani, et al., did a multicenter, cross-sectional study conducted in 386 pregnant women attending routine antenatal visits at 4 antenatal clinics from September 2019 to August 2020. The objective is to estimate the prevalence of subclinical and overt hypothyroidism in antenatal care clinics, and to evaluate the performance of targeted screening approach based on the risk stratification as recommended by the U.S. Preventive Service Task Force (USPSTF) and adopted by the American Thyroid Association (ATA). The authors concluded that the application of the targeted screening for subclinical and overt hypothyroidism using the USPSTF and ATA criteria performed poorly in the studied population. Thus, universal screening appears to be a better option.

Baba et al., did a qualitative study conducted within the boundaries of Islamabad capital territory and district Rawalpindi, Pakistan. The data was collected through in-depth and semi-structured interviews conducted with the respondents that included patients of COPD (n=8) as well as their treatment supporter(s) (n=7), recruited from the OPD wards of three hospitals (two public and one private hospital). The study shows that COPD patients not only face challenges in their physical health, but also in socio-economic and psychological domains that are equally harmful. It highlights varying notions of the respondents as to how treatment-seeking of COPD posed challenges in their lifestyles, at both, household and individual levels. Patients with COPD need high levels of input from healthcare facilities; hence, health care professionals should be trained in case management of COPD.

There are two audit and quality improvement reports in this issue. Dr. Al-shamery, did a clinical Audit Report on Adherence to Imaging Guidelines for Patients with Acute Low Back Pain in Airport Health Centre . It is observed from practice that most of the physicians did follow the guidelines while treating the patients with acute low back pain, although, sometimes they advised imaging within 6 weeks of symptoms. The Audit was conducted through a retrospective review of health records of randomly selected 66 patients with acute low back pain. Audit criteria derived from PHCC Clinical Practice Guideline for the Management of Low Back Pain in Adults . Audit findings of the total sample of 66 patients showed in 95% compliance with the recommended practice on imaging requirement for patients with acute Low Back Pain and didn't do imaging at the first visit. The author concluded that the recommendation on achieving 100% level of compliance in practice and sustain the practice. While Dr. Rahma, did a quality improvement project on documentation of pediatric observations in urgent care setting. Serious or life threatening illness in children in a primary care setting is thankfully rare. It has been reported that the prevalence of serious illness is 0.8% in primary care and 7.2% in secondary care . Early recognition and treatment of febrile children with serious infections improves prognosis, however, early detection can be difficult.There is a clear need for this quality improvement project in identifying how often each of these parameters are measured in a child presenting to an urgent care setting under the age of 5. The authors seek to identify the frequency of documentation of clinicians in each of the parameters highlighted in the NICE guideline in acutely unwell children under the age of 5.

Mougrabi, et al., attempt to assess the extent of effect of mental and physical wellbeing and social relation on the quality of life of patients with cardiovascular disease. It was a descriptive cross sectional study of all adults' Saudi patients who had cardiovascular diseases or had cardiac surgery at least for the previous 5 years, performed between February 2021 And December 2021 at different regions in Saudi Arabia. 470 participants were included in the study , 47.9% females and 52.1% males. The authors concluded that the factors that's lower the quality of life for cardiovascular patients in Saudi community is important and essential to address their needs and gives better QoL.

Sulaiman , et al., did a cross-sectional survey was conducted among patients who visited private health facilities looking at why patients go to private health care facilities? Perspectives from Qassim Saudi Arabia. Saudi government provides free health care to the population, however still a large number of people visit private health care facilities. The main reasons for choosing the private health

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Prevalence of self-medication use, and the attitude and practices toward traditional eye medicines regarding eye symptoms

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Abstract

Background: Self-medication is defined by the World Health Organization (WHO) as the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms [4]. Use of traditional eye medicines or ophthalmic medicines without the supervision of an ophthalmologist may have adverse effects on the patient's visual outcome. It is well known that this attitude and practice carries pharmacological and toxicological risks, such as a delayed diagnosis or inappropriate treatment, causing side-effects, intoxication or harmful drug interactions, which can aggravate the individual's condition and eventually negatively impact the patient's visual prognosis [5].

Materials and methods: The study was a cross-sectional study. All data was collected using an online self-designed questionnaire that contained demographic data, such as the patient's age, gender and level of education. There were also questions regarding the knowledge, attitude and practice of using over-the-counter (OTC) eye medication and TEM use among the Saudi population living in the Kingdom of Saudi Arabia.

Result: The study sample included 894 respondents. Results showed that in the past 12 months, only 6.82% of respondents used eye medications without visiting an ophthalmologist. The most common self-prescribed medications were anti-allergic and antibiotics. The results revealed that 148 respondents had previously used TEMs (16.4%). The majority of respondents (86.6%) preferred medications over TEM to treat eye diseases.

Key words: self-medication, traditional eye medication, Saudi Arabia, ophthalmology, eye

Introduction

The eyes are vital organs that help us to navigate the world. There are common practices for the use of traditional eye medicines (TEMs) and self-medication across the world and relates to the perceived quality of a country's healthcare system [1]. TEM refers to use of biologically related medicines, therapies or any practices that are applied to the eye or administered orally to resolve any eye-related disorders [2]. TEMs are biologically derived therapies that are usually dried parts of various plants that are rendered soluble in an aqueous medium [3]. Self-medication is defined by the World Health Organization (WHO) as the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms [4]. Use of traditional eye medicines or ophthalmic medicines without the supervision of an ophthalmologist may have adverse effects on the patient's visual outcome. It is well-known that this attitude and practice carries pharmacological and toxicological risks, such as a delayed diagnosis or inappropriate treatment, causing side-effects, intoxication or harmful drug interactions, which can aggravate the individual's condition and eventually negatively impact the patient's visual prognosis [5]. The WHO and its partners have launched a global initiative titled "The Right to Sight" to reduce visual impairment and burden of eye illness [6]. To achieve the desired prognosis, it is important for the patient to consult an ophthalmologist or a physician regarding any eye problem and to take appropriate medicines and follow treatment instructions. Attitudes and practices related to TEMs and self-medication have not been extensively studied in the Saudi population [7], especially in the capital city of Riyadh. Therefore, this cross-sectional population-based study was aimed at assessing current practices and knowledge regarding common eye diseases and their symptoms and to determine the prevalence of self-medication use and TEM use among Riyadh and other city populations.

Methodology

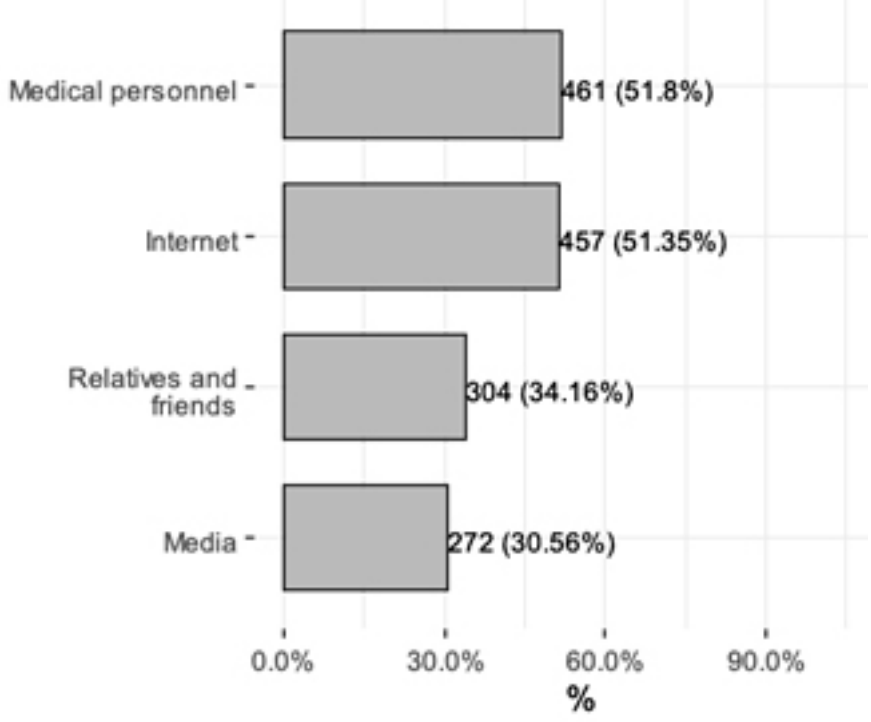
The study was a cross-sectional study. All data was collected using an online self-designed questionnaire that contained demographic data, such as the patient's age, gender and level of education. There were also questions regarding the knowledge, attitude and practice of using over-the-counter (OTC) eye medication and TEM use among the Saudi population living in the Kingdom of Saudi Arabia.

Total participants were 894 males and females. The data was statistically analyzed using R v 3.6.3, and counts and percentages were used to summarize participants' responses. Using check box questions, the percentage for each response was calculated from the total sample size. Bar plots were used to visualize the responses. The Chi-Square Test of Independence was used to assess the factors associated with self-medication.

Results

The study sample included 894 respondents. Males and females represented 19.9% and 81.1%, respectively. More than half of the respondents were from Riyadh (61.5%). The average age of the study sample was 41.3 ± 11.3 years. Regarding education level, 66% of respondents completed university education, and 20.2% were only educated to high school level. Less than 5% of respondents completed a secondary education, and 8.72% had a post-graduate degree. Students represented 10.5% of the study sample. In contrast, employed and unemployed respondents represented 34.1% and 39.9%. The majority of respondents did not report any eye problems (83.7%). Eye diseases reported by respondents included inflammation (10.9%), cataract (3.69%), keratoconus (1.23%), and strabismus (0.78%). The majority of respondents did not have any eye medications at home (87.7%).

Figure 1: Source of information regarding eye diseases (n = 854)



The most common sources of information regarding eye diseases were from medical personnel (51.8%) and the internet (51.35%). Respondents who obtained their information from friends and relatives or the media, represented 34.16% and 30.56% of the study sample (Figure 1).

Results showed that in the past 12 months, only 6.82% of respondents used eye medications without visiting an ophthalmologist. The most common self-prescribed medications were anti-allergic and antibiotics (Figure 2). The medication was recommended by a GP or a physician (who was non-specialized in ophthalmology) in 34.4% of the cases and was recommended by a pharmacist in 27.9% of cases. Approximately three-quarters of respondents read the drug leaflet (70.5%), and the majority of respondents checked the expiry date (86.9%). Slightly less than three-quarters of respondents were aware of the adverse effects of self-prescribed medication (68.9%). The reasons given by 59 participants for using non-prescribed medications are shown in (Figure 3).

The most common reasons for using self-prescribed medications were redness of the eye (47.46%) and itching (42.37%). Other reasons included eye irritation (30.51%), a burning sensation (25.42%), watery eyes (20.34%), and blurring of vision (20.34%).

Figure 2: Use of non-prescribed medications for eye problems (n = 32)

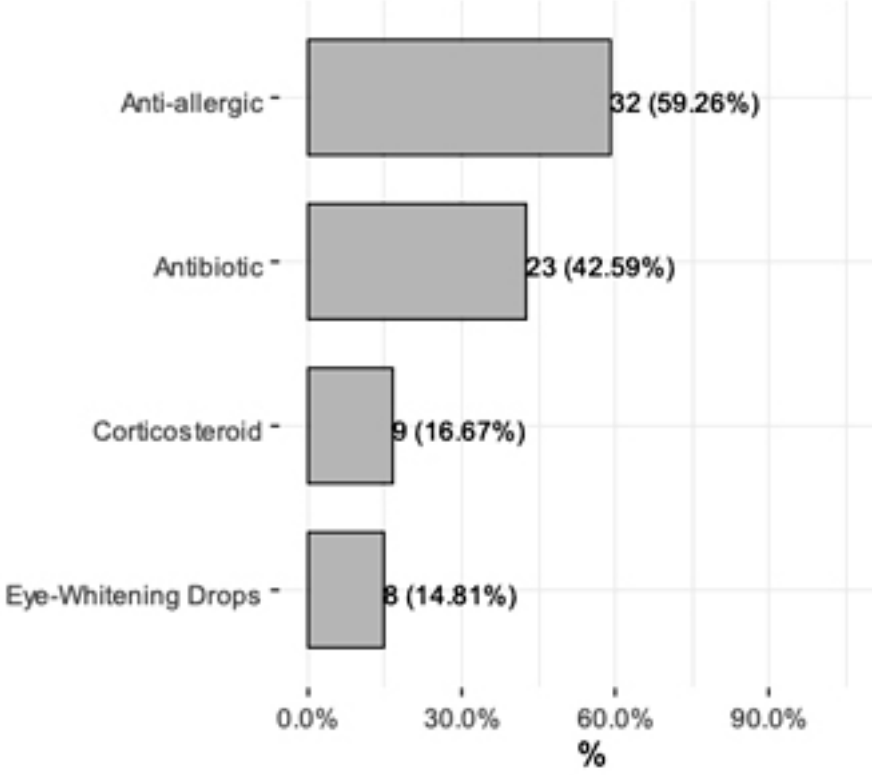
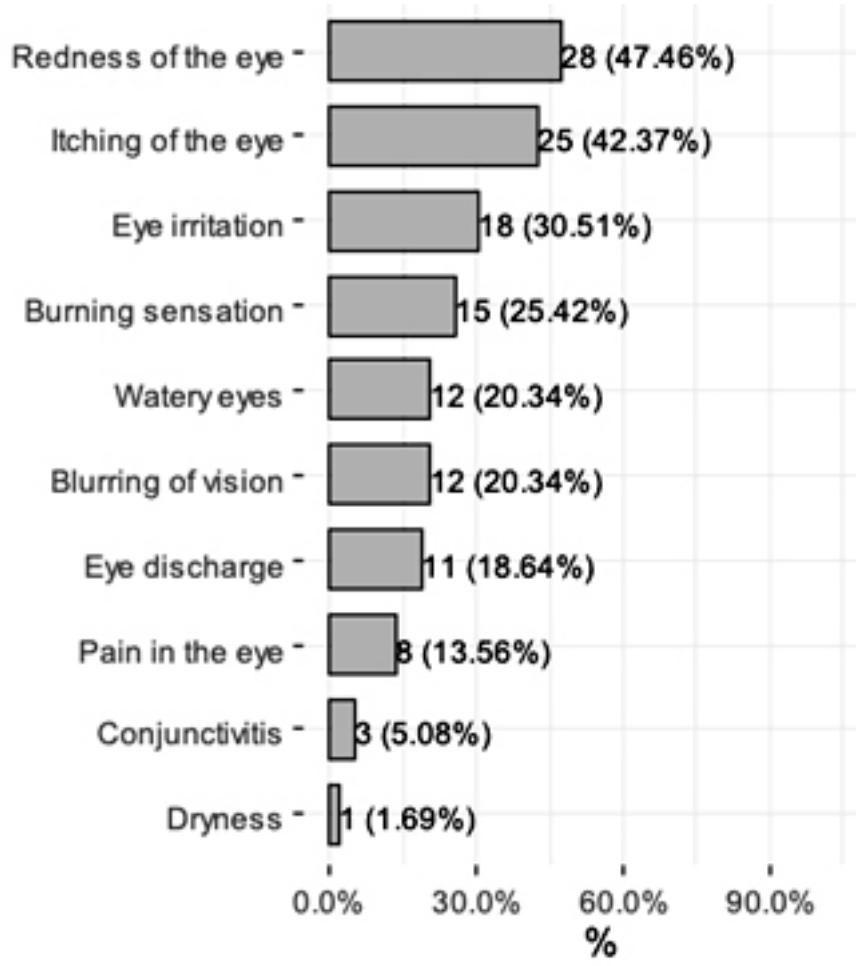
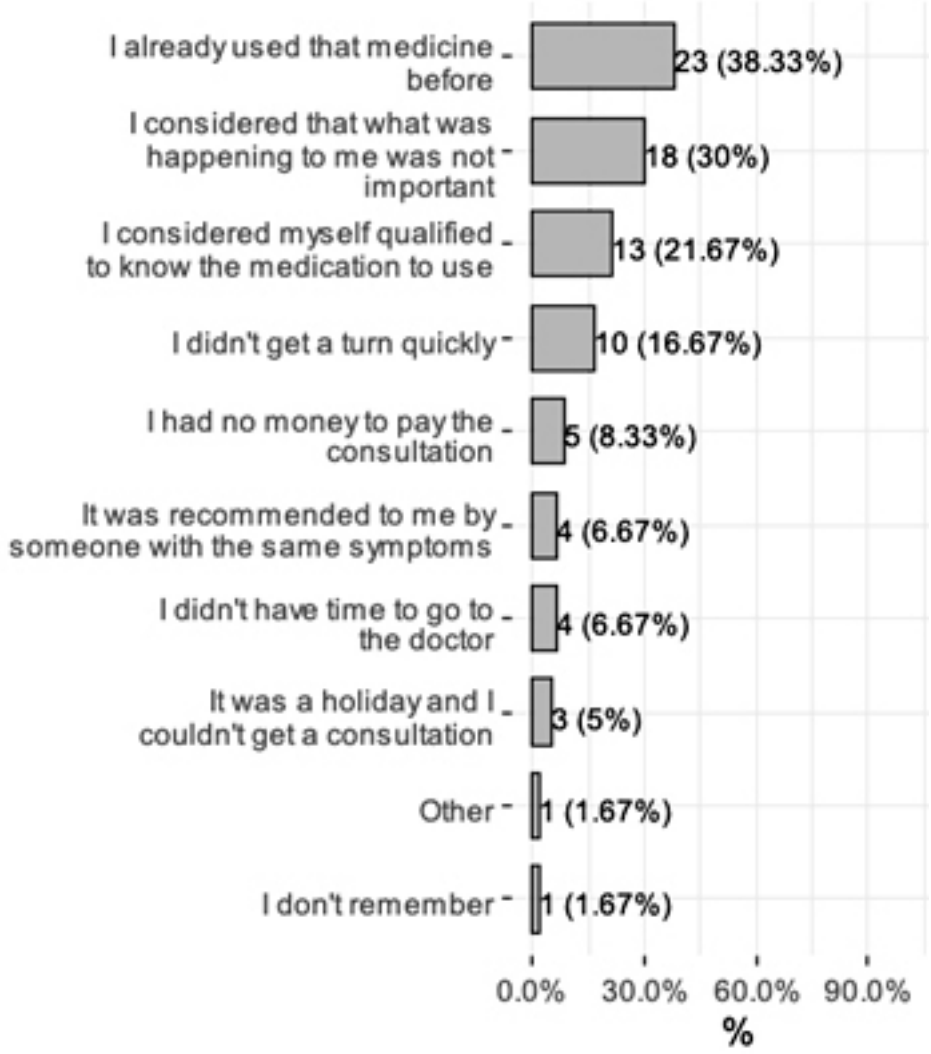


Figure 3: Reasons for using non-prescribed medications (n = 59)



Anti-allergic medications were the most commonly used class of medications (n = 32, 59.26%), followed by antibiotics (42.59%) and corticosteroids (16.67%). Eye-whitening drops were used by 14.81% of the respondents who reported using self-prescribed medications.

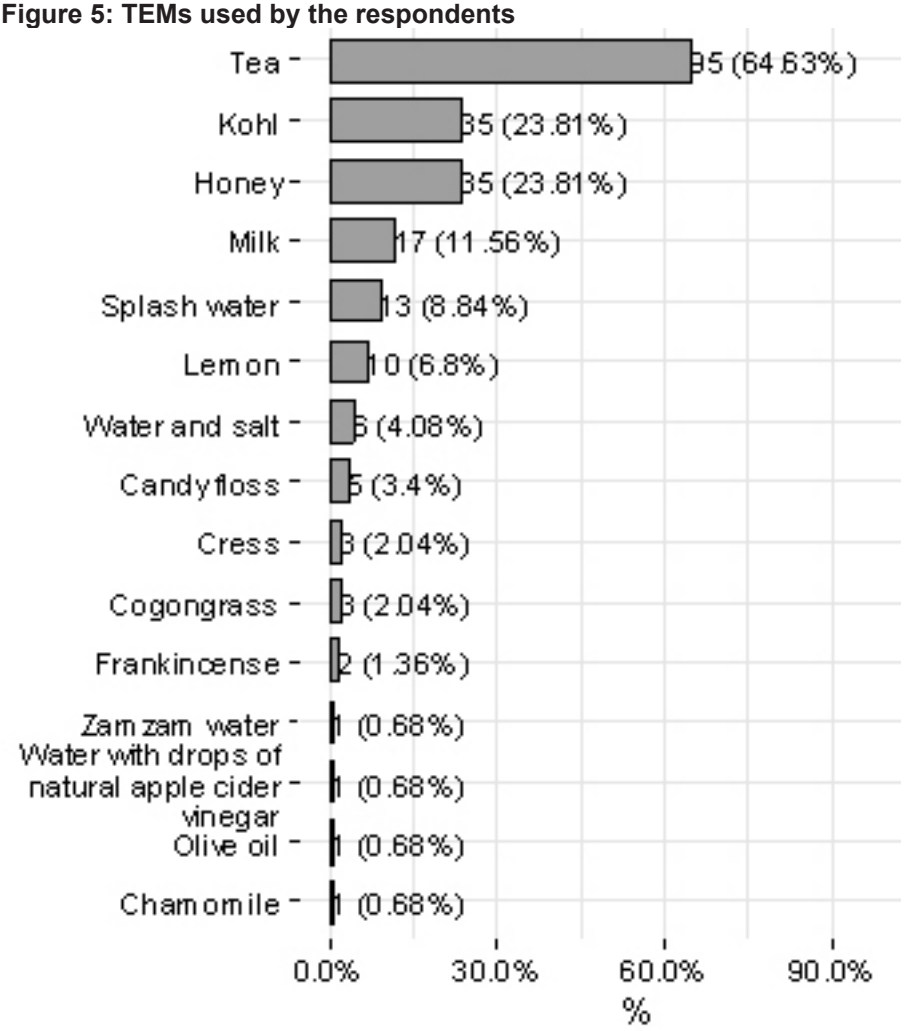
Figure 4: Reasons for not consulting an ophthalmologist before self-prescribing eye medications (n = 59)



The most common reason that participants self-prescribed eye medications was because they had previous experience of using the same medication (38.33%). Some respondents did not consider the eye disease/problem to be important (30%), and slightly less than one-quarter of respondents considered themselves qualified enough to know which medication they could use (21.67%). Financial issues was the reason for not consulting an ophthalmologist in 8.33% of the cases (Figure 4).

The results revealed that 148 respondents had previously used TEMs (16.4%). The TEMs used are shown in Figure 5. Slightly less than half of the respondents (45.3%) believed that TEMs are safe and effective. Only 10.1% of respondents experienced eye injuries due to TEM use. The majority of respondents (86.6%) preferred medications over TEM to treat eye diseases.

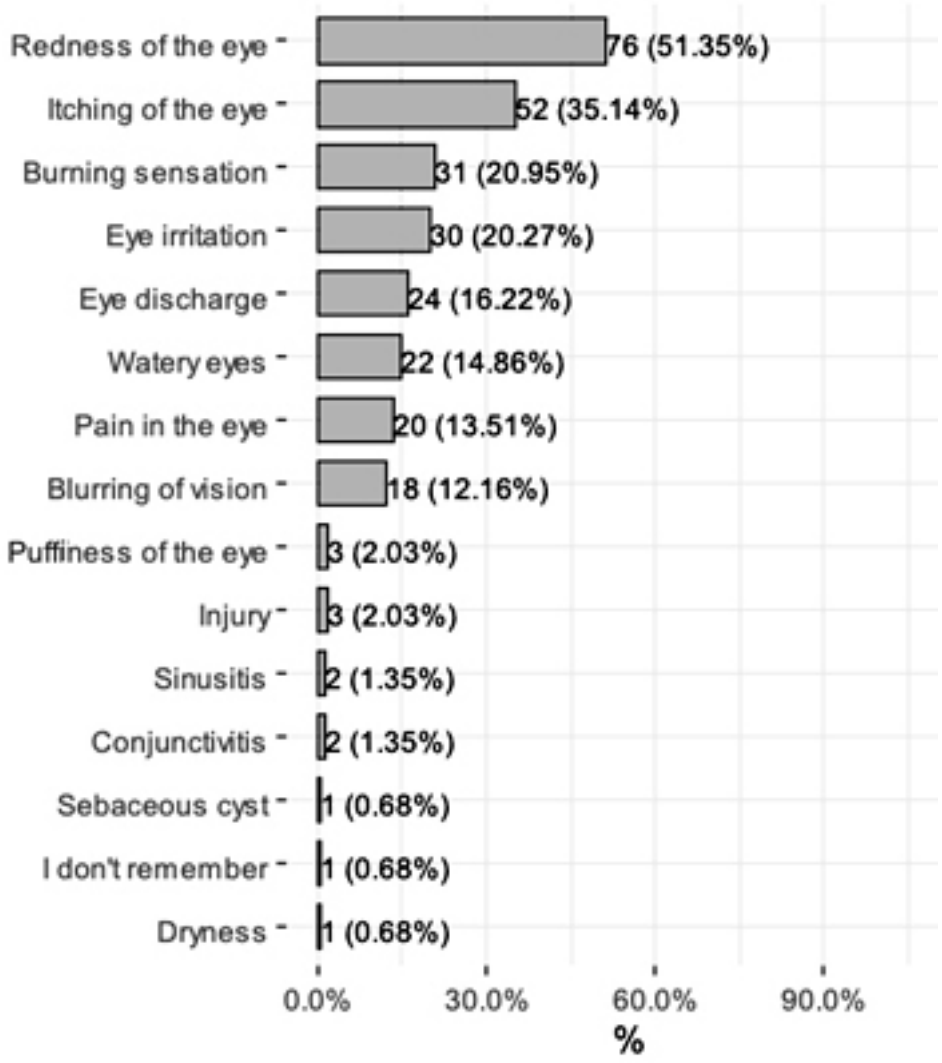
Figure 5: TEMs used by the respondents



Percentages were calculated from respondents who reported using TEM (n = 147)

The most commonly used TEM was tea, as reported by 64.63% of respondents. Kohl, honey, and milk were used by 23.81%, 23.81%, and 11.56% of respondents, respectively. Splash water and lemon were used by 8.84% and 6.8% of respondents, respectively. Water and salt were used by 4.08% of respondents who reported using TEM(Figure 5).

Figure 6: Reasons for using TEM (n = 148)



Results showed that eye redness was the most common reason for using TEMs (51.35%), followed by itching (35.14%), and burning (20.95%) (Figure 6).

Eye complaints and the availability of eye medications at home were associated with a higher frequency of use of self-prescribed medications ($P < 0.001$). No other factors were associated with the frequency of use of self-prescribed medication.

On the other hand, eye problems and the use of media as a source of information were associated with a higher frequency of use of TEMs ($P < 0.05$). No remaining factors were associated with the frequency of use of TEMs.

Discussion

The aim of this study was to determine the prevalence and attitude towards TEMs, and self-medication use among Saudi citizens.

In the Kingdom of Saudi Arabia, the use of complementary and alternative medicine (CAM) has gained broad popularity. However it has also raised several questions and increased fears about its professionalism, safety and effectiveness. Adulteration, incorrect formulation, drug interactions and the use of plants and herbs have all led to adverse effects that can be life-threatening or fatal to patients [8]. It is a matter of great concern when complications occur and ophthalmic side effects increase due to self-medication. Many self-medications are safe and efficient, however misuse of these drugs due to a lack of information about them can lead to serious side effects. In the Saudi population, the use of TEM and self-medication are not well documented [9].

In our study, 16.4% of participants used TEMs. The prevalence of use of TEM was lower compared to other studies conducted in Taif City, Saudi Arabia by Bifari et al. (2020). Most Taif City participants were from the age group of 20-29 years (43.9%). However, 22% of Taif City participants considered TEMs to be safe and effective [10]. In our study, the majority of participants (34.3%) were from the age group 36–45. However, TEM use was higher among the age group 46–55 which accounted for 26.2% of our participants [11]. This may have been due to an overall increased level of awareness in the Saudi population or because the majority of participants in the survey were from the capital, Riyadh, where population awareness is higher than in other cities.

Ophthalmic self-medication seemed to be independent of gender in the Colombian population, as well as in the Brazilian cohort [12]. However, our study is consistent with a study conducted in the Argentinean population where a higher tendency to use this approach was found in women. Regarding age, the average age of our study sample was 41.3 ± 11.3 years. However, all three Latin American studies demonstrated that the misuse of ophthalmic topical preparations was independent of age, despite there being a non-significant tendency toward people from the 18–50-year-old age group to self-medicate in all three countries [12].

Only 6.82 percent of respondents in our survey utilized eye medicines instead of consulting an ophthalmologist. These reassuring results indicate that our society is aware about the risk of using medication without prescription and understand that they can receive satisfactory treatment from their nearest primary health care providers due to the difficulty of obtaining antibiotics without medical prescription. Furthermore, anti-allergic medications were the most commonly used class of medications 59.26%, followed by antibiotics 42.59%. This is not consistent with other studies conducted by Ajayi et al. (2014), Al-Azzam et al. (2007) and Berzanskyte et al. (2006) [13] [14] [15]. This might be due to the belief that most eye problems are due to allergies. Furthermore, the use of antibiotics in our study population was mostly for non-infective eye conditions like allergic conjunctivitis, refraction, glaucoma, corneal laceration, cataract etc.

A study conducted in the Kingdom of Saudi Arabia by Akeel et al. (2018) reported that the use of traditional medicines for any problems was found to be three times greater among high school participants [16]. In contrast to our sample, participants with a university degree (18.0%) and post-graduate (16.7%) had the highest percentage of TEM use. Our sample study supported and corresponded with previous research findings conducted in Zimbabwe and Nigeria, which showed that traditional eye medicines are not dependent on the participant's level of education [17] [18].

According to Marquez et al, family members' counsel was the most motivating element for self-treatment [19]. During our study, the most common reason for self-prescription of eye medications was due to previous experience of using the medication 38.33%. Some respondents did not consider the eye disease/problem important (30%), and slightly less than one-quarter of the respondents considered themselves qualified to know which medication they could use (21.67%). Financial issues were the reason for not consulting an ophthalmologist in 8.33% of the cases.

Respondent opinion regarding the safety and effectiveness of TEM was requested and less than half of the respondents who had used TEMs before (45.3%) considered them to be safe and effective. Another study conducted in the Kingdom of Saudi Arabia by Al-Ghamdi et al. (2017) established that most users believe traditional or herbal medicines to be efficient and safe.

These findings can help us to understand how people may underestimate the risk and complication of traditional eye medicine. The use of media as a source of information is associated with a higher frequency of TEM and OTC use, and this might explain how even educated people could be prone to misleading information.

In our study we faced some constraints and barriers between ourselves and the older age group since our method of conducting data was through the use of an online survey. This made it difficult to contact them. The second barrier was that most of our respondents were from Riyadh City, which is the capital, and may not reflect the same convictions and uses as other cities.

Conclusion

Our results indicate that self-medication is not common and raises the question of why TEMs are more popular. The National Center for Complementary and Alternative Medicine (NCCAM), with the cooperation of ophthalmologists, need to investigate the safety and effectiveness regarding TEM use. The findings from this research can provide insights into how misleading media and lack of knowledge can affect our decision. Notably, promoting information to patients regarding the side effects of ophthalmic self-medication, in addition to increasing awareness concerning TEM, is necessary. Further research in this field is needed.

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Awareness and Knowledge about Childhood Autism among Family Medicine Residents in Al Madinah Region in Saudi Arabia, 2020

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Abstract

Background: Autism spectrum disorder (ASD) refers to a range of conditions characterized by some degree of impaired social behavior, communication and language, and a narrow range of interests and activities that are both unique to the individual and carried out repetitively.

Objective: To assess knowledge of Family Medicine residents in Al Madinah Region regarding childhood autism.

Methods: This cross-sectional study was conducted to assess knowledge of 103 family medicine residents about childhood autism in Al Madinah Region, Saudi Arabia. A structured self-administered web-based Healthcare Workers (KCAHW) Questionnaire was used to assess knowledge of childhood autism among participant residents.

Results: Residents' total score (Mean±SD) was 13.18±2.80 (out of 19, 69.4%). The highest attained mean scores were for the first and second domains (6.36±1.64, 79.5% and 0.78±0.42, 78%, respectively), while the lowest was for the fourth domain (2.62±1.10, out of 6, 43.7%). Highest mean knowledge scores among participants were among those aged 35-39 years (13.33±0.58). However, knowledge scores did not differ significantly according to residents' age groups. Male residents had significantly lower knowledge scores than females (12.56±2.53 and 14.21±2.95, respectively, p=0.003). Mean knowledge scores were highest among R4 residents (13.66±2.91). However, knowledge scores did not differ significantly according to residents' training levels. Participants in Yanbu Residency Program had significantly lower mean knowledge scores than those in AL Madinah (12.26±2.70 and 13.45±2.79, respectively). However, knowledge scores did not differ significantly according to residency programs. Mean knowledge scores about autism did not differ significantly according to attending workshops or conferences about autism.

Conclusion: Knowledge of family medicine residents regarding childhood autism is suboptimal. Correlates of KCA may help in selection of healthcare workers who would best provide health education and management for caregivers of children with autism. It is important to update the knowledge gaps of healthcare workers who have limited knowledge regarding childhood autism and to train them to be able to provide healthcare service that would ensure early diagnosis and interventions for management of autism.

Key words: Autism spectrum disorder, children, Family Medicine, Knowledge, Saudi Arabia.

Introduction

Autism spectrum disorder (ASD) refers to a range of conditions characterized by some degree of impaired social behavior, communication and language, and a narrow range of interests and activities that are both unique to the individual and carried out repetitively. ASDs begin in childhood and tend to persist into adolescence and adulthood. In most cases the conditions are apparent during the first five years of life. Individuals with ASD often present with other conditions, including epilepsy, depression, anxiety and attention deficit hyperactivity disorder. The level of intellectual functioning in individuals with ASDs is extremely variable, extending from profound impairment to superior levels [1].

ASD can sometimes be detected at 18 months or younger. By the age of two years, a diagnosis by an experienced professional can be considered very reliable. However, many children do not receive a final diagnosis until much older [2]. Not all causes of ASD are known. However, we have learned that there are likely many causes for multiple types of ASD. There may be many different factors that make a child more likely to have an ASD, including environmental, biologic and genetic factors. Most scientists agree that genes are one of the risk factors that can make a person more likely to develop ASD [3]. Children who have a sibling with ASD are at a higher risk of also having ASD [4-5].

ASD continues to be an important public health concern as its prevalence has increased over time. A global estimation shows that 1 in 160 children have ASD with increased occurrences in boys [1] and has increased now to be between 0.9% to 1.5% among children [7]. A study was done recently in the Gulf region that reported the prevalence was the highest in the Kingdom of Saudi Arabia (KSA), with 59 per 10,000 children [8]. For that high prevalence globally and locally and because there is no medical test, like a blood test to diagnose ASD, doctors need to look at the child's behavior and development to make a diagnosis.

Since the Family Medicine physicians are the first contact of the families within the healthcare system it is important that Family Medicine physicians have knowledge of autism in order to offer families appropriate guidance and support. One study was done in Riyadh city, KSA among Family Physicians Medicine and published in June 2019 shows low awareness level and moderate to low level of confidence in the physician's ability to recognize, identify, or communicate in regard to ASD [9].

Therefore, this study is possibly the first study that investigates the awareness and knowledge of ASD among family medicine residents in Saudi Arabia.

Aim of study

To assess knowledge of Family Medicine residents in Al Madinah Region regarding childhood autism.

Methodology

Study design

This study followed a cross-sectional design, using a self-administered questionnaire which was carried out at the Family Medicine training centers in Al Madinah region in Saudi Arabia.

Population and Setting

This study was conducted with Family Medicine residents in the Al Madinah region, which lie in the Western Province of Saudi Arabia. The total number of Family medicine residents in this region is 161.

Sample Size and Sampling Procedure

The sample size was based on the total number of Family Medicine residents (N=161) and was determined using the Raosoft sample size online calculator [10], with a predetermined margin of error of 5% and a confidence level of 95%. The target sample size was set at 109 residents. Of those, 103 responded to the survey, giving a response rate of 64%.

A non-probability purposive sampling method was used. The inclusion criteria were as follows: being a family medicine resident (R1 to R4), and being trained in a family medicine center in Al Madinah region, and being a Saudi national. The exclusion criteria were as follows: Family medicine residents in regions other than Al Madinah, Family Medicine specialists or consultants, and non-Saudi nationals.

Data collection

Data were collected using the English version of the "Knowledge about Childhood Autism among Healthcare Workers (KCAHW)" Questionnaire [11]. The questionnaire was adapted from a previous study and was modified to include the gender, level of residency, residency program city, and any attended ASD workshops or conferences. The questionnaire form was self-administered and web-based. The questionnaire consisted of demographics/background information and four domains to assess knowledge related to ASD. The questionnaire included demographic variables of participants, such as gender, residency level, Program city, and workshops or conference attendance about ASD.

The first domain contains eight-item questions that addressed the impairments in social interaction usually found in children with childhood autism. The scores in this domain range from 0 to 8. The second domain contains only one-item question that addressed impairment in area of communication and language development, which is a part of symptom presentation in children with childhood autism. The scores in this domain range from 0 to 1. The third domain contains four-item questions that addressed the areas of obsession and compulsive pattern of behavior found in children with childhood autism; a pattern of behavior which had been described as restricted, repetitive and stereotyped. The scores in this domain range from 0 to 4. The last domain contains six-item questions

that addressed information on what type of disorder is childhood autism, possible comorbid conditions and onset of childhood autism in affected children. The scores in this domain range from 0 to 6 [11].

Therefore, the total scores range from 0 to 19 for the four-domain scores added together. The mean total score for the KCAHW questionnaire among a particular sample population or community is a measure of the knowledge level about childhood autism among that particular population [11].

After obtaining ethical approval, a pilot study was conducted using the study questionnaire with eight family medicine residents to determine the clarity of the language and the questionnaire's structure. The results of the pilot study were not included in the main results. Then, copies of the study questionnaire were delivered to family medicine residents during the period from September to October 2021.

Data entry and analysis

The collected data was cleared, entered, and analyzed by using the Statistical Package for Social Sciences (IBM, SPSS version 25.0 for windows). Descriptive analysis methods were used, and data were presented in terms of frequencies and percentages for qualitative data and mean±SD for quantitative data. To test significance of differences in knowledge scores, independent variable t-test and analysis of variance (ANOVA) were applied accordingly. P-values less than 0.05 were considered as statistically significant.

Ethical consideration

An ethical clearance was given by the Ethical Committee of the Ministry of Health in Al Madinah region. All respondents were asked for their consent before participation in the study.

Results

Table 1 shows that 103 residents completed and submitted the online "Knowledge about Childhood Autism among Healthcare Workers (KCAHW) Questionnaire". The data in table 1 shows that (73.8%) of the responses were from the residents whose age 26-30 years old. About two-thirds of participants (62.1%) were males. The highest responses were from fourth level residents, while the lowest were from the third level residents (31.1% and 19.4%, respectively). About three-quarters of responses were from AL Madinah residents (77.7%). Only 18.4% of the residents attended workshops or conference about autism.

Table 2 describes residents' responses regarding the eight statements included in the first domain, addressing the impairments in social interactions usually found in children with childhood autism. The majority of residents gave correct answers about marked impairment in use of multiple non-verbal behaviors (90.3%), failure to develop peer relationship (89.3%), and social smile is usually absent (81.6%), lack of spontaneous will to share enjoyment (86.4%), and lack of social or emotional reciprocity (81.6%). More than two-thirds of participants gave correct answers regarding loss of interest in the environment and surroundings (71.8%) and the fact that the child can appear as if deaf or dumb (68.9%), while the residents got the lowest score regarding the statement staring into open space and not focusing on anything specific (55.3%).

Table 3 includes the first domain (only one statement) that addressed impairment in area of communication and language development, which is part of symptom presentation in children with childhood autism. Most residents (77.7%) gave the correct answer.

Table 4 includes the third domain (4 statements) assessing obsession and compulsive pattern of behavior found in children with childhood autism; a pattern of behavior, which had been described as restricted, repetitive and stereotyped. More than three-quarterss of participants gave correct answers regarding hand repetitive movement, persistent preoccupation with parts of objects and love for regimented routine activities (81.6%, 77.7%, and 76.7%, respectively), while 41.7% gave a correct answer regarding the fact that autism may be associated with abnormal eating habits.

Table 5 included the fourth domain, which contained six statements that addressed the information nature of childhood autism, possible comorbid conditions, and onset of childhood autism in affected children. More than three-quarterss of participants had correct answers regarding what type of disorder is childhood autism, which was represented by these two statements; autism is childhood schizophrenia and autism is an auto-immune condition (76.7% and 77.6%, respectively), while less than half of participants gave wrong answers regarding comorbid conditions associated with autism. Regarding the onset of childhood autism, 65% gave the correct answer, as shown in Table 6.

Table 7 shows that residents' total score (Mean±SD) was 13.18±2.80 (out of 19, 69.4%). The highest attained mean scores were for the first and second domains (6.36±1.64, 79.5% and 0.78±0.42, 78%, respectively), while the lowest was for the fourth domain (2.62±1.10, out of 6, 43.7%).

Table 8 shows that highest mean knowledge scores among participants were among those aged 35-39 years (13.33±0.58). However, knowledge scores did not differ significantly according to residents' age groups. Male residents had significantly lower knowledge scores than females (12.56±2.53 and 14.21±2.95, respectively, p=0.003). Mean knowledge scores were highest among R4 residents (13.66±2.91). However, knowledge scores did not differ significantly according to residents' training levels. Participants in Yanbu Residency Program had significantly lower mean knowledge scores than those in AL Madinah (12.26±2.70 and 13.45±2.79, respectively). However, knowledge scores did not differ significantly according to residency programs. Mean knowledge scores about autism did not differ significantly according to attending workshops or conferences about autism.

Table 1: Demographics/ background

Personal Characteristics	No.	%
Age groups (in years)		
• 26-30	76	73.8
• 31-34	24	23.3
• 35-39	3	2.9
Gender		
• Male	64	62.1
• Female	39	37.9
Level of training		
• R1	24	23.3
• R2	27	26.2
• R3	20	19.4
• R4	32	31.1
Residency program		
• Yanbu	23	22.3
• AL Madinah	80	77.7
Attending any workshops or conference about autism		
• Yes	19	18.4
• No	84	81.6

Table 2: Residents' responses regarding the first domain (impairments in social interaction)

Statements	Yes	No	Do not know
	No. (%)	No. (%)	No. (%)
Marked impairment in use of multiple non-verbal behaviors	93 (90.3)	4 (3.9)	6 (5.8)
Failure to develop peer relationship appropriate for developmental age	92 (89.3)	2 (1.9)	9 (8.7)
Lack of spontaneous will to share enjoyment, interest or activities with other people	89 (86.4)	7 (6.8)	7 (6.8)
Lack of social or emotional reciprocity	84 (81.6)	5 (4.9)	14 (13.6)
Staring into open space and not focusing on anything specific	57 (55.3)	22 (21.4)	24 (23.3)
The child can appear as if deaf or dumb	71 (68.9)	16 (15.5)	16 (15.5)
Loss of interest in the environment and surroundings	74 (71.8)	16 (15.5)	13 (12.6)
Social smile is usually absent in a child with autism	94 (91)	3 (2.9)	6 (5.8)

Table 3: Residents' responses regarding the second domain (impairment in communication)

Statement	Yes	No	Do not know
	No. (%)	No. (%)	No. (%)
Delay or total lack of development of spoken language	80 (77.7)	13 (12.6)	10 (9.7)

Table 4: Residents' responses regarding the third domain (obsessive and repetitive behavioral pattern) found in children with childhood autism

Statements	Yes	No	Do not know
	No. (%)	No. (%)	No. (%)
Stereotyped and repetitive movement	84 (81.6)	9 (8.7)	10 (9.7)
May be associated with abnormal eating habit	43 (41.7)	21 (20.4)	39 (37.9)
Persistent preoccupation with parts of objects	80 (77.7)	2 (1.9)	21 (20.4)
Love for regimented routine activities	79 (76.7)	6 (5.8)	18 (17.5)

Table 5: Residents' responses regarding the fourth domain (type of disorder autism is and possible associated co-morbidity)

Statements	Yes	No	Do not know
	No. (%)	No. (%)	No. (%)
Autism is childhood Schizophrenia	4 (3.9)	79 (76.7)	20 (19.4)
Autism is an auto-immune condition	5 (4.8)	80 (77.6)	18 (17.4)
Autism is a neuro-developmental disorder	48 (46.6)	34 (33)	21 (20.4)
Autism could be associated with mental retardation	38 (36.9)	35 (34)	30 (29.1)
Autism could be associated with epilepsy	28(27.2)	30 (29.1)	45 (43.7)

Table 6: Usual age-onset of autism

	Neonatal age No. (%)	Infancy No. (%)	Childhood No. (%)
Usual age of autism diagnosis	7 (6.8)	29 (28.2)	67 (65.0)

Table 7: Residents' knowledge scores in different domains

Domain	Areas	No. of statements	Mean±SD	%
First	Impairments in social interaction	8	6.36±1.64	79.5
Second	Impairment in communication	1	0.78±0.42	78.0
Third	Obsessive and repetitive behavioral pattern	4	2.78±1.18	69.5
Fourth	Type of disorder autism is and possible associated co-morbidity	6	2.62±1.10	43.7
Total	All	19	13.18±2.80	69.4

Table 8: Participants' knowledge scores (Mean±SD) about autism according to their personal characteristics

Personal characteristics	No.	Mean±SD	P-value
Age			
• 26-30	76	13.29±2.94	
• 31-34	24	12.83±2.53	
• 35-39	3	13.33±0.58	0.785
Gender			
• Male	64	12.56±2.53	
• Female	39	14.21±2.95	0.003
Level of training			
• R1	24	12.13±2.98	
• R2	27	13.48±2.83	
• R3	20	13.30±2.13	
• R4	32	13.66±2.91	0.197
Residency program			
• Yanbu	23	12.26±2.70	
• Al Madinah	80	13.45±2.79	0.072
Attending workshops or conference about autism			
• Yes	19	13.32±2.26	
• No	84	13.15±2.92	0.822

Discussion

The increasing prevalence of ASD over the last few decades generates a unique challenge for general practitioners who frequently encounter autistic patients during their practice. Therefore, family physicians should have sufficient knowledge regarding the main characteristics of ASD for proper diagnosis, early intervention, and appropriate management [12].

Using the KCAHW scores, findings of the present study revealed that participant residents' knowledge about ASD was suboptimal. Their mean total knowledge score was 13.18±2.80 (out of 19), with 69.4% of their total responses being correct. Their knowledge gap was mainly related to the fourth domain, about information on type of ASD (2.62±1.10, 43.7%). On the other hand, their best knowledge regarding ASD covered the first domain about impairment of social interaction (6.36±1.64, 79.5%) and the second domain about impairment of communication and language development (0.78±0.42, 78%), while a lower mean score was attained for the third domain (obsession and compulsive pattern of behavior) (2.78±1.18, 69.5%).

These findings are in accordance with those of Bakare et al. [11], in Nigeria, who reported a total mean KCAHW score of participant healthcare workers similar to that of our study (12.35±4.40, 70.2%). However, they found that their knowledge gap was higher in the third domain, followed by the first, fourth and second domains, respectively.

Eseigbe et al. [13] noted that physicians' specialty was a significant factor related to their knowledge about ASD. Pediatricians had significantly enhanced knowledge and self-perceived competency, compared with general practitioners who had poor knowledge.

Zuckerman et al. [14] stated that primary care physicians should improve their knowledge of autism since they constitute the first professional point of contact with parents of children with a potential diagnosis of ASD. Several studies explained that poor knowledge among primary care physicians may be due to their outdated beliefs and misconceptions about symptoms of autism [15] or insufficient resources for management of ASD [16].

Rhoades et al. [17] noted that physicians who lack the necessary knowledge about ASD may miss critical opportunities for education about ASD and the important and prompt referral to appropriate services.

Despite the fact that family physicians play a vital role in early recognition and long-term management of ASD [18], only 18.4% of our participant residents attended workshops or conferences about autism. This clearly low attendance at training opportunities may reflect the need for more training facilities in Al Madinah and Yanbu for healthcare professionals who can be involved in the multidisciplinary approach for ASD management. Therefore, continuing medical education and training of our family medicine residents proved to be a pressing necessity for improving their current knowledge and filling up their identified areas of knowledge gap.

In agreement with our findings, lack of autism-specific continuing education or training [19], and low attendance rates where autism training does exist [20] were reported among primary care physicians. Therefore, receiving continuing medical education about autism enhances physicians' knowledge [15].

Bordini et al. [21] observed improvements in knowledge of primary care providers about autism with continuing medical education, while Major et al. [22] reported that knowledge among pediatric residents increased from 58.6% to 75.3%. In addition, Eray and Murat [23] reported an increased knowledge about autism from 34.7% to 88.0% after training. Odejide et al. [24] added that it is important to enhance knowledge of healthcare workers by training on improving diagnostic skills and the ability to adequately provide the necessary information to ASD patients and their caregivers regarding its management.

Our study revealed that residents' knowledge about ASD varied according to some of their personal characteristics. Males were significantly less knowledgeable than females. Older and senior (R4) residents were more knowledgeable than younger and junior (R1) residents. Also, residents in Yanbu were less knowledgeable regarding ASD than those in Al Madinah. However, a particularly alarming finding is that the continuing medical education (e.g., attending training courses or conferences) on ASD was not associated with better knowledge among family medicine residents. Therefore, it is highly recommended to improve and expand training opportunities for physicians on management of ASD.

It has been reported that more years of clinical experience were associated with higher knowledge about ASD [25], with primary care physicians' age being positively correlated with autism knowledge [26], as those aged more than 35 years had good knowledge levels [25].

In agreement with our findings, Austriaco et al. (12) noted that, among medical students and pediatric trainees, females rated understanding ASD behavior significantly higher than their male counterparts did (p=0.005), and attained significantly higher ratings for understanding the importance of ASD routine (p=0.011), as well as discussing the child's routine with the family (p=0.003).

Workshops and online conferences proved to be important for training on ASD screening [18]. Bauer et al. [27] focused on adding an autism-oriented module to a pre-existing computer system that could automatically provide screening, diagnosis, and referral feedback based on information provided by the primary care physicians.

Murthy and Wig [28] suggested that training approaches for primary healthcare physicians that aim at enhancing the availability of mental healthcare manpower should include evaluation of healthcare workers' existing knowledge of and attitudes toward mental disorders, assessment of existing training materials, evaluation of the needs for new training materials and evaluation of the support and supervision needed to carry out their duties.

In Nigeria, Bakare et al. [11] reported that knowledge about childhood autism (KCA) as measured by the KCAHW questionnaire was significantly associated with age group distribution of the healthcare workers, with those age group of fourth decades and above more likely to have higher mean score (p=0.004) and previous experience of managing children with autism spectrum disorders (ASD) (p<0.001). KCA showed near significant association with area of specialty, with those healthcare workers in psychiatry compared to pediatrics having higher mean score (p=0.071) and also with years of working experience of the healthcare workers (p=0.056). More than half of the healthcare workers subscribed to the opinion that facilities and law caring for the needs and rights of children with childhood autism and other developmental disorders are lacking in Nigeria.

Conclusion

Knowledge of family medicine residents regarding childhood autism is suboptimal. Correlates of KCA may help in selection of healthcare workers that would best provide health education and management for caregivers of children with autism. It is important to update the knowledge gaps of healthcare workers who have limited knowledge regarding childhood autism and to train them to be able to provide healthcare service that would ensure early diagnosis and interventions for management of autism.

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Exploring the Treatment Types and Challenges in Patients with Chronic Obstructive Pulmonary Disease: A Qualitative Study

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Abstract

Introduction: World Health Organisation (WHO) indicates Chronic Obstructive Pulmonary Disease (COPD) to be emerging as the third leading cause of mortality by 2030. COPD not only affects the healthcare system of a country, but also the quality of life of patients and their families. Prevalence of COPD among Pakistani adults aged 40+ was found to be 2.1%; however, the research on patient's perspectives regarding the challenges faced in the diagnosis and management of COPD in Pakistan is still lacking. Therefore, the authors in this study aim to explore and document the barriers affecting the management of COPD by the patients and their families/care takers.

Methods: It is a qualitative study conducted within the boundaries of Islamabad capital territory and district Rawalpindi, Pakistan. The data was collected through in-depth and semi-structured interviews conducted with the respondents who included patients of COPD (n=8) as well as their treatment supporter(s) (n=7), recruited from the OPD wards of three hospitals (two public and one private hospital).

Conclusion: The study shows that COPD patients not only face challenges in their physical health, but also in socio-economic and psychological domains that are equally harmful. It highlights varying notions of the respondents as to how treatment-seeking of COPD posed challenges in their lifestyles, at both, household and individual levels. Patients with COPD need high levels of input from healthcare facilities; hence, health care professionals should be trained in case management of COPD.

Key words: Non-communicable diseases, chronic diseases, chronic obstructive pulmonary disease, patient's perspective

Introduction

Chronic obstructive pulmonary disease (COPD) is a respiratory condition that results in partially reversible airflow obstruction. Potential causes of COPD include exposure to smoke of cigarettes and various other environmental and occupational pollutants (1). Symptoms of COPD commonly include chronic cough, unusual production of sputum, and shortness of breath with exertion (2). Since it is non-transmissible and non-contagious, the mechanisms designed for its cure are more preventive in their approach. Therefore, it requires careful treatment and effective methods to reduce and fight the symptoms. Patients are further affected by this disease due to reduced functioning of lungs and compromised quality of life (QoL) (3-5). Currently, COPD is a potential global public health issue (6) causing a significant burden on the patients, societies, and the healthcare system on a wider level (7). As per the indications of the World Health Organisation (WHO), COPD is emerging to be the third leading cause of mortality by 2030 (8). The proportion of respiratory diseases leading to COPD is higher in developing countries than in the developed nations (9). One of the major reasons of higher prevalence of COPD in developing countries is the production of more industrial products without keeping in view health standards. Around 90% of the deaths caused by COPD are reported in low- and middle-income countries (LMICs) (10) since the majority of the patients of COPD in these countries remain undiagnosed or untreated. As per an epidemiological survey conducted in (11) countries of the Middle East and North Africa region (BREATHE), prevalence of COPD among the Pakistani adults more than the age of 40 was found to be 2.1% (11).

Increase in the prevalence of COPD not only affects the health care system of the country, but also deteriorates the quality of life of the patients, their care takers, as well as their families. In LMIC states like Pakistan, where there is a lack of trained staff and professional services, and limited facilities available to diagnose and cater to COPD at the primary health care level, the management of the disease can be extremely challenging. Through the mobilization and engagement of not only the health providers, but also the patients, care takers, families, and communities, it is possible to enable the patients to access the health services and manage their symptoms (12-14). Certain studies reveal that various barriers like patient empowerment (15, 16), poor health literacy (15, 17), social support (18, 19), comorbidities e.g., depression and anxiety (18, 19), inadequate training of health care providers in diagnosis and management of chronic disease (19, 20), and limited services for COPD at the primary health care setting (19, 20) often hinders patient's engagement in self-management.

The challenges in managing a chronic disease like COPD have been discussed in various studies in different settings; however, the research on patient's perspectives regarding the challenges faced in the diagnosis and management of COPD in Pakistan is still lacking. Therefore, the authors in this study aim to explore and document the barriers affecting the management of COPD by the patients and their families/care takers.

Materials and Methods

The study employed qualitative data through in-depth and semi-structured interviews, and the data were analysed through thematic analysis.

The research was conducted in three hospitals within the boundaries of Islamabad capital territory and district Rawalpindi, Pakistan; two public and one private hospital. These hospitals were selected for the study as they are comprised of dedicated wards and outpatient care delivery (OPD) days designated for people with pulmonary disease(s). The access to these locales was obtained through medical practitioners in the relevant departments. The pulmonary wards and OPDs were observed for the recruitment of respondents for the study through purposive and snowball sampling. The criteria for selection of respondents were based on their diagnosis of COPD. Patients suffering from tuberculosis and Lung cancer were not interviewed. The interviews were based on the clinical investigations about the patient's disease. A total of 15 in-depth and semi structured interviews were conducted with the respondents that included patients of COPD (n=8) as well as their treatment supporter(s) (n=7).

The interviews were conducted in Punjabi, Urdu, and Potowari as per the linguistic background of the respondents. Each interview lasted for at least 30 minutes and was audio-recorded after obtaining verbal consent from the interviewee; however, the confidentiality of the respondent was maintained throughout the process. The findings were analyzed through thematic analysis. Interviews were transcribed verbatim and translated into English. The researcher developed newly emerged themes by drafting initial codes from the transcripts and categorizing them. Relevant verbatims were also incorporated in the themes following the analysis in order to contribute towards the credibility of the data.

Results

Barriers in treatment of COPD:
Various types of barriers were reported by the patients as well as their treatment supporters in seeking and complying with treatment for COPD. These barriers have been categorized as follows: 1) economic barriers; 2) social barriers and; 3) personal barriers.

Economic Barriers and Opportunity Cost
Any chronic illness increases the pressure over the family; it is not just related to transformation in the economic structure of the family but also on the social and domestic life of the people within the household. Many people fail to get proper treatment due to financial conditions and poor economic structure of the household. Treatment support was a common factor that was observed; people with severe cases of COPD were relying on their children for the treatment expenses since they were unable to work or were retired from their duties.

In many cases of lower middle class, people worked together to bear the burden of the disease if any member of the family suffered from COPD. In that case various people from the household acted as treatment supporters.

"Hum 4 bhai hen, abu kay ilaj ka kharcha hum mil kr pura krty hen, kisi ki karyany ki dukan hai aur koe naib qasid hai. Lekin hum mil k krty hen sb takay sbka hissa rahe iss men"

"We are four brothers; together we bear the expenditure of our father's treatment. One has a general store and another one is office boy. We try to do it together so that everyone can have a part in it" (R3)

People of the lower middle-class incomes prefer visiting government/public hospitals for their treatment needs. Some patients are entitled in public hospitals; in that case their treatment expense is reduced to a certain level.

"Hum gharib loag hen, pension aati hai lekin ilaj mehnga hai. Islye koshish hoti hai sarkari hospital men ayen. Wahan khrcha kam hotta hai."

"We are poor people; although I receive pension, the treatment is expensive. That's why we try to come to public/ government hospitals. It is less expensive here" (R6)

Elderly and retired people rely on their family members for treatment support. Treatment supporters get an extra burden financially and mentally. The treatment supporter's occupation determines the quality of treatment he chooses for the patient.

The type of disease and its severity directly affects the domestic economy of the family; it becomes an extra burden on the people of poor households. The choice of healthcare facility and the level of care received are determined by the socioeconomic status of the patients and their families. Before the process of diagnosis, clinical investigations cost a lot.

"Aik ABG test 1500 Rs ka hota hai aur sath e khoon k test wgera sb boht mehnga par jata hai"

"A single ABG test costs PKR 1500, combined with other blood tests becomes too expensive" (R3)

The patient in the public health facility belonged to middle and lower middle class. The patients from both private and public health facilities reported that they had paid an opportunity cost for the treatment of the disease. The domestic economy and overall system was entirely disturbed by a single family member with chronic illness. The patient needed clinical equipment (depending upon the severity of the illness), which is expensive and unaffordable for most of the treatment supporter respondents.

"Aik oxygen concentrator ki qeemat 1.5-2 lac Rs hoti hai, hr bnda nahe lai skta. Cylinder iss sy zada mehngy partay hain. Men kbhe kbhe cylinder wali oxygen istemal krta hn wrna yeh mera 3sra concentrator hai"

"One Oxygen concentrator costs around 1.5-2 lac rupees, everyone cannot afford it. Cylinders cost even more than that. Sometimes I take oxygen from cylinders, but this is my third concentrator" (R1)

Social Challenges

The patients reported about the changes in their social patterns and interactions due to the disease, where in severe cases of COPD, the patients were forced to stay at home. Most of the respondents were retired individuals, but their daily activities like offering prayers in the mosque, meeting friends/relatives, and attending social gatherings were compromised.

"Main masjid jata tha namaz parhta tha, sbsy milta tha magr ab chalta bhe hun tou saans phulta hai"

"I used to go and pray in the mosque and meet everyone, but now even if I walk, my breath shortens" (R6)

Carrying the equipment along, which in most cases is an oxygen cylinder, is a hard task for the patient as well as the family; an extra hand was needed to carry the equipment.

"Pehly bahar jata tha, logon sy milta tha ab yeh oxygen ki machine hai islye na kahen jaaskty hen na himmat hoti hai"

"I used to go outside and meet people, but now I am on concentrator, so neither can I go outside nor do I have the strength to go anymore" (R1)

Since all the respondents of the study were male and they play an active role in domestic decision-making process, the disease caused them to become dependent upon other individuals of the family. The patients reported that being bed-ridden had drastically compromised their decision-making power as the head of the family.

Treatment supporters were of the view that overstressing the patient by discussing family matters with them affected their health more. Hence, they kept their matters to themselves and decided to make decisions without disturbing the patients.

Being the elder male member of the family, children usually required final approvals for their decisions. But in the case of their fathers' chronic illness, families took their decision themselves without bothering the patient, including matters relating to marriage.

"Bachay cheezen daikh laity hen phr mujh sy approve krva laitay hen"

"My children look after the matters themselves, and then get them approved from me" (R1)

Personal Challenges

For any chronic illness, the main issue for the patient observed was the acceptance of being a patient. This happened after the appearance of the symptoms and consequent diagnosis of the disease. The patients found it difficult to comply with the treatment. Hence, to adhere

with the treatment, children and other family members counselled and convinced them to ensure follow-ups and maintain a proper lifestyle as recommended by the physician.

It is usually hard to accept and live with a progressive disease, having rare chances of complete recovery. Will power and counselling are highly required in such cases, as the disease intensity and symptom severity can lead to harmful consequences.

"7 saalon sy iss bemari sy lar raha hn, ab aadat hogae hai lekin takleef to rehti hai"

"I am fighting this disease for 7 years; I have developed its habit but still there is pain" (R1)

Parallel treatment

The respondents reported that they never completely relied on allopathic or modern medicinal treatment; an additional/supplemental treatment was sought by the respondents in almost all types of illnesses. The parallel treatments i.e., religion/spiritual or indigenous ones were usually derived from their cultural trends and transferred from generation to generation.

Dum/Duroods[1], Role of Religion and Spirituality

Most of the respondents reported that they were dependent upon their religious affiliations for their treatment.

"Bhai Allah pr Imaan hai lekin hum dam wgera krvaty hen, Allah kay kalam men asar tou hota hai"

"Brother, we have faith in Allah, but we go for Religious prayers, because they are words of God and they have an impact" (R3)

"Hamare peer hen Kashmir men unky pass jatay hen dua krvany, kuch behtri bhe hue hai inhen. Lekin illaj to zruri hai woh sath sath chal raha hai"

"Our spiritual mentor (peer) is in Kashmir, we go to him for prayers. He is getting better, but other treatment is equally important and we are getting it" (R5: Treatment Supporter)

Homeopathic Treatment

Homeopathic is one of the most common types of treatments used as a parallel treatment in Pakistan. The impact of homeopathic treatments was comparatively slower than the allopathic treatment, however the chances of recovery were guaranteed.

"Sleep apnea hai mujhe, meny isky lyay homeopathic treatment krvaya tha. Shuru men farq para lekin jab tabeat zada kharab hona shuru hue tou meny hospital men doctor ko dikhaya unhon ny mujhe phir sy Allopathic py daal dia ab bhe kbhe kbhe zrurt paray tou men who dawai lai leta hn, side effect tau nahe hai mujhe iska"

"I have sleep apnoea, for that I also sought homeopathic treatment. I was recovering in the start but when the symptoms got severe, I went to the doctor in the hospital. He again gave me the Allopathic medicines. I still take Homeopathic medicines sometimes. I don't feel any side effects from them" (R2)

Indigenous Medicine/Home-based Remedies

Indigenous methods have a wide range of availability across every culture. The use of this form of treatment is effective, cheap, and accessible. All of the patients were using some type of home-based remedies for the treatment of COPD in this study. Using honey and black pepper together was one of the most commonly used remedies for cough and cold, helping in clearing the throat infection and controlling cough.

"Bachpan men jb damay ki wajah sy boht khaansi hoti thee, tou Ammi Shehad aur Kaali mirch daite thee. Uss sy kuch din aram ajata thaa. Abhe bhe men who istemal krta hn aur tabeat behtr rehti hai"

"During my childhood, I used to have severe cough due to Asthma. My mother used to give me Honey and Black Pepper. It was very recovering and I still use that" (R2)

The Cassia is also known as the Golden Shower tree. Tea was made from the sticks of the tree, which was reported to be helpful for patients with pulmonary disorders and fever. It is a commonly planted and an easily accessible tree.

"Kisi ny btaya tha k iss bemari men Amaltas ka kehva peena chaye uss sy seeny ko araam aata hai aur saans behtr rehti hai, meny istemal kia aur mujhe farq para. Islye ab men roz peeta hn"

"Someone told me to have Cassia's tea for chest relief. I used it and it helped, now I use it daily" (R6)

Seafood was also considered a good diet for people with respiratory diseases e.g., those having COPD. This included soup made from the fish's head.

"Machli kay Sir ki Yakhni bana ki pee jati haii uss sy boht behtri aati hai"

"Fish Head soup is used; it helps in recovery" (R1)

The home-based remedies are widely accepted and majorly used alongside the main treatment course, continuing from generation to generation and rooted within the cultures.

Role of Hakeem

Hakeems, or traditional healers, play an integral part in recovery mechanisms of diseases. Patients from rural as well as urban areas rely on these hakeems, and the remedies and traditional medicines given by them.

"Abbu ki pehly agr saans khrab hoti thee tou jaa k sharbat

Footnotes

(1) Religious/spiritual chants usually used in healing

"Abbu ki pehly agr saans khrab hoti thee tou jaa k sharbat lai aatay they hakeem sy. Wooh sharbat hakeem jari bootion sy banata tha. Uss sy aram bhe ajata aur saans behtr hojati thee"

"If our father had difficulty in breathing, we used to get medicinal syrup from the Hakeem. That syrup was made from herbs. It was a reliever of difficulty in breathing" (R3: Treatment Supporter)

Patients reported that the hakeems had been their first preference in treatment seeking; in case of severity, hospital-based treatment was considered.

"Doctor k pass tou ab aaye hen, pehly tou Hakeem sahib ilaj krty thy"

"We have come to the doctor now; earlier we used to get treated by the Hakeem" (R6)

People are dependent on these traditional healers in various capacities. They are considered an integral part of the recently designed interventions as they are regarded as communal assets.

Discussion

Asthma and COPD are emerging areas in the public health discourse. Pulmonary diseases are mostly progressive; hence, any intervention designed to tackle them are based on the idea of lifestyle change and management, and adaptation with the disease.

This study explores challenges faced by the patients and their family in managing the disease, and the types of treatment opted by the patients along with the modern medicinal course. The study was designed to capture views of patients and their families, and the modification in their economic and social life after the diagnosis. This allowed exploration of different barriers/challenges that are faced by the patients.

The findings of this study clearly show that the patients faced economic, social, and personal challenges during- and post-treatment phases. The study highlights varying notions of the respondents as to how treatment-seeking of COPD posed challenges in their lifestyles, at both household and individual levels.

COPD is an important cause of mortality worldwide, with smoking being one of the leading risk factors (21). Use of low quality or cheap cigarettes and tobacco intake is common especially among rural residents. According to the American Lung Association, risk of death caused by COPD is 13 times higher in smokers as compared to non-smokers (22, 23). In the early stages, COPD is often milder in severity unlike most of the diseases. However, the disease worsens and becomes unmanageable if diagnosed at later stages, mostly among patients of older ages (24).

Patients with COPD exhibit serious symptoms, and their life is compromised due to restricted activities, social isolation, and financial burden. Families and caretakers of COPD patients are required to provide physical and emotional support (25).

Patients with COPD need high levels of input from healthcare facilities; however, unfortunately they are often overlooked in providing specialized nursing, critical and sensitive care, and/or social and community support. The current research makes a clear case for the implementation of improved services and support for patients with COPD. The patients were reported to face challenges while paying for their daily medicines as well as the healthcare equipment, which is expensive and not affordable for everyone. Other patients reported the impact of reduced physical functioning on their social lives and interaction skills. According to research, physical barriers including reduced body functioning among patients with COPD require intense emotional and psychological support. Moreover, economic barriers are difficult to overcome (26).

The present study shows that a majority of the patients who sought treatment for COPD were diagnosed with Stage 2. Similar studies show similar trends in the sense that patients who reach healthcare facilities have symptoms with severe intensity. This leads to more complex treatment (27). COPD patients and their families rarely reported to have any complete understanding of the condition and its prevention. It is for this reason public health interventions also focus on awareness raising regarding the disease and adoption of preventive measures.

Many studies reported the attribution of symptoms to aging or smoking (28); this trend is also consistent with the findings of the current study. Patients of older age with initial symptoms emerging at the age of 40-45 years were relatively more ill as compared to younger patients. This may be due to the reason that many patients did not perceive their respiratory symptoms to be related to a serious condition like COPD, as many lacked sufficient information and awareness regarding the disease. Symptoms such as breathlessness were not taken seriously, and the ability of the patients to adapt to their symptoms further increased the risk.

Several clinical trials have investigated the effect of herbal medicines on lung function and potential impacts of their anti-inflammatory properties on systemic circulation (29). Similarly, the present study reveals various perspectives of the patients regarding the use of home-based remedies or indigenous herbal medicines. Cassia tree sticks were reportedly used as an effective treatment that proved to be efficacious, providing immediate relief for chest pain and breathlessness.

Results from a controlled observational study indicated that homeopathic drugs have a preventive effect on the onset of respiratory disease episodes; however, the conclusion would be firmly reached after a randomized study (30). In contrast, the current study reported that

although homeopathic medicines provided complementary results to the allopathic treatment, nonetheless they were ineffective in their entirety and the patients had to reach out for hospital-based remedies for quick recovery and relief. Moreover, patients using herbal treatment were recovering at a slower rate.

A study also reported that patients had to physically adapt themselves to the disease and limit their activities as COPD progressed (28). Similarly, this study revealed complaints from the patients regarding the severity of the symptoms. Reportedly, symptoms of COPD were progressive and unrecoverable; the patients reported to feel relieved for a while only, and the pain would re-emerge within the span of the next few hours or days.

Conclusion

Apparently, healthy individuals are likely to develop underlying COPD if they are smokers. Patients with COPD should be screened before time so that the progressiveness of the disease can be controlled; thus, active screening through Spirometry and Peak Expiratory Flow Rate (PEFR) plays an important role in early detection of this disease. Smoking and exposure to certain dangerous environmental pollutants, including cigarette smoke, smoke from fuel, wooden stoves, and pesticides is responsible for development and progression of COPD.

Patients not only face challenges in their health, but also in socioeconomic and psychological domains that are equally harmful. A disease, be it of any kind, demands care and management; however, this is quite more significant in the case of diseases that may cause organ dysfunction.

Health care professionals should be trained for case management of chronic diseases, specifically COPD, in order to clearly communicate the diagnosis of COPD and its care practices to the patients in an appropriate manner. Smokers should be reassured that they will additionally receive care that is related to smoking cessation.

Parallel treatments help in reducing the symptoms for a limited time only. Hence, the allopathic treatment (based on the use of inhaled bronchodilators and corticosteroids) should be emphasized and reinforced for people with COPD, which is currently the best approach for its management, and has proved effective for improving lung function and quality of life, as well as reducing symptoms and disease exacerbations.

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Prevalence and associated factors of burnout among nurses in a general hospital in Yanbu, Saudi Arabia

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Abstract

Background: Burnout is a prevalent psychological state among nurses. Burnout syndrome consists of emotional exhaustion, depersonalization, and reduced personal accomplishment, which results from prolonged stress in the workplace.

Aim: This study aimed at assessing the prevalence and associated factors of burnout among nurses in Yanbu General Hospital, Saudi Arabia.

Materials and Methods: A cross-sectional study was conducted among 249 nurses at Yanbu General Hospital, Saudi Arabia. The validated Maslach Burnout Inventory Human Services Survey for Medical Personnel was used to measure burnout. Sources of stress were assessed by 17 items. Data obtained were analyzed using the Statistical Package for the Social Sciences, version. 20. Students' t-test, correlation and analysis of variance were used to assess the relationship between variables.

Results: High burnout was found among 168 (67.5%) participants. The EE score was significantly higher among Saudis, (p=0.004), among those who worked >40 hours per week (p<0.001) and among those who had more than 8 shifts per week (p=0.001). The depersonalization (DP) score was significantly higher among Saudis (p=0.014), and among those who worked >40 hours per week (p<0.001). The personal accomplishment (PA) score was higher among those who had higher monthly income (p=0.038). Sources of stress were associated with the three scales of burnout.

Conclusion: Burnout was highly prevalent among nurses in this study and was associated significantly with work related factors and sources of stress in the workplace. Working conditions should be improved to minimize the impact and consequences of burnout among nurses.

Key words: Burnout, Mental Health, Nurses, Saudi Arabia, Source of Stress, Yanbu

Introduction

Occupational burnout is classified as "workers stress that has not been successfully managed" [1]. The triadic dimensions of burnout include emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). While EE predisposes one towards being worn out, emotionally depleted or fatigued, DP reduces one's work engagement, in addition to PA that identifies a sense of ineffectiveness amongst workers. This phenomenon succinctly predisposes workers toward lower productivity levels and the inability to cope [2-4], yet those afflicted with burnout exhibited higher frequencies of absenteeism, high turnovers at the workplace, or opted for early retirement due to reduced job satisfaction [5]. Greater psychological repercussions have been associated with burnout - sleep disturbances, anxiety, depression, alcohol use, and suicidal ideation [5].

With the commensurate rise in demand for health services, healthcare workers have been reported to be potentially vulnerable to burnout. The nursing workforce, in particular, have reported high levels of burnout in view of their emotionally draining job demand and prolonged patient contact in wards and clinics [6]. Approximately, 11.2% of nurses suffered the burnout syndrome worldwide [7]. Nurses working in intensive and critical care units were more likely to suffer from burnout [7].

Demographic characteristics such as gender or age and work-related (job characteristics and risk exposures) stressors among healthcare workers were known to be associated with the burnout syndrome [8-12]. As the health system delivery in Saudi Arabia underwent a major shift and restructuring exercise, nurses who formed the huge workforce within the healthcare system were geared towards managing greater job demands and expectations from clients [13]. With these escalated demands on health services and influx of patient admissions, the current study was aimed to explore the prevalence of burnout and its associated factors amongst a sample of nurses in Yanbu General Hospital, Saudi Arabia.

Materials and Methods

Study setting and sample

This cross-sectional study was conducted among nurses in Yanbu General Hospital, Yanbu al-Bahr, Saudi Arabia in 2021. Yanbu' al Bahr is a major Red Sea port in the Al Madinah province. It is approximately 300 kilometers from Jeddah. Sample size required for this study was calculated by using G-power software. With a confidence level of 95%, and a power of 80%, minimum sample size was calculated to be 246. Out of 300 nurses in the hospital, 249 returned complete questionnaires (response rate =83%).

Inclusion and exclusion criteria

The study included all nurses who joined the hospital for more than six months. Those who joined the hospital for less than six months or declined to participate were excluded.

Study instruments

For the collection of data, the study employed a printed self-administered structured questionnaire, which comprised three sections.

- Section one included sociodemographic variables and work-related variables. Sociodemographic section included variables like gender, age, marital status, history of chronic disease, income, educational level and nationality. Work related factors included variables such as department, years of experience, working hours per day, and number of on-calls per month.
- Section two employed the Maslach Burnout Inventory-Human Services Survey for Medical Personnel (MBI-HSS (MP)), which is a reliable, widely used validated tool for assessment of burnout. It addresses three dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). It consists of 22 items within these three dimensions (each comprising nine, five, and eight items, respectively) [14]. The questionnaire was scored on a 7-point Likert scale which ranged from 0 to 6, (0 = never, 1 = sometimes per year or less often, 2 = once a month or less often, 3 = several times a month, 4 = once a week, 5 = several times a week, and 6 = daily). We then summed the scores and categorized them into "low," "moderate," and "high" in each subscale category. Lower scores regarding personal accomplishment predicted a greater likelihood of burnout [14]. We defined burnout as the presence of at least one of the following: (i) high score (27 and above) regarding EE, (ii) high score regarding depersonalization (13 and above), and (iii) low score regarding personal accomplishment (0-31) [14]. All three subscales EE, DP, AP showed high internal consistency with Cronbach's alpha coefficient values of 0.844, 0.867, and 0.884, respectively [14].
- In section three, we assessed sources of stress with 17 items obtained from the literature. The following question headed these items: "To what extent do the following conditions cause stress to you?" Each item was scored from 1 (causing no stress) to 4 (causing severe stress) [15,16]. The Cronbach's alpha coefficient of these items in this study was 0.91. The questionnaire was distributed in both Arabic and English language [16].

Ethical considerations

Ethical approval was obtained from the Ethical Committee of the Institutional Review Board in Al-Medina. The objectives of the study were explained to the volunteer nurses, and written informed consent was obtained from each participant. The collected data were confidential and would not be disclosed. Participants could withdraw from the study at any time.

Statistical analysis

We performed descriptive and inferential data analysis using SPSS (version 20.0, IBM). In descriptive analysis, mean and standard deviation (SD) were obtained for the continuous variables, while frequencies and percentages were obtained for the categorical variables. Age was categorized into categories. The independent two-sample t-test and analysis of variance (ANOVA) test were used to assess the association between the burnout subscales and the independent variables. Test of normality for each

subscale of burnout was performed. The associations between the burnout subscales and the sources of stress were evaluated by Pearson correlation coefficients. P-value less than 0.05 was considered statistically significant.

Results

Sociodemographic and work characteristics of the participants

The majority were females (87.6%), Saudi (75.1%) and aged ≤30 years (60.2%). About a third (34.5%) had 10 years or more experience after graduation, 16.1% had administrative tasks, 62.7% worked ≤40 hours per week, and 70.7% had shifts (Table1).

Sources of stress in the workplace

The most important sources of stress reported by the participants (ranked by mean) were lack of staff (3.4±1.4), lack of resources (3.2 ± 1.4), work overload (3.2±1.4), long working hours (3.1±1.3) and negative rewards (3.0 ±1.5) (Table 2).

Prevalence of burnout

Among the participants, 126 (50.6%) had high EE, 73 (29.3%) had high DP, and 76 (30.5%) had low PA. Of them, 49 (19.7%) showed moderate EE, 45 (18.1%) showed moderate DP, and 53 (21.3%) showed moderate PA. High burnout was found among 168 (67.5%) participants (scoring high on at least one subscale of burnout) (Table 3).

Association between burnout and sociodemographics and work characteristics

To determine the factors associated with burnout in the univariate analysis, we used the total score of EE, DP, and PA as a continuous variable. The EE score was significantly higher among Saudis (27.6±8.8) compared to non-Saudis (21.2±7.3), (p=0.004), and higher among those who worked >40 hours per week (30.7±10.2) compared to those who worked ≤40 hours (23.2±10.2) (p<0.001). Participants who had more than 8 shifts per week also scored higher on EE (30.0±9.7) compared to those who had less than 8 shifts (p=0.001) (Table 4).

The DP score was significantly higher among Saudis (9.4±3.2) compared to non-Saudis (6.2±3.7) (p=0.014), and higher among those who worked >40 hours per week (11.4±4.7) compared to those who worked ≤40 hours (7.0±2.1) (p<0.001) (Table 4). Regarding PA, higher monthly income was associated with higher PA (p=0.038) (Table 4).

Association between burnout and sources of stress in the workplace

All 17 sources of stress in this study correlated positively and significantly with EE with the r coefficients ranging from 0.629 to 0.346 (p<0.001).

Out of 17 sources of stress in this study, 15 correlated positively and significantly with EE with the r coefficients ranging from 0.361 to 0.131 (p<0.050). There was no association between PA and sources of stress (Table 5).

Table 1: Sociodemographic and work characteristics of the participants (n=249)

Characteristics	No.	%
Age		
• ≤30	150	60.2
• >30	99	39.8
Gender		
• Male	31	12.4
• Female	218	87.6
Nationality		
• Saudi	187	75.1
• Non-Saudi	62	24.9
Marital status		
• Married	152	61.0
• Not married	97	39.0
Have you had (Covid-19)		
• Yes	39	15.7
• No	210	84.3
Educational level		
• Diploma	123	49.4
• Bachelor	126	50.6
Chronic diseases		
• No	230	92.4
• Yes	19	7.6
Income (SAR)		
• <8000	72	28.9
• 8000-12000	118	47.4
• >12000	59	23.7
Department		
• Internal Medicine, Pediatrics, Outpatient clinics	74	29.7
• Surgery, Orthopedics, Neurosurgery Obstetrics and Gynecology	57	22.9
• ICU, Emergency	91	36.5
• Others	27	10.8
Years of service		
• <5	78	31.3
• 5-9	85	34.1
• ≥10	86	34.5
Do you have administrative tasks		
• Yes	40	16.1
• No	209	83.9
Working hours per week		
• ≤40	156	62.7
• >40	93	37.3
Do you have shifts		
• Yes	176	70.7
• No	73	29.3
Shifts per week (n=176)		
• <=4	87	49.4
• 5-8	25	14.2
• >8	64	36.4

Table 2: Sources of stress in the workplace

Sources of stress	Mean	Standard deviation
Work overload	3.2	1.4
Long working hours	3.1	1.3
Fear of violence	2.5	1.4
Work environment	2.6	1.5
Lack of resources	3.2	1.4
Fear of making mistakes that can lead to serious consequences	2.7	1.4
Working with uncooperative colleagues	2.5	1.4
Work in offices	1.9	1.2
Cannot participate in decision making	2.1	1.3
Work demands affect my personal/home life	2.6	1.4
Lack of staff	3.4	1.4
Worries about finances	2.8	1.6
Negative rewards	3.0	1.5
Interaction with patients and relatives	2.3	1.3
Time pressure and difficulty to meet deadlines	2.5	1.3
Office work	2.0	1.3
Fear of getting Covid19	2.5	1.5

Table 3: Prevalence of burnout among participants

Dimensions of burnout	Low n (%)	Moderate n (%)	High n (%)
Emotional exhaustion (EE)	74 (29.7)	49 (19.7)	126 (50.6)
Depersonalization (DP)	131 (52.6)	45 (18.1)	73 (29.3)
Personal achievement (PA)	76 (30.5)	53 (21.3)	120 (48.2)

EE: High: >27 Moderate: 17–26 Low: 0–16
DP: High: >13 Moderate: 7–12 Low: 0–6
PA: Low: 0–31 Moderate: 32–38 High: >39

Table 4: Association between burnout and sociodemographic and work characteristics

Personal Characteristics	Emotional Exhaustion		Depersonalization		Personal Accomplishment	
	Mean (SD)	P-value	Mean (SD)	P-value	Mean (SD)	P-value
Age						
- ≤30	25.4 (9.7)	0.422	8.3 (2.9)	0.470	34.3 (7.2)	0.079
- >30	26.9 (9.1)		9.1 (4.2)		36.7 (8.2)	
Gender						
- Male	24.4 (9.2)	0.514	10.1 (4.4)	0.358	34.5 (8.6)	0.692
- Female	26.2 (9.5)		8.4 (3.3)		35.4 (7.6)	
Nationality						
- Saudi	27.6 (8.8)	0.004	9.4 (3.2)	0.014	39.5 (6.4)	0.533
- Non-Saudi	21.2 (7.3)		6.2 (3.7)		41.6 (7.6)	
Marital status						
- Married	25.0 (8.1)	0.523	8.3 (3.8)	0.669	36.1 (7.3)	0.13
- Not married	26.3 (8.9)		8.8 (3.3)		33.9 (8.1)	
Have you had a Covid-19						
- Yes	26.3 (9.0)	0.876	9.0 (3.0)	0.729	35.5 (9.2)	0.894
- No	25.9 (9.6)		8.5 (3.5)		35.2 (7.4)	
Educational level						
- Diploma	27.7 (8.5)	0.076	9.7 (3.2)	0.052	35.2 (8.0)	0.961
- Bachelor	24.4 (9.2)		7.6 (3.5)		35.3 (7.4)	
Chronic diseases						
- No	25.5 (9.4)	0.066	8.4 (3.5)	0.244	35.0 (8.0)	0.342
- Yes	31.9 (8.7)		10.7 (2.8)		37.9 (2.4)	
Income (SAR)						
- <8000	22.6 (9.6)	0.062	7.1 (4.3)	0.143	33.8 (6.7)	0.038
- 8000-12000	27.4 (9.0)		8.9 (2.7)		35.1 (7.6)	
- >12000	27.4 (8.5)		9.8 (3.6)		37.8 (8.5)	
Department						
- Internal Medicine, Pediatrics, Outpatient clinics	25.9 (8.5)		8.8 (2.7)		35.7 (7.3)	0.103
- Surgery, Orthopedics, Neurosurgery Obstetrics and Gynecology	24.3 (9.3)		9.6 (2.2)		32.2 (7.8)	
- ICU, Emergency	27.8 (10.6)	0.876	8.3 (4.5)	0.552	36.3 (8.2)	
- Others	23.9 (9.5)		7.0 (3.7)		36.7 (5.7)	
Years of service						
- <5	24.3 (10.3)	0.350	7.5 (2.8)	0.321	36.3 (5.3)	0.474
- 5-9	26.1 (8.6)		8.7 (2.9)		35.2 (7.8)	
- ≥10	27.5 (9.5)		9.5 (4.3)		34.3 (9.3)	
Do you have administrative tasks						
- Yes	24.6 (9.5)	0.513	8.3 (2.6)	0.784	33.6 (8.2)	0.398
- No	26.3 (9.5)		8.7 (3.6)		35.6 (7.6)	

Table 4: Association between burnout and sociodemographic and work characteristics (continued)

Personal Characteristics	Emotional Exhaustion		Depersonalization		Personal Accomplishment	
	Mean (SD)	P-value	Mean (SD)	P-value	Mean (SD)	P-value
Working hour per week						
- ≤40	23.2 (8.3)	<0.001	7.0 (2.1)	0.001	35.7 (7.5)	0.392
- >40	30.7 (10.2)		11.4 (4.7)		34.5 (7.9)	
Do you have shifts						
- Yes	26.1 (10.2)	0.913	8.5 (3.5)	0.736	35.4 (7.8)	0.491
- No	25.9 (7.7)		8.9 (3.3)		34.9 (7.5)	
Shifts per week (n=176)						
- ≤4	19.2 (9.7)	0.001	6.5 (4.2)	0.176	36.2 (7.9)	0.626
- 5-8	23.4 (9.4)		7.7 (3.8)		34.6 (10.2)	
- >8	30.0 (9.7)	0.422	9.6 (3.3)	0.47	34.6 (6.5)	

SD: Standard deviation

Table 5: Association between burnout and sources of stress in the workplace

Sources of Stress	Emotional Exhaustion		Depersonalization		Personal Accomplishment	
	r	P-value	r	P-value	r	P-value
Work overload	0.475	<0.001	0.206	0.001	0.194	0.222
Long working hours	0.493	<0.001	0.212	0.001	0.114	0.074
Fear of violence	0.519	<0.001	0.383	<0.001	0.051	0.433
Work environment	0.582	<0.001	0.369	<0.001	0.027	0.674
Lack of resources	0.405	<0.001	0.131	0.039	0.137	0.331
Fear of making mistakes that can lead to serious consequences	0.467	<0.001	0.299	<0.001	0.067	0.289
Working with uncooperative colleagues	0.476	<0.001	0.279	<0.001	0.048	0.449
Work in offices	0.393	<0.001	0.285	<0.001	0.112	0.082
Cannot participate in decision making	0.443	<0.001	0.274	<0.001	0.087	0.173
Work demands affect my personal/home life	0.629	<0.001	0.339	<0.001	-0.041	0.519
Lack of staff	0.474	<0.001	0.118	0.062	0.061	0.346
Worries about finances	0.277	<0.001	0.116	0.067	0.068	0.285
Negative rewards	0.524	<0.001	0.309	<0.001	-0.106	0.094
Interaction with patients and relatives	0.459	<0.001	0.361	<0.001	-0.075	0.238
Time pressure and difficulty to meet deadlines	0.426	<0.001	0.322	<0.001	0.044	0.485
Office work	0.363	<0.001	0.319	<0.001	0.022	0.727
Fear of getting Covid19	0.346	<0.001	0.193	0.002	0.136	0.231

r: Correlation coefficient

Discussion

This study aimed to explore the prevalence of burnout and its associated factors amongst a sample of nurses in Yanbu General Hospital, Saudi Arabia. The current study found that the prevalence of burnout was approximately 67.5%. High EE was found among 50.6% of the nurses, while 29.3% and 30.5% of the sample had high DP and low PA respectively. The magnitude of burnout prevalence amongst nurses seemed inconsistent across the local and international literature. A recent study among primary healthcare nurses in Saudi Arabia reported the overall prevalence of burnout to be 89%; with 39% of them specifically reporting to have high EE, 38% had high DP, while 89% had low PA [15].

A study of multinational nurses working in Saudi Arabia found that 45% of the sample had high EE, 42% had high DP and 71.5% had low PA [17]. Approximately 52.8% of nurses from Egypt exhibited high EE, 7.2% had high DP and 96.5% of them exhibited low PA [18]. While a study from Israel reported high EE, high DP and low PA to affect approximately 30.8%, 5.1% and 84.6% of their nursing sample respectively [19], another Jordanian study reported nearly 55% of their nurses were afflicted with high EE, while high DP and low PA accounted for 50% each [20]. Plausible explanations of such inconsistencies could be explained by the variations in patient culture across different populations and the role of nurses according to different specialties and healthcare settings based on demand needs and services (either in rural or urban areas; or between inpatient or outpatient care) that overwhelms nurses tasks capacities.

The associations between burnout and socio-demographic characteristics seemed subjective and varied across different studies. The current study found that Saudi nurses had higher burnout as compared to non-Saudis. This finding was contradictory to a previous study from Saudi Arabia [21].

This study found a significantly higher burnout score amongst nurses who worked for more than 40 hours per week (EE and DP) and those who had more than 8 shifts per week (EE score). Previous Saudi Arabian studies showed mixed findings, with one showing consistency with the current study [15], while two others were contrary to the current findings [12,21].

There were multiple work-related stressors significantly associated with burnout among nurses in this study. Consistent with previous burnout literature across different healthcare worker populations [5,13,16,22,24], nurses in this study reported work overload, long working hours, and time pressure and deadlines as stressors that increased their burnout level. Succinctly, burnout not only catalyzes serious personal repercussions like substance abuse or family conflicts at the individual level [25,26], but also compromises the efficiency of health systems and patient satisfaction with health services at the institutional level [27,28].

Consistent with these previously evidenced burnout impacts, the current study found that nurses who perceived work demands as affecting personal or home life, having fear of making mistakes that can lead to serious consequences while working and worries about finances were significantly associated with burnout.

Factors of negative rewards and restrictions on nurses for not being able to participate in decision making also showed positive relationships with burnout scores in the current study. It is noteworthy to understand that reward is an important criterion to motivate a person to work efficiently [29,30], yet to prevent mental well-being deterioration from work stress or emotional burnout [31]. The Effort-Reward Imbalance Model necessitates the equilibrium between work efforts and rewards to be executed through triadic domains: salary, prestige, and job security [32], similarly advocated by a previous study amongst medical residents in Malaysia [22].

Statistically significant correlations between burnout scores with nurses' fear toward encountering violence in the workplace, working in an office setting and working with uncooperative colleagues were observed in this study. These findings were consistent with previous works conducted amongst Spanish [33], Saudi Arabian and multi-national nurses working in Saudi Arabia [13,15,34]. The non-conducive friendly workplace setting, and the bullying phenomenon that emerges as a consequence of individual's behaviour within an organization has been postulated to elevate stress, burnout, frustrations and intention to leave service among healthcare workers in previous studies [22,35,37].

The current study found a statistically significant correlation between fear of getting Covid-19 and burnout among nurses. Similar findings were observed in previous studies [38,39]. The outbreak of COVID-19 has escalated patient admission to hospitals and consequently increased the workload of frontline nurses [38]. During a health crisis or an outbreak, nurses would be given new roles and are required to carry out additional tasks which may be beyond the scope of their usual nursing role or capacities [38,40].

As the current pandemic has overwhelmed healthcare systems, most countries worldwide were forced to implement strict mitigation and suppression measures to flatten the epidemic curve or to achieve the somewhat "herd immunity" through mass vaccination programs [41-44]. Frontline healthcare workers are often deployed to complement shortage of staff and healthcare resources. These circumstances may pose escalated burden on frontline nurses, yet being emotionally fatigued or burned out [45].

Under these situations, nurses would encounter greater interactions with patients or relatives with Covid-19, and working under more compact environments; both showed statistically significant correlations with burnout in the current study. Studies have shown that compactness of people is a factor spread for COVID-19[46], and the

infection rate amongst frontline healthcare workers was higher in urban hospitals with higher population density [47]. These plausible factors may have influenced nurses fear of gettingCovid-19, yet increased their level of burnout with current job demands.

The limitations of this study need to be acknowledged. The cross-sectional nature of the investigation cannot establish causal inferences. The self-reported survey among the respondents may be subjected to social desirability or recall bias. The relatively small sample size from a single-hospital limits the generalizability of the study findings.

Conclusions

This study revealed that the overall burnout rate was relatively high among the nurses. Saudi nurses, nurses working on shifts and long working hours were associated with the burnout phenomenon in the current sample. Work-related stressors ultimately provoked the burnout syndrome. Organization's systemic changes to relieve overload of routine work and proactive psychological support are recommended to sustain the emotional and mental health wellbeing of the nursing workforce.

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Prevalence of overt and subclinical hypothyroidism during pregnancy in antenatal care - cross-sectional study, Jeddah, Saudi Arabia

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Abstract

Objective
• To estimate the prevalence of subclinical and overt hypothyroidism in antenatal care clinics
• To evaluate the performance of targeted screening approach based on the risk stratification as recommended by the U.S. Preventive Service Task Force (USPSTF) and adopted by the American Thyroid Association (ATA)

Method: This was a multicenter, cross-sectional study conducted in 386 pregnant women attending routine antenatal visits at 4 antenatal clinics from September 2019 to August 2020. All participants underwent clinical and thyroid function test (TFT) including TSH and T4 levels. Based on risk factor assessment, participants were categorized into low-risk versus high-risk patients. The performance of targeted screening was assessed by comparing the two categories regarding the prevalence of subclinical and overt hypothyroidism and calculating the associated sensitivity, specificity and accuracy.

Result: Overall, the prevalence of dysthyroidism was 11.7% (95% CI=8.6-15.3%) with 10.4% subclinical hypothyroidism and 1.3% overt hypothyroidism cases. No difference in the prevalence of dysthyroidism was found between low-risk and high-risk patients. The performance of the risk stratification-based screening approach in detecting subclinical or overt hypothyroidism showed sensitivity (73.3% and 86.7%), specificity (30.2% and 13.2%), and accuracy (35.2% and 21.8%), using the USPSTF alone and combined with the ATA criteria, respectively.

Conclusion: The application of the targeted screening for subclinical and overt hypothyroidism using the USPSTF and ATA criteria performed poorly in the studied population. Thus, universal screening appears to be a better option.

Key words: Hypothyroidism, Overt, Pregnancy, Screening, Subclinical, Targeted, Universal, U.S. Preventive Service Task Force;

Introduction

Pregnancy involves significant stress on both mother and fetus that may include endocrine disorders such as hypothyroidism, which increases the risk of adverse maternal and fetal outcomes (1).Undiagnosed or inadequately treated hypothyroidism is associated with increased risk for miscarriage, placental abruption, premature rupture of membranes, preeclampsia and stillbirth (2-8). Moreover, thyroid dysfunction in pregnant women may adversely affect the neuropsychological development of their children. Clinical studies showed that children born to hypothyroid mothers are at higher risk for cognitive delay, autism and attention deficit hyperactivity disorder (9–16). On the other hand, the diagnosis of thyroid disorders during pregnancy can be challenging owing to the presence of subclinical forms, in addition to the physiological variations of thyroid function during pregnancy (17).Click or tap here to enter text. Besides, there is consistent evidence that reference ranges should be adapted to the specific population and ethnic group, as well as other clinical and obstetrical parameters (18).

Universal screening of pregnant women with low-risk for thyroid dysfunction is controversial because of insufficient evidence. Therefore, women at high risk are considered the target of systematic screening, which includes the measurement of the thyroid stimulating hormone (TSH) (19). Nevertheless, multiple studies across different countries, such as UK, Czech Republic and China, estimated that targeted screening may result in 30%-88% of overt or subclinical hypothyroidism cases being undiagnosed (20-22).

As a consequence, it is crucial to estimate the probability of developing hypothyroidism during pregnancy among low-risk women with reference to high-risk women, to reflect the most appropriate screening strategy within this specific population. In Saudi Arabia, the prevalence of hypothyroidism during pregnancy is not estimated properly. Two single-center studies in Riyadh region reported a prevalence of subclinical hypothyroidism as high as 10.3 and 13%(23,24). There are no reports for the prevalence of hypothyroidism in pregnant women in Jeddah region so far.

We conducted a multicenter study to estimate the prevalence of subclinical and overt hypothyroidism among all pregnant women attending antenatal care clinics in primary care centers in Jeddah, Saudi Arabia and to evaluate the performance of targeted screening approach based on the risk stratification as recommended by the U.S. Preventive Service Task Force (USPSTF) and adopted by the American Thyroid Association (ATA) (25,26).

Methods

Design and Setting

A cross-sectional study was carried out at the antenatal clinics of National Guard Hospital (NGH) and the attached primary health centers (PHCCs) in Jeddah, Saudi Arabia from September 2019 to August 2020.

Participants and Sampling

The study involved consecutive pregnant ladies recruited from routine antenatal visits in three PHC centers in NGH and from the antenatal clinic in the main NGH from September 2019 to August 2020. Women aged 18-45 years, presenting at 13 weeks or more gestational age, and without an established thyroid disorder were included. Women previously diagnosed with overt or subclinical hypothyroidism, autoimmune thyroiditis, or hypothyroidism were excluded.

Sample size was calculated by using the single proportion equation in Raosoft software package, based on the assumption that the rate of presence of hypothyroidism is 50%, and a margin error of 5% at the 95% confidence level; the required sample size was 384.

A stratified sampling technique with equal allocation was used to recruit an equal number (N/4) of participants from the three PHCCs and the NGH antenatal clinic. A systematic random sampling was used to recruit all eligible and consenting women from the participating centers.

Tools

A data collection sheet was designed to collect the study data, including: 1) demographic data; 2) obstetrical and medical history such as parity, number of previous abortions, history of infertility, smoking status, etc.; 3) dysthyroidism risk factors using a combination of the checklists recommended by the USPSTF and adopted by the ATA (25,26), including 13 demographic, clinical and biological factors considered for profiling women who are at high risk of thyroid dysfunction during pregnancy (Box 1); 4) clinical parameters including body mass index (BMI), blood pressure, and presence of clinical goiter; and 5) thyroid function test (TFT) including TSH and T4 levels.

Box 1. Factors defining high-risk for thyroid dysfunction among pregnant women

Category	#	Factor
Demographic factors	1	Age above 30 years
	2*	Living in a region with presumed iodine deficiency
Non-specific/ obstetrical factor	3	History of miscarriage or preterm delivery
	4	Type 1 diabetes mellitus or other autoimmune disorders
	5	Infertility
	6	Family history of autoimmune thyroid disease or hypothyroidism
	7	Prior therapeutic head or neck irradiation or thyroid surgery
Thyroid-specific factors	8*	Symptoms or clinical signs suggestive of hypothyroidism
	9	Goiter
	10	Currently receiving levothyroxine replacement
	11	Positive detection of thyroid antibodies, primarily thyroid peroxidase (TPO) antibodies
Additional ATA factors§	12	BMI ≥ 40 kg/m2
	13	Multiple prior pregnancies (≥2)

* Factors not considered in the present study, as Saudi Arabia is not presumed an iodine deficient region (Factor 2), and hypothyroidism symptoms often overlap and are confused with pregnancy symptoms (Factor 8).
§ Additional factors considered by the ATA but not by the USPSTF.

Exposure and Outcome definition

Participants were divided into two groups: low-risk and high-risk category. High-risk category included profiles with targeted screening according to the USPSTF and ATA recommendations, which are defined as the presence of at least one of the identified risk factors (25,26). Consequently, women with none of the listed risk factors were classified as low-risk category. The following two factors (of the 13) were discarded in the study:

- Living in a region with presumed iodine deficiency was discarded as Saudi Arabia is not concerned with such deficiency (27).
- Symptoms or clinical signs suggestive of hypothyroidism were not considered because hypothyroidism symptoms often overlap with pregnancy symptoms (27).

Participants were classified as normal (normal TSH and T4), subclinical hypothyroidism (TSH above normal range with normal T4), overt hypothyroidism (TSH above normal range and T4 below normal range), or hyperthyroidism (TSH below normal range and elevated T4), according to the results of the TFT. Normal ranges for TSH were defined according to the pregnancy trimester, in accordance with the ATA recommendations: first semester (0.1-2.5 mIU/L), second trimester (0.2-3.0 mIU/L), and third trimester (0.3-3.0 mIU/L) 25. Furthermore, autoimmune thyroiditis was defined as TPO levels >35 IU/mL (28).

Procedure

The study objectives, procedure and terms were explained to the eligible participants, who signed the informed consent. After enrollment, participants were interviewed regarding their demographics, obstetrical and clinical history, in addition to the checklist of risk factors. Afterwards, all the participants underwent a structured physical examination including thyroid palpation to detect a clinical goiter, weight and height measurement with calculation of the BMI, blood pressure measurement using an electronic sphygmomanometer. Finally, blood sample was collected to measure TSH, T4 levels using the standard biological methods in the attached laboratory. Further, TPO was measured for participants who had subclinical hypothyroidism to screen for autoimmune thyroiditis.

Statistical Methods

Data was entered, cleaned and coded in an Excel sheet, then transferred to the Statistical Package for Social Sciences version 21.0 for Windows (SPSS Inc., Chicago, IL, USA) for statistical analysis. Categorical variables are presented as frequency and percentage, while continuous variables are presented as mean ± standard deviation (SD). Accuracy of the risk stratification-based screening approach was explored by analyzing the association of the risk category (high-risk vs. low-risk) with TFT results (normal vs. abnormal) using chi square test, and by calculating the corresponding sensitivity, specificity, negative and positive predictive values and overall accuracy with 95% CI. Furthermore, we tested the performance of the cumulative number of factors in indicating hypothyroidism using the Receiver Operating Characteristics (ROC) curve, where TFT result was analyzed as the dependent variable; results are presented as area under the curve (AUC) with 95% CI, standard error (S.E) and the level of statistical significance. The association of TFT results with the other demographic and clinical data was analyzed using chi square test, Fisher's exact test, or Mann-Whitney U test, as applicable. A p-value of < 0.05 was considered to reject the null hypothesis.

Results

Demographic, clinical and obstetrical characteristics

Three hundred and eighty-six pregnant women were included whose mean (SD) age was 30.11 (6.22) years and 212 participants (54.9%) were in the third trimester. There was high prevalence of overweight (33.4%) and obesity (40.7%). Other obstetrical parameters showed gravidity ≥3 (56.4%) and previous still birth (3.4%) (Table 1).

Table 1: Demographic, obstetrical and clinical data, and thyroid function test findings

Parameter	Category	Frequency	Percentage
Age (years)	Mean, SD	30.11	6.22
Gestational age (weeks)	Mean, SD	26.60	7.78
	Median, range	27	13, 40
Trimester	Second (week 14–27)	174	45.1
	Third (week 28-end)	212	54.9
Gravida	1	95	24.6
	2	73	18.9
	3	63	16.3
	4	51	13.2
	5+	104	26.9
Living children	0	102	26.4
	1	95	24.6
	2	67	17.4
	3	49	12.7
	4	35	9.1
	5+	38	9.8
Previous stillbirth	No	373	96.6
	Yes	13	3.4
Smoking	Yes	5	1.3
	No	381	98.7
BMI (Kg/m2)	Morbid obesity (≥40)	13	3.4
	Obesity 2 (35– 39.9)	49	12.7
	Obesity 1 (30–34.9)	95	24.6
	Overweight (25–29.9)	129	33.4
	Normal (18.5–24.9)	98	25.4
	Underweight (<18.5)	2	0.5
Systolic BP (mmHg)	Mean, SD	110.91	10.91
	Range	84	144
Diastolic BP (mmHg)	Mean, SD	67.94	9.32
	Range	45	98
TSH (IU)	Mean, SD	1.92	1.13
	Range	0.01	7.76
T4 (IU)	Mean, SD	10.67	1.46
	Range	0.89	15.80
TFT result	Normal	341	88.3
	Subclinical hypothyroidism	40	10.4
	Overt hypothyroidism	5	1.3

Abbreviations : BMI : body mass index ; BP : blood pressure ;
TSH : thyroid stimulating hormone ; TFT : thyroid function test ; T4 : thyroxine

Thyroid function test findings

TFTs showed 10.4% cases of subclinical hypothyroidism and 1.3% cases of overt hypothyroidism. Thus, the prevalence of thyroid dysfunction, including both subclinical and overt hypothyroidism, was 11.7% (95% CI=8.6-15.3%) (Table 1).

Risk factor assessment and risk stratification

The most prevalent risk factors considered by the USPSTF were age > 30 years (45.1%), history of miscarriage or preterm delivery (31.9%), and family history of autoimmune thyroid disease or hypothyroidism (22.8%). None of the participants was reported to be receiving thyroid replacement therapy. By considering the UPSTF criteria, 70.2% of the participants were classified as high-risk; and by combining UPSTF and ATA criteria, 86.8% would be classified as high-risk (Table 2).

Diagnostic value of the risk stratification-based screening approach

There was no difference in the prevalence of abnormal TFT results between low-risk and high-risk categories as per the USPSTF criteria (10.4% vs. 12.2%, p=0.730) and ATA criteria (including the two additional factors) (11.8% vs. 11.7%, p=0.980), respectively. Further, none of the evaluated risk factors was associated with increased percentage of abnormal TFT (Table 2).

Table 2: Assessment of risk factors and their association with the prevalence of abnormal thyroid function test

Parameter / level Risk factors*	Risk factor prevalence (N, %)		Abnormal TFT prevalence (%) (In presence vs absence of factor)	p-value
Demographic factors				
1. Age above 30 years	174	45.1	12.1 vs 11.3	0.874
2. Residence region with presumed iodine deficiency §	0	0.0	-	-
Non-specific/ obstetrical factors				
3. History of miscarriage or preterm delivery	123	31.9	11.4 vs 11.8	1.000
4. Type 1 DM or other autoimmune disorders	23	6.0	8.7 vs 11.8	1.000
5. Infertility	42	10.9	11.9 vs 11.6	1.000F
Thyroid-specific factors				
6. Family history of autoimmune thyroid disease or hypothyroidism	88	22.8	11.4 vs 11.7	0.922
7. Prior therapeutic head or neck irradiation or thyroid surgery	5	1.3	0.0 vs 11.8	1.000 F
8. Symptoms or clinical signs suggestive of hypothyroidism ‡	NA	NA	-	-
9. Goiter	31	8.0	9.7 vs 11.8	1.000 F
10. Currently receiving levothyroxine replacement	0	0.0	-	-
11. Positive detection of thyroid antibodies, primarily TPO antibodies	1	0.3	0.0 vs 11.7	1.000 F
Additional factors by ATA¥				
12. BMI ≥ 40 kg/m2	13	3.4	15.4 vs 11.5	0.655 F
13. Multiple prior pregnancies (≥2)	291	75.4 11.	7 vs 11.6	0.978
USPSTF Risk category (factors 1-11)				
Low	115	29.8	12 (10.4)	
High	271	70.2	22 (12.2)	0.730
USPSTF + ATA Risk category¥ (factors 1-13)				
Low	51	13.2	6 (11.8)	
High	335	86.8	39 (11.7)	0.980

Abbreviations:
ATA: American thyroid association; TPO: thyroid peroxidase; TFT: thyroid stimulating hormone; USPSTF: U.S. Preventive Services Task Force;
* Factors considered for targeted thyroid dysfunction screening in pregnant women according to the USPSTF;
¥ Including 2 extra factors considered by the American Thyroid Association.
§ Factor not considered in the present study as Saudi Arabia is not presumed iodine deficient region.
‡ Factor not considered in the present study as hypothyroidism symptoms often overlap and are confused with pregnancy symptoms.
F Significance level calculated using Fisher's exact test; otherwise, chi square test was used.

The performance of risk stratification-based screening approach in detecting subclinical or overt hypothyroidism showed sensitivity (73.3% vs. 86.7%), specificity (30.2% vs. 13.2%), and accuracy (35.2% vs. 21.8%), using the USPSTF and the USPSTF + ATA criteria, respectively. However, overt hypothyroidism was detected with 100% sensitivity and 30.2% specificity using the USPSTF criteria alone (Table 3).

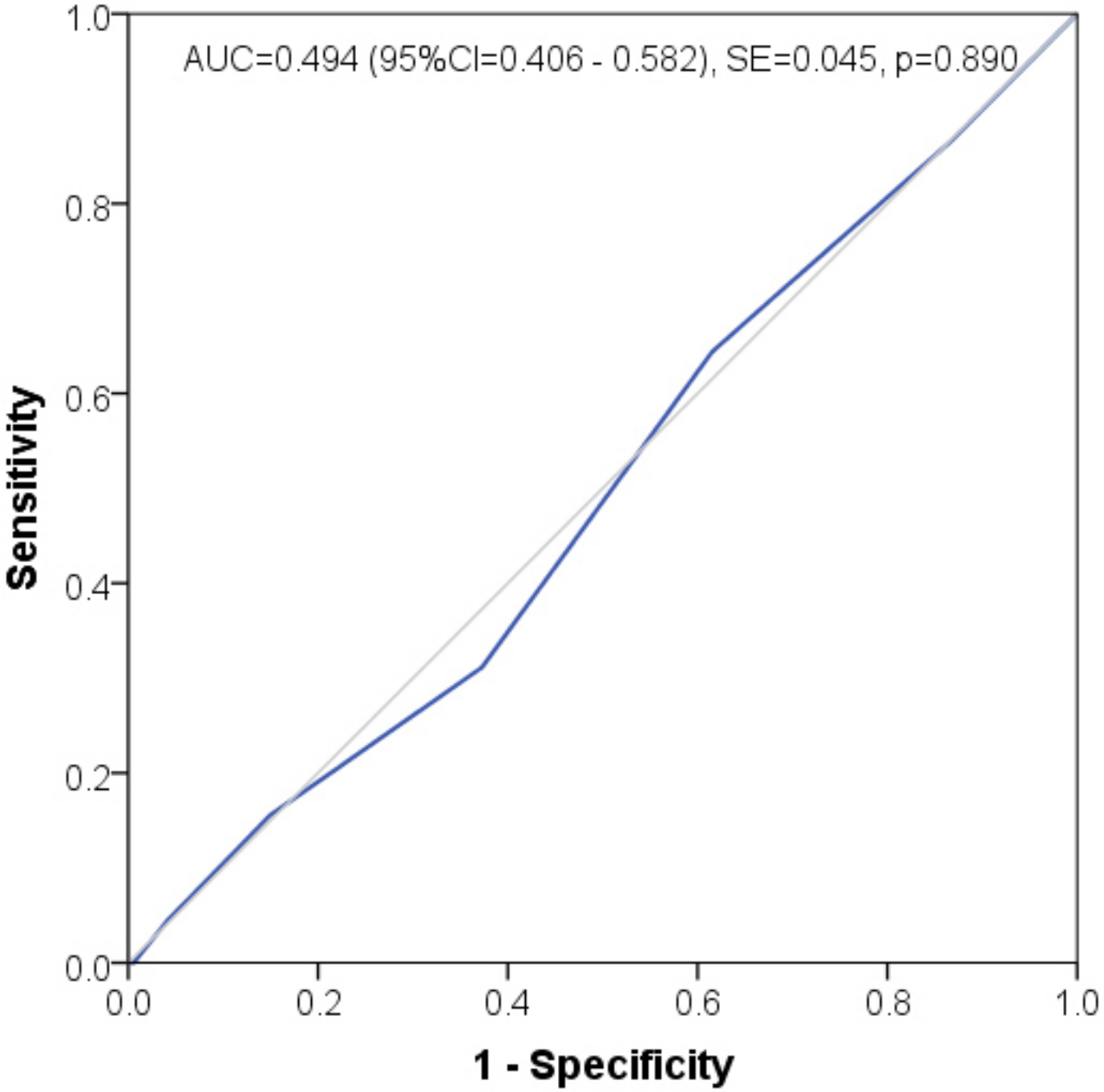
Table 3: Performance of risk stratification approach in the screening for hypothyroidism and over hypothyroidism in pregnant women

Condition	**Subclinical or overt hypothyroidism**				**Overt hypothyroidism**	
Criteria	**USPSTF**		**USPSTF + ATA**		**USPSTF**	
Parameter	**Value**	**95%CI**	**Value**	**95%CI**	**Value**	**95%CI**
Sensitivity (%)	73.3	58.1 – 85.4	86.7	73.2 – 95.0	100.0	47.8 – 100.0
Specificity (%)	30.2	25.4 – 35.4	13.2	9.8 – 17.3	30.2	25.6 – 35.1
PPV (%)	12.2	10.3 – 14.4	11.6	10.5 – 13.0	1.9	1.7 – 2.0
NPV (%)	89.6	83.7 – 93.5	88.2	77.2 – 94.3	100.0	-
Accuracy (%)	35.2	30.5 – 40.2	21.8	17.8 – 26.2	31.1	26.5 – 36.0

USPSTF: US Preventive Services Task Forces criteria, considering the presence of any of the following risk factors: age>30 years, residence in region with iodine deficiency (not applicable in the present study), history of miscarriage, preterm delivery or infertility, type 1 DM or other autoimmune disorders; Family history of autoimmune thyroid disease or hypothyroidism; Prior therapeutic head or neck irradiation or thyroid surgery; symptoms or clinical signs suggestive of hypothyroidism (not used in the present study); clinical goiter; currently receiving levothyroxine replacement; previous positive thyroid antibodies.
USPSTF + ATA (American Thyroid Association): include morbid obesity and multiple prior pregnancy (≥2), in addition to the previous risk factors.
95% CI: 95% confidence interval; PPV: positive predictive value; NPV: negative predictive value.

The ROC curve analysis showed AUC=0.494 (p=0.890), indicating poor performance of the number of cumulative risk factors in predicting thyroid dysfunction in pregnant women (Figure 1).

Figure 1. ROC curve analysis of hypothyroidism during pregnancy as a function of the number of cumulative risk factors



AUC. Area under the curve; S.E: standard error; CI: confidence interval

Table 4: Other demographic and clinical factors associated with abnormal thyroid function test

Parameter	Category	Normal TFT		Abnormal TFT		p-value
		N	%	N	%	
Age (years)	Mean, SD	30.12	6.20	30.02	6.49	0.919t
Smoking	Yes	5	100.0	0	0.0	
	No	336	88.2	45	11.8	1.000F
Gravida	1	84	88.4	11	11.6	
	2	67	91.8	6	8.2	
	3	56	88.9	7	11.1	
	4	46	90.2	5	9.8	
	5+	88	84.6	16	15.4	0.657
Living children	0	90	88.2	12	11.8	
	1	88	92.6	7	7.4	
	2	59	88.1	8	11.9	
	3	40	81.6	9	18.4	
	4	34	97.1	1	2.9	
	5+	30	78.9	8	21.1	0.083
Previous stillbirth	Never	331	88.7	42	11.3	
	1+	10	76.9	3	23.1	0.184F
Gestational age (weeks)	Median, P75	26	34	28	35	0.324M
Trimester	Second	158	90.8	16	9.2	
	Third	183	86.3	29	13.7	0.172
BMI (Kg/m2)	Morbid obesity	11	84.6	2	15.4	
	Obesity 2	41	83.7	8	16.3	
	Obesity 1	82	86.3	13	13.7	
	Overweight	117	90.7	12	9.3	
	Normal	88	89.8	10	10.2	
	Underweight	2	100.0	0	0.0	0.738
Systolic BP (mmHg)	Mean, SD	110.67	10.98	110.67	10.98	0.234
Diastolic BP (mmHg)	Mean, SD	67.65	9.29	70.11	9.43	0.096

BMI: Body mass index; BP: blood pressure; TFT: thyroid function test
Test used: M Mann-Whitney U test; F Fisher's exact test; otherwise, chi square test.; P75: 75th centile.

Discussion

Summary of findings

The accuracy of screening for thyroid dysfunction among pregnant women is crucial to prevent the associated morbidity and anticipate the cost-effectiveness of a nationwide screening program in balance with the economic burden of the disease. Findings from the present cross-sectional study showed a prevalence of thyroid dysfunction of 11.7%, of which 10.4% was subclinical and 1.3% was overt hypothyroidism. Although anti-TPO test results were missing for two-thirds of hypothyroid women, positive detection was found in 5 out of 11 (45.5%) tested women. The application of the risk stratification-based screening approach in the study population enabled detecting thyroid dysfunction among pregnant women with 73.3-86.7% sensitivity and 13.2-30.2% specificity, depending on the criteria used, resulting in an overall accuracy of 21.8-35.2%. On the other side, the use of USPSTF criteria alone enabled detecting overt hypothyroidism with 100% sensitivity and 30.2% specificity. Further, the number of cumulated risk factors was not significantly indicative for hypothyroidism.

Prevalence of subclinical and overt hypothyroidism

Findings from the present study are concordant with epidemiological figures reported in other studies. Locally, a study from Riyadh, in 2018, estimated the prevalence of subclinical hypothyroidism as 13% among women attending the antenatal clinics (29). Internationally, an Indian study,(30) which included 400 pregnant patients, showed 12% prevalence of hypothyroidism, including 9% subclinical and 3% overt hypothyroidism, which is similar to our findings. Additionally, the same study reported 52% cases of positive anti-TPO antibody detection among hypothyroid women, which could be assumedly comparable to our findings that showed positive detection among 5 out of 11 hypothyroid women who were tested.

Lower rates were found in an Iranian study that evaluated 3,158 pregnant women. It showed, approximately 4.7% prevalence of hypothyroidism including 4.2% subclinical and 0.5% overt hypothyroidism, and the majority of cases were diagnosed in the first trimester (31). A Turkish study screened 1,416 consecutive pregnant women in their first semester and found 22.3% cases of subclinical and 1.6% of overt hypothyroidism, for an overall 23.9% prevalence of thyroid dysfunction by using the cutoff value proposed in the 2017 ATA recommendation (32). This variability between the different studies may result from regional discrepancies in the risk factors, notably the odd risk in endemic versus non-endemic regions.

Cost-effectiveness implication of targeted screening

The application of the USPSTF criteria in the study population classified 70.2% of the pregnant women as being at high-risk for thyroid dysfunction, thereby enabling the detection of overt hypothyroidism with 100% sensitivity and 30.2% specificity, for an overall prevalence of 1.3%. By assuming the generalizability of these findings in the target population, the implementation of a targeted screening strategy based on the USPSTF criteria would result in 70.2% of all pregnant women undergoing blood TFT to rule out overt hypothyroidism and no undiagnosed cases. In other terms, such an approach would enable ~30% cost-effectiveness by comparison to a systematic blood test screening. This supports superior cost-effectiveness of the risk-based targeted screening by reference to systematic screening in overt hypothyroidism, as the screening approach is quasi costless in that it relies only on the patient's medical history. In absence of screening, data from the literature estimated between 0.2% and 1% prevalence of undiagnosed overt hypothyroidism in pregnant women living in an iodine deficient region(33-36). In Saudi Arabia, further local studies are warranted to provide an accurate estimate of the performance and cost-effectiveness of targeted screening versus universal screening.

On the other hand, by considering both overt and subclinical hypothyroidism, the application of the USPSTF criteria failed to detect approximately 27% of the cases of thyroid dysfunction (sensitivity = 73.3%), out of an overall prevalence of 13.7%; whereas only 12.2% of those who were classified as high-risk tested positive in TFT (PPV=12.2%). This suggests that in every 1,000 pregnant women, 733 would have to undergo blood TFT to confirm or rule out thyroid dysfunction, while 37 would be misclassified as low-risk among the remaining 267 others and would go undiagnosed. By combining the USPSTF and ATA criteria, the performance of the approach was not improved significantly, as its application would result in 16 cases misclassified as low-risk in every 1,000 evaluated women, whereas 868 would undergo blood TFT.

This is supported by observations from another local study, which found 10.5% prevalence of subclinical hypothyroidism in pregnant women who were screened based on a risk stratification method versus 18.5% who were randomly enrolled in the study (29). Similar observations were reported in international studies, where targeted screening was associated with up to one-third hypothyroid women being undiagnosed(33,34). Such inference questions both the effectiveness and cost-effectiveness of the targeted screening strategy based on the USPSTF approach and suggests considering universal blood TFT screening to prevent morbidity and health expenditures resulting from undiagnosed thyroid dysfunction.

This leads to examine the relevance of universal screening from a cost-effectiveness perspective. A cost-effectiveness analysis showed that universal screening of hypothyroidism during the first pregnancy trimester was more cost-effective than risk-based screening approach, with an incremental cost-effectiveness ratio of $7,258 per quality-adjusted life-year (QALY). However, compared to no screening, either approach was cost-effective (37). Another study that focused on subclinical hypothyroidism found that universal screening would enable approximately $83,564 cost-saving and 5.9 QALYs for every 1,000 women who are screened; and according to the analysis model, universal screening remains cost-effective even for a prevalence of the condition as low as 0.25%. However, the latter cost-effectiveness model was based on the cost-savings resulting from a hypothetical reduction of the incidence of low intellectual quotient in offspring as an effect of thyroid hormone replacement therapy prescribed in diagnosed women(38).

Clinical implication of subclinical hypothyroidism in pregnant women

The previous observations lead us to a crossroad: whether subclinical hypothyroidism could be considered as a pathological entity with significant clinical implication. Review and meta-analyses of longitudinal studies show that subclinical hypothyroidism develops in 3-15% of pregnant women, and is associated with several maternal and fetal adverse outcomes. Maternal adverse outcomes include pre-eclampsia, premature rupture of membranes, placenta abruption, gestational hypertension, and gestational diabetes. Fetal adverse outcomes include abortions, preterm delivery, cognitive delay, intrauterine growth retardation, and neonatal death (2,30,39). However, the benefits of a therapeutic intervention including levothyroxine therapy are highly controversial. While some trials reported reduction in the incidence of preterm births, abortions and low birth weight offspring, the core evidence from the majority of studies and meta-analyses does not conclude significant benefit of levothyroxine therapy in subclinical hypothyroidism to prevent the adverse maternal or fetal outcomes (2,39-43). Recommendations 28 and 29 from the 2017 Guidelines of the ATA specify the indications of levothyroxine therapy in subclinical hypothyroidism during pregnancy depending on anti-TPO antibody status, and emit strong recommendation to treat TPO-Ab positive women with TSH greater than the pregnancy-specific reference range based on moderate-quality evidence, as well as TPO-Ab negative ones with TSH >10.0 mU/L based on low-quality evidence. On the other hand, the Guidelines strongly do not recommend treating TPO-Ab negative women with TSH within the pregnancy-specific reference range, based on high-quality evidence (25).

Clinical implication of overt hypothyroidism in pregnant women

On the other hand, the efficacy of treating overt hypothyroidism and autoimmune thyroid disease during pregnancy is supported by growing evidence. Overt hypothyroidism diagnosed during pregnancy is managed by levothyroxine therapy using doses that should be titrated against TSH level, and aims to obtain and maintain maternal euthyroidism throughout the pregnancy and lactation period. Ideally, the treatment should be started in the pre-conception period, which requires education and awareness raising among the population (44). Recommendation 27 in the 2017 Guidelines of the ATA, based on moderate-quality evidence (strongly recommends) highlights the relevance of treating overt hypothyroidism during pregnancy (25). An efficacy study based on prospective data showed that perinatal outcomes among overt hypothyroidism women who were treated were similar to euthyroid ones(36). Regarding autoimmune thyroid disease, a randomized trial showed significant reduction (70%) in the risk of preterm delivery among women with autoimmune thyroid disease who were treated with levothyroxine with reference to those who were untreated (45).

Altogether, high sensitivity of the risk-based targeted screening and the possibility of implementing significant intervention in overt hypothyroidism are in favor of the implementation of such a screening program in Saudi Arabia. However, further local studies are warranted to confirm the high performance found in the present study and to analyze the cost-effectiveness of such screening strategy at the national level.

Conclusion

Findings from the present cross-sectional study showed the prevalence of thyroid dysfunction of 11.7% among pregnant women (10.4% were subclinical and 1.3% were overt hypothyroidism). The application of the targeted screening for subclinical and overt hypothyroidism using the USPSTF and ATA criteria performed poorly in the studied population and its implementation would result in 16 to 37 undiagnosed cases per 1,000 evaluated women. Thus, universal screening appears to be a better option; however, the cost-effectiveness of such an approach may be impacted by the absence of therapeutic implication in subclinical forms, to date, which represent a high proportion of cases. On the other hand, the risk-based screening approach was highly sensitive in case detection of overt hypothyroidism. However, further local studies are warranted to confirm the performance of targeted screening in overt hypothyroidism and to analyze the cost-effectiveness of such screening strategy at the national level.

Authors contribution:

Both authors Lubna Zahrani and Mada Abdullhaq contributed equally in literature search, study design, data collection, data analysis and manuscripts writing, TS data collection, manuscripts writing and supervision FF study design, all authors reviewed the manuscript .

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Prevalence of iron supplementation among pregnant woman in Taif, Saudi Arabia: a cross sectional study

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Abstract

Background: Deficiencies in iron during pregnancy may negatively impact the health of the mother, the pregnancy, as well as fetal development. Aim: Several studies evidenced that there is poor compliance with prenatal iron supplements during the antenatal period. More studies are needed to assess the prevalence, compliance and influencing factors of iron supplement among pregnant women. Methods: A cross-sectional study was carried out to assess the iron supplementation practice and influencing factors among pregnant woman in different hospitals of Taif city, Saudi Arabia. Results: The prevalence of iron supplements use during pregnancy among the study participants was 99.6%. There was no significant association between the age, weight and number of pregnancies (p value >0.05). There was significant association in status of previous pregnancy (p value = 0.014). Women with healthy previous pregnancies appeared to consume iron supplement more than women with problems in their previous pregnancies. Pregnant women aged between 30-44 years were more likely to be adherent to iron supplement (30%). Mothers who had University education were more likely to be adherent to iron supplement than others (35%). Conclusion: There is a need to encourage pregnant women to visit early for antenatal care. Iron and folic acid supplements, dietary intake preferences, diagnosis and continuous follow up of pregnant women are approaches to reduce anemia during pregnancy in Taif region. The purpose of this study was to enhance the public awareness about iron supplements during pregnancy.

Key words: Iron supplements; anemia; pregnant women; prevalence.

Background

According to the World Health Organization, around 2 billion people, amounting to over 30% of the world's population are anemic, where Preschool children and women of reproductive age are particularly affected [1]. Iron deficiency is the most common cause of anemia and is the most widespread nutritional disorder affecting a large number of children and women in developed and developing countries. It is estimated that 56 million pregnant women are affected with anemia globally, largely due to iron deficiency. In developing countries such as South-East Asia, this proportion can be as high as 85%, making pregnant mothers especially susceptible to increased risk of mortality and reduced work capacity [2]. The main causes of iron deficiency include a diet poor in absorbable iron, increased requirement for iron (e.g. during pregnancy) not covered through the diet, loss of iron due to parasitic infections (particularly hookworm), and blood losses. The consequences of iron deficiency anemia are serious and may include diminished intellectual and productive capacity and possibly increased susceptibility to infections [3]. It is a risk factor for perinatal complications like perinatal infection, pre-eclampsia, low birth weight, prematurity, and perinatal mortality risks. Earlier studies showed strong evidence that iron supplementation with or without folic acid, results in a significant reduction in the incidence of anemia during pregnancy [4, 5]. Studies suggested that hemoglobin below 11 g/dl increased the risk of preterm birth, low birth weight, and small gestational age in the first trimester and the risk of low birth weight in the third trimester [6, 7].

The overall requirement of iron during pregnancy is high due to expansion of maternal red blood cell mass during pregnancy and support of feto-placental development [8]. Even though mobilization of iron deposits with increased iron absorption occurs during pregnancy, iron requirements are difficult to counterbalance by diet alone, despite taking fortified food and supplementation [4]. Thus, it is important that the women commence gestation with a good iron status to avoid the risks produced by high antenatal doses of iron, even if considered preventive or therapeutic. The benefit of the early iron supplementation in women with insufficient reserves is well documented but there is contradictory evidence regarding the effect of iron supplementation during gestation in iron deficient women. While some authors have observed that the iron supplementation in these women is beneficial for the newborn, others have indicated that it could provoke an excess of iron which can induce oxidative stress and haemo-concentration; factors that can negatively influence the health of the mother and the development of the fetus [9]. It is well established that iron supplementation, with or without folic acid during pregnancy, substantially improves maternal health and pregnancy outcomes [10]. In fact, the provision of iron supplements to pregnant women is one of the most widely practiced public health measures. However, there is no consensus worldwide regarding the optimum iron dose for supplementation during pregnancy, with recommendations varying between 30 and 200 mg/day [11]. Recommendations not only vary by iron dose, but also by whether iron supplementation is routine (treatment of all pregnant women regardless of their iron status) or selective (only women with or at risk of developing iron deficiency or iron deficiency anemia) , and whether iron supplementation is for prevention or treatment of iron deficiency anemia and or iron deficiency. All these facts were taken into consideration, and the study was designed to investigate the prevalence and determining factors of iron supplementation in pregnant women in Taif, Saudi Arabia. In addition, iron supplementation practice, reasons for supplementations and the level of compliance to iron and its associated factors were also examined.

Methods

1. Study design, setting and target population

A cross-sectional study was conducted from January 2020 to March 2020. The study was performed on pregnant women in 3 centers namely Al-Hada Armed Forces Hospital, Prince Mansour Armed force Hospital and Al-Adwani Hospital at Taif Region, Saudi Arabia. Pregnant women (n=310) were randomly selected for the study. Verbal consent was obtained from each pregnant woman prior to inclusion in the study. All subjects remained anonymous and participation was voluntary. Also, all records and data remained confidential for research purposes only.

2. Exclusion criteria

Women with any acute or chronic illnesses, anemia due to any chronic illness, history of blood transfusion in the present pregnancy and those who receive iron intravenously were excluded from the study.

3. Inclusion criteria

Pregnant women (at any stage of pregnancy) with age over 16 years were included. Similar population having haemoglobin level over 3 g/dl, gestational diabetes, hypertension, smokers, or non-smokers, taking different types of iron supplement during pregnancy were also included in the study.

4. Data collection

Self-administered questionnaires in Arabic and English languages were distributed to determine the iron intake from various sources and reasons for supplementing iron during their pregnancy. It also estimated the prevalence of iron deficiency and iron deficiency anemia and compliance among pregnant women along with encountered complications. A pilot study on 20 pregnant women was carried out to ensure that the research instrument is clear, well-written and will acquire the desired responses. The results of this pilot study are not included in the final results. The questionnaire consisted of two parts; the first part included the demographic data; the second part contained the obstetrics related characteristics, sources and reasons for supplementing iron as well as reasons for compliance and non-compliance.

5. Statistical analysis

Statistical Package for Social Science version 22 Inc., Chicago IL, USA, was used to enter, process, and analyze the data. Mean and frequencies as percentages were used to describe the variables. Chi-square and Fisher's exact tests were used to determine the association between the women's demographic characters and the different variables. The significance of the differences was calculated at a 95% confidence interval and P value < 0.05 was considered as statistically significant.

Results

The questionnaires were collected from the period of January 2020 to March 2020. A total of 310 pregnant women were enrolled to fill in the questionnaire. Table 1 shows the baseline characteristics of the study participants. Most of the participants (57%) were aged between 30-44 years, 95% of them were Saudi national and 97% of them did not smoke. Approximately, 96% of participating women consumed a mixed diet, 3% were reported as vegetarian while 0.3% as vegan. The prevalence of iron supplements use during pregnancy among the study participants was 99.6% (Figure 1). Table 1 shows the prevalence of iron supplement among participants according to their answers to the related questions. Approximately, 77% of participating women had two or more pregnancies. While about one-fifth of participants (17%) stated that they had miscarriage in previous pregnancies. A total of 8% of participants reported that they had gestational diabetes, 1% had gestational hypertension and 0.6% suffered from both. Only 3% of women suffered from heavy bleeding before or after their last birth. Results revealed that about 42% participants had iron deficiency while 0.6% had anemia. A total of 45% of participants were diagnosed with iron deficiency in the first trimester, 44% in the second trimester and 10% in the third trimester. The majority of the participants (73%) administered a daily dose of iron supplement, while 2% took a weekly dose and 25% took it irregularly. The majority of women (75%) reported using iron fortified cereals while a quarter (25%) did not consume them. Maximum percentage of women (89%) were eating red meat during their pregnancy, while almost 87% of the participants used food supplements. About 34% of women were aware about foods that prevent iron absorption, and 66% of participants had no idea. On the other hand, 38% of participants received counseling about proper nutrition during pregnancy and about 62% had not received any counseling.

Factors related to iron supplementation during pregnancy were tested and are depicted in Table 1. There were no significant differences between the age, weight and number of pregnancies (p value >0.05). There was significant difference observed in status of previous pregnancy (p value 0.014). Participants with previous healthy pregnancy appeared to consume iron supplements more than women with problem in their previous pregnancies. Most iron supplement doses used by study participants (69%) were the preventive dose (30-99 mg/day); while 17% used the treatment dose (>100mg/day); less than one third (8.3%) used the low dose (<30mg/day); while 5% of the participants had no knowledge about doses. The majority of participants reported to have supplemented iron in the form of iron sulfate (Figure 2).

Figure 1. The prevalence of iron supplements uses during pregnancy.

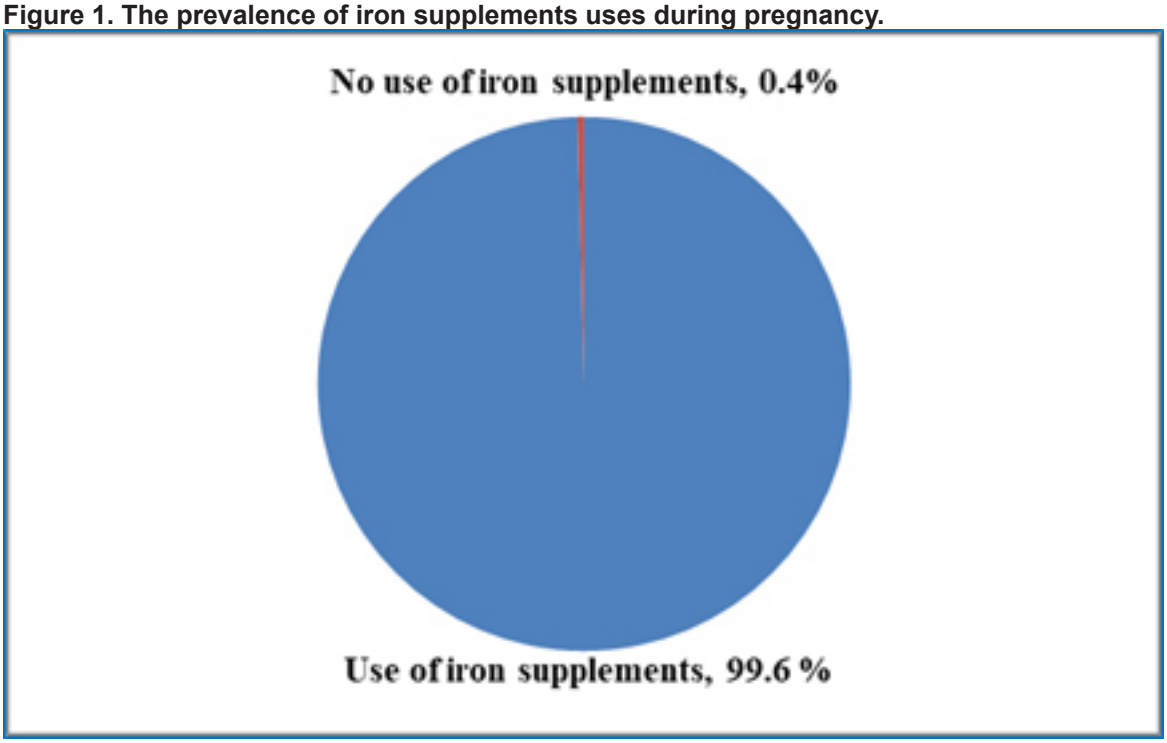

Table 1: Association between iron supplementation and sociodemographic/maternal data and determining factors of iron supplementation

Characteristics	Frequency	Percentage	p-value
Age			
16-29	99	32%	
30-44	178	57%	0.34
>45	32	10%	
Weight (kg)			
≤45	20	6%	
46-60	105	34%	0.74
61-80	133	43%	
>80	51	16%	
Height (cm)			
150-160	218	70%	0.81
161-170	85	27%	
171-180	6	2%	
BMI			
Normal weight	166	54%	
Overweight/obese	116	37%	0.65
Underweight	27	9%	
Nationality			
Saudi	295	95%	0.82
Non-Saudi	14	5%	
Education level			
University	205	66%	
High school	71	23%	
Intermediate school	19	6%	0.97
Primary school	13	4%	
Illiterate	1	0.3%	
Working			
Yes	136	44%	0.37
No	173	56%	
Wealth level			
Rich	45	15%	
Medium	255	82%	0.9
Poor	9	3%	
Smoking			
Yes	2	0.6%	
No	302	97%	0.98
Stopped	5	2%	
Diet			
Vegetarian	10	3%	
Vegan	1	0.3%	0.98
Mix	298	96%	
First pregnancy			
Yes	71	23%	0.58
No	238	77%	
Number of children			
0	69	22%	
1	35	11%	0.72
2-3	133	43%	
>4	72	23%	

Table 1: Association between iron supplementation and sociodemographic/maternal data and determining factors of iron supplementation (continued)

Type of pregnancy			
Single	297	96%	0.84
Twin	12	4%	
Status of previous pregnancy			
Miscarriage	54	17%	
Iron deficiency	37	12%	
Anemia	22	7%	
Heavy bleeding during delivery	8	3%	0.014*
None	188	61%	
Pregnancy problem			
Gestational diabetes	26	8%	
Gestational hypertension	4	1%	0.99
Both	2	0.6%	
None	277	89%	
Diagnosed with iron deficiency/anemia			
Iron deficiency			
Anemia	110	42%	0.61
Normal	2	0.6%	
	151	57%	
Time of iron deficiency diagnosis			
First	54	45%	
Second	52	44%	0.19
Third	12	10%	
Time of using iron supplement			
Long before pregnancy	23	7.4%	
When planned to become pregnant	6	1.9%	
Once came to know about pregnancy	35	11.3%	0.063
Once have iron deficiency	25	8%	
First trimester	63	20.3%	
Second trimester	135	43.5%	
Third trimester	22	7%	
Dose of iron supplement			
Low dose	26	8.3%	
Preventive dose	213	69%	0.19
Treatment dose	54	17%	
Use of iron fortified cereals			
Yes	231	75%	0.56
No	78	25%	
Eat red meat			
Yes	275	89%	0.72
No	34	11%	
Use of iron fortified juices			
Yes	180	58%	0.39
No	129	42%	
Use of other food supplements			
Yes	269	87%	0.7
No	40	13%	

Figure 2: Different types of iron supplements consumed by the participants.

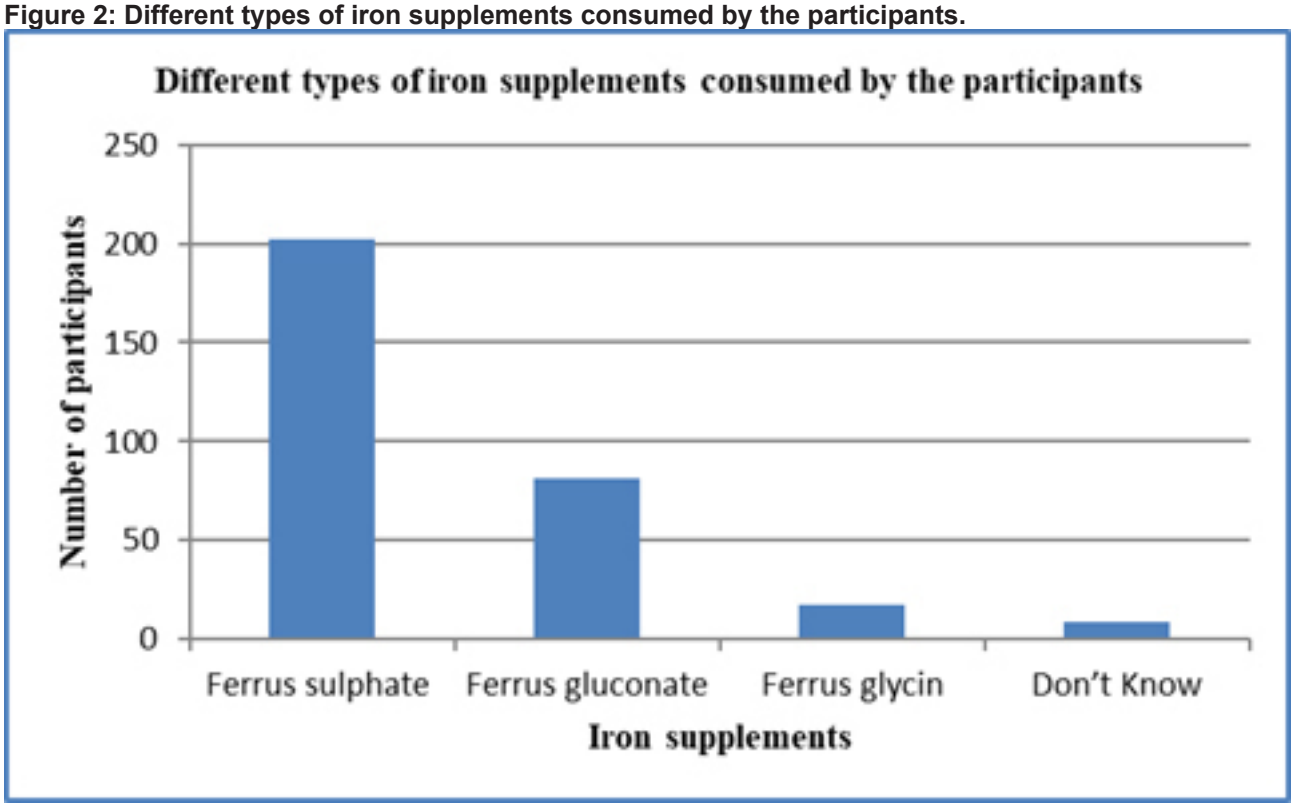

Figure 3. Prevalence of side effects of Iron supplements in pregnant women.

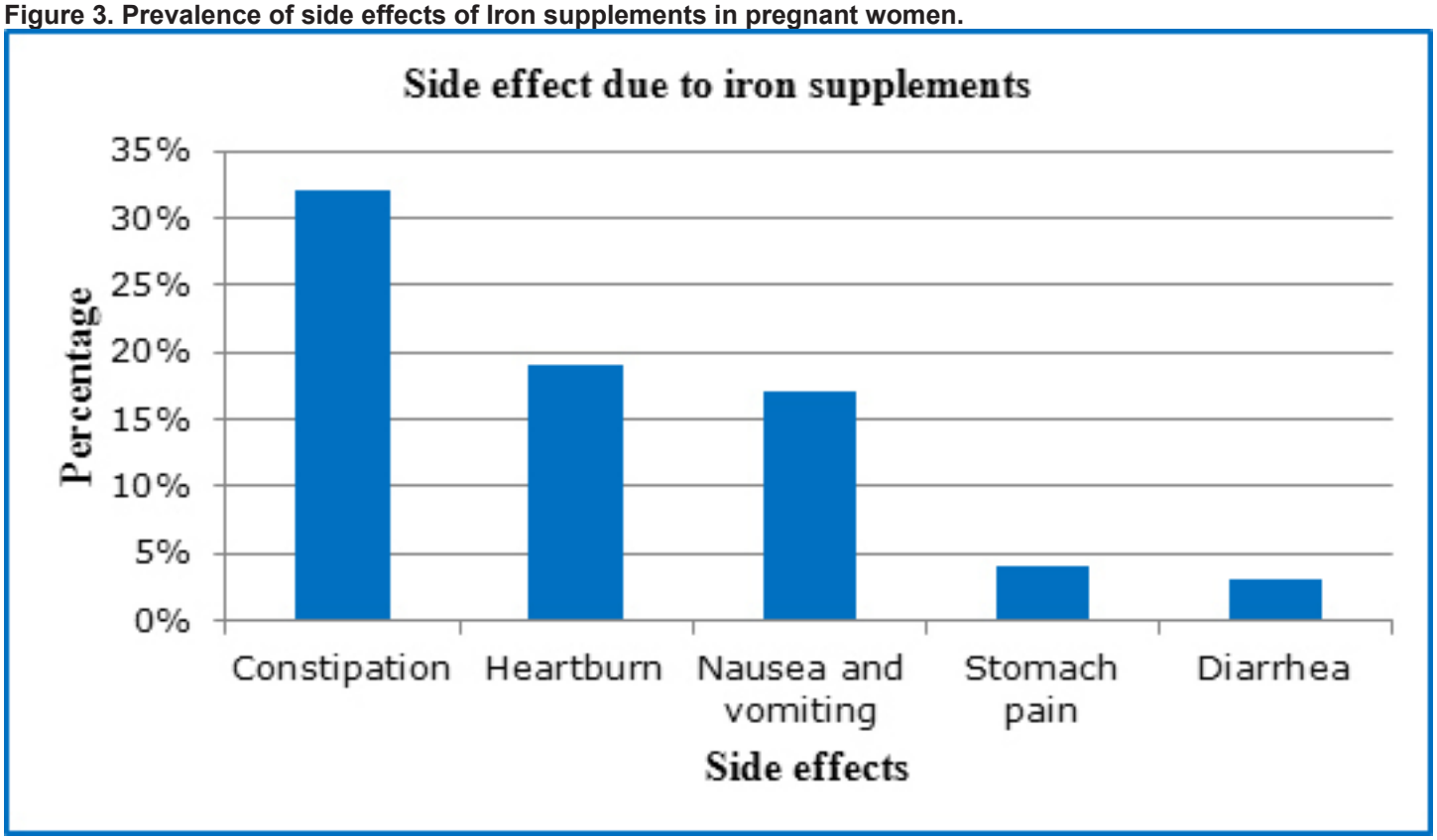

Table 2: Associated factors of iron supplement compliance among pregnant women.

Variables	Compliance	p-value	Non-compliance
Age (n=310)		0.42	
16-29	53 (17%)		47 (15%)
30-44	94 (30%)		84 (28%)
>45	13 (4%)		19 (6%)
Education		0.20	
University	107 (35%)		99 (32%)
High school	41 (13%)		30 (9%)
Intermediate school	7 (2%)		12 (4%)
Primary school	4 (1%)		9 (3%)
Illiterate	1 (0.3%)		0 (0.00%)
Work		0.27	
Yes	75 (24%)		61 (20%)
No	85 (27%)		89 (29%)
Wealth level		0.15	
Rich	26 (9%)		19 (6%)
Medium	132 (43%)		124 (40%)
Poor	2 (0.6%)		7 (2%)
Smoking		0.15	
Yes	0 (0.00%)		2 (0.6%)
No	156 (51%)		147 (47%)
Stopped	4 (1%)		1 (0.3%)
Diet		0.50	
Vegetarian	6 (2%)		4 (1%)
Vegan	0 (0.00%)		1 (0.3%)
Mix	154 (50%)		145 (47%)
First pregnancy		0.00	
Yes	51 (16%)		20 (6%)
No	109 (36%)		130 (41%)
Number of children		0.002*	
0	49 (16%)		20 (6%)
1	19 (6%)		16 (5%)
2-3	62 (20%)		72 (23%)
>4	30 (10%)		42 (13%)
Type of pregnancy		0.63	
Single	153 (49%)		145 (46%)
Twin	7 (2%)		5 (7%)
Status of previous pregnancy		0.011*	
Miscarriage	28 (9%)		26 (8%)
Iron deficiency	11 (4%)		26 (8%)
Anemia	10 (3%)		13 (4%)
Heavy bleeding before or after birth	2 (0.6%)		6 (2%)
None	109 (36%)		79 (25%)
Reason for non-compliance		0.80	
Forgetting	1 (0.7%)		37 (24%)
Better get it from natural source	0 (0.00%)		18 (11%)
Because of side effects	4 (3%)		92 (61%)

Table 2: Associated factors of iron supplement compliance among pregnant women. (continued)

Side effects		0.19	
Constipation	25 (15%)		53 (32%)
Diarrhea	1 (0.6%)		5 (3%)
Nausea and vomiting	6 (4%)		28 (17%)
Heartburn	8 (5%)		31 (19%)
Stomach pain	0 (0.00%)		7 (4%)
Use of iron fortified cereals		0.55	
Yes	122 (39%)		110 (35%)
No	38 (12%)		40 (13%)
Eating red meat		0.59	
Yes	141 (45%)		135 (44%)
No	19 (6%)		15 (5%)
Use of iron fortified juices (n=310)		0.55	
Yes	96 (31%)		85 (27%)
No	64 (21%)		65 (21%)

Table 2 depicts the association between different factors and compliance to iron supplement during pregnancy, in the study participants. The results indicated that all these factors were not statistically significantly associated with compliance to iron supplements ($p>0.05$). Pregnant women aged between 30-44 years were more likely adherent (30%) to iron supplements. No significant association between family income and rate of compliance was observed. In contrast, education had a significant effect on compliance. Mothers who had University education were more likely to be adherent (35%) to iron supplements than others with a low level of education. Mothers with mixed diet showed better compliance (50%), in contrast with vegetarian mothers (2%). Participants who had two or more pregnancies showed a 36% adherence rate. Rate of compliance in women who had normal previous pregnancy (36%) were significantly higher ($p=0.011$) than those who had previous pregnancy risk status such as iron deficiency (9%), anemia (4%), miscarriage (3%) and heavy bleeding (0.6%). High prevalence rate of constipation (32%), is likely to be the most prominent reason for non-adherence followed by heartburn (19%), nausea and vomiting (17%), stomach pain (4%) and diarrhea (3%) (Figure 3). Likewise, mothers who consume iron-fortified cereals (39%) and iron-fortified juices (31%) seemed to be more adherent.

Discussion

The present study estimated a higher prevalence rate (99.6%) of iron supplementation among pregnant women compared to the study performed in Germany (2018) that showed prevalence of 65.7% [11]. A total 42% of the participants in our study suffer from iron deficiency which is close to the prevalence rate of 35.3% found in a study conducted in Eastern Province of Saudi Arabia [12]. On the other hand, results of a study conducted in Danish and Norwegian pregnant women showed prevalence rate of 28% and 85%, respectively [13]. These differences may be attributed to variations among regions, nutritional composition, counseling and practice of iron supplementation by pregnant women. Our study also examined the compliance with iron and possible associated causative factors among pregnant women. Only 51.6% of the participants were compliant to iron supplements. In general, the compliance was relatively close to the results reported by Habib and colleagues (2009), where observed iron compliance was 50% [14]. In contrast, another study performed in Nepal reported 73% of total compliance with iron and folate supplementation [15]. In our study, the main reason for non-compliance was side effects (61%) followed by forgetfulness, whereas forgetfulness was the main factor in a study carried out by Siabani et al, 2018 in Iran [16]. However, this could be addressed with better counseling during antenatal visits and providing strategies that remind women to take their pills on time. Moreover, another study conducted in Nepal reported that the side-effects were the main barriers to adherence [17]. This was in line with our study. Educating women about the benefits of supplementation and managing side-effects would be useful.

Our study also showed that routine low-dose supplementation is well tolerated and associated with fewer side effects. Makrides and coworkers, 2003 reported that few side effects of low-dose iron supplementation during pregnancy may facilitate compliance [18]. Our study noticed high compliance among older age group participants and among women having 2-3 children. This may be due to women who had more children had a longer exposure to the messages of antenatal supplements that might have improved their compliance. Furthermore, older women may be more concerned about their health and pregnancy outcome, and get necessary support and cooperation from their family members. This finding was in line with studies conducted in India and Ethiopia where elderly and middle-aged women were slightly more compliant than younger women [19]. Education had a significant effect on compliance as reported by a study conducted in Saudi Arabia in 2009, which is similar to our study findings [14]. Pregnant women who had normal previous pregnancy were likely to be more adherent in contrast to the results reported in a study conducted in

Ethiopia in 2015, in which participants who consumed iron fortified cereals and juice had high compliance [19].

Our study finding reported very low prevalence of anemia (0.6%) that may be supported by the iron supplements, iron fortified cereals and mixed diet that is naturally rich in iron. Also, they routinely use iron supplements even in absence of any deficiency. In contrast, other studies conducted in other provinces of Saudi Arabia reported high prevalence rate of anemia such as in Jazan (58.9%) [20], Makkah (39%) [21], Riyadh (20.4%) [22] and Alkhobar (41.3%) [23]. However, a study conducted in Germany (2018) reported to have supplemented iron in form of iron sulfate which is the most common form [11]. The study encountered some limitations, such as the nature of the study design (cross-sectional) did not allow further evaluation of any apparent associations over time. The study did not assess the format of the different iron supplements, nor the specific side-effects for each format. Also, accuracy of responses to sensitive items, such as smoking and income, may be suspect. In addition, as study was performed in four hospitals, more centers and participants need to be involved to further estimate the prevalence of iron deficiency among pregnant women in Taif city, Saudi Arabia.

Conclusion

The prevalence of iron supplements use during pregnancy among pregnant women in Taif city was very high. However, nearly half of the participants reported compliance to iron supplements. The noncompliance was due to adverse effects of the iron. Prevalence of anemia among pregnant woman was found to be low and most cases of iron deficiency in pregnancy were diagnosed in the second and third trimester. There is need to encourage pregnant women to visit early for antenatal care and they should check hemoglobin level at first visit. Iron sulfate was the most used supplement reported by participants in Taif. As per our understanding, the strategies to reduce anemia during pregnancy should be iron and folic acid supplements, dietary intake preferences, diagnosis and continuous follow up of pregnant women. The current study intended to enhance the public perception about iron supplements during pregnancy.

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Why patients go to private health care facilities? Perspectives from Qassim, Saudi Arabia

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Abstract

Saudi government provides free health care to the population, however still a large number of people visit private health care facilities. This study aimed to measure patients' satisfaction with and reasons for visiting private health care facilities in Qassim, Saudi Arabia. A cross-sectional survey was conducted among patients who visited private health facilities in the month of August and September 2019. Data was collected through an online questionnaire with variables on various aspects of care and services and reasons for choosing the facilities. The data was analyzed using SPSS version 21. A total of 1220 respondents participated in this study. The mean score of the overall patients' satisfaction was 3.08 (±1.29). About 525 (43.1%) of respondents were satisfied. About 78.1% of respondents were satisfied with the private health facilities' working hours. Highly satisfied domains were; working hours, the respect and help from the staff. The patients' age, educational level, nationality, residence, monthly income and occupation were associated with the overall satisfaction in a private health facility ($p < 0.05$). The main reasons for choosing the private health facilities were delayed appointment in governmental hospitals and less waiting time in private hospitals. Service redesign is required to improve appointment management systems and patients' satisfaction in public sector health facilities.

Key words: Satisfaction; Private health facility; quality in healthcare; Qassim; Saudi Arabia

Introduction

In health care, patient satisfaction is an important evaluation means to determine the quality of services (1). In recent years, the concept has assumed much greater significance, particularly in market-based health systems. It also represents a complex mixture of the patient's health needs, the expectations they have for the type and quality of care, and the care finally received (2).

Customer satisfaction is a feeling of pleasure or disappointment resulting from comparing product/service's perceived performance with his or her expectations (3). Patients' satisfaction is a critical issue for healthcare pro-viders. A number of studies have been conducted concerning the investigation and measurement of patients' satisfaction with health services (4-8) as well as exploring the factors that affect it (9,10).

There has been a rapid growth of population during the last few decades in Saudi Arabia along with changes in the life style and disease patterns. Saudi government provides free health care services to the population. Ministry of Health (MoH) is the main provider of health care services through a large network of Primary Health Care (PHC) centers and hospitals across the country (11). MoH strives to continuously improve the quality of services and patient satisfaction. For this purpose, an ongoing survey program is conducted by the Saudi Ministry of Health to assess the patients' satisfaction level for medical services (12). Despite these, the private sector has been expanding continuously in Saudi Arabia. In 2005, the private sector constituted about 21% of beds in the Kingdom(13) which has increased to about 25% in 2020 (14). Private funding for health care is expected to increase from 25.8% in 2016 to about 28% in 2025 (15).

There is need of information about why people choose private health facilities despite free public health services to improve the system in the public sector. Literature on patient satisfaction is scarce in Saudi Arabia. There have been some small scale studies in Saudi Arabia which either compared satisfaction in public and private health care facilities(16,17) or either of these two (18-20). A study from Taif, which compared public and private facilities reported higher satisfaction in the private sector compared to public sector hospital (16). An-other open online survey which compared satisfaction with gynecological and obstetric services in Saudi Arabia found similar results of higher satisfaction in the private sector compared to public sector hospitals (21). A study in Najran included participants from three private facilities and found that overall satisfaction score was 3.9 out of 5 (20). Most of these studies were limited in scope to a single private facility or small sample size. Additionally, as part of Vision 2030, the Saudi government has plans to improve and expand health care through public private partnerships (15). This also calls for evidence about patients' satisfaction in the private sector as well. We therefor conducted this study in private health institutions in Qassim region to measure the population satisfaction with, and reasons for choosing the private health care sector.

Materials and Methods

Study design, setting and population

This cross-sectional study was carried out between 9th September and 12th October 2019 in Qassim Region, Saudi Arabia. Qassim is located in central part of Saudi Arabia with an estimated population of 1.5 million in 2020. There are 19 hospitals under MoH, one hospital under other governmental sector and four private hospitals. Number of MoH PHCs is 156 while there are 119 private polyclinics providing health care services under different specialties in the region (14). The target population was patients who visited outpatient or emergency departments of private health facilities during the last month from the date of data collection.

Sample Size:

Sample size was calculated using Epi Info Stat calculator. The previous studies from Saudi Arabia have reported satisfaction on varying scales and in different domains. We assumed an overall satisfaction rate of 50% for calculation of sample size for our study. At 95% confidence level, 4% margin of error and a design effect of 2.0, the required sample size was 1200. Assuming a response rate of 60% we needed to invite at least 2000 participants to achieve required sample.

Sampling procedure

Convenience sampling was applied for selection of facilities and participants. Three private hospitals and fifty poly-clinics were approached for participant recruitment. After explaining the purpose of study and getting approval of administration, participants' contact numbers were obtained from the participating facilities. A total of 2,074 partici-pants were invited to participate and the link of the questionnaire was sent on their WhatsApp number.

Data collection procedure and instrument

Data was collected online using Google forms. Link of the questionnaire was sent on the participants' mobile number. After initial invitation, a reminder message was sent after one week from the first invitation. A semi-structured questionnaire was developed after review of the literature on the concept of patient satisfaction (1,12,17,18,22-24). The questionnaire contained 20 items divided into three sections. Questions in the first section collected information about patients' age, gender, nationality, educational level, monthly income, and health insurance. The second section collected information about the patients' satisfaction with the private health facilities. This section covered four dimensions which include: accessibility to the private health facility (two items), health facility (three items), waiting time (two items) and health care staff (five items). An additional two questions assessed overall satisfaction and likelihood of recommending the facility to others. The third section included an open-ended question about the rea-sons for the utilization of a private health facility. The assessment of patients' satisfaction was measured using a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree), where strongly agree was given a score of 5 and strongly disagree was given a score of 1.

The questionnaire was translated into Arabic by bilingual experts and then back translated to assess the validity. A pilot study was done before starting the data collection to assess the understandability and accuracy of translation. Analyses were carried out using Statistical Package for Social Sciences (SPSS) version 21.0. Frequencies and pro-portions of responses were calculated. Mean score out of five was calculated along with the standard deviation for each of the satisfaction items. To compare overall satisfaction across various socio-demographic variables, Mann Whitney-U, and Kruskal-Wallis tests were used as the distribution of response variable was skewed. We also conducted ordinal logistic regression to control for confounding of independent variables on each other. A P-value of less than 0.05 was considered statistically significant. Responses in the open-ended questions were coded and then presented as frequency and percentages.

Results

Out of 2,074 individuals invited, a total of 1,220 participants responded to this online survey giving a response rate of 58.8%. Characteristics of the study population are summarized in Table 1. A total of 1,220 patients responded to the questionnaire. Of them 943 (77%) were male. The age category 26 to 45 years comprised 76% of the respondents, whereas only two percent were more than 60 years. The majority of respondents were Saudi (95%). Nearly three quarters (71%) were government employees. Sixty percent of patients had a total monthly income between 5,000 and 15,000 Saudi Riyals. Most of the respondents did not have health insurance (85%).
The type of facilities utilized by respondents included private hospitals 38% (457), polyclinics 29% (357), dental clinics 28% (335) and eye clinics 6% (71). Departments visited and condition for which visit was made are presented in a supplementary table.

Patients' satisfaction with private health facilities
The mean score of the overall patients' satisfaction was 3.08 (±1.29) out of 5. About 525 of patients were satisfied (43%), 298 were neutral (25%) and 395 were dissatisfied with the private health facility (32%).

Table 2 shows the percentages distribution for each of the items on the patients' satisfaction questionnaire. A large percentage of respondents agreed that the working hours of the health facility were suitable (78%) and that the private health facility is accessible (64%). Less waiting time was reported by 52% of respondents. Fifty-three percent of the patients agreed that the private health facilities provided rapid health care services.

The private health facility staff were found to be respectful by 72% and had excellent communication by 64% of patients. The doctor-patient interaction was good; nearly two thirds of the patients agreed that the doctors ensured that the patients understood the instructions (62%) and the doctors involved the patients in their management plan (55%). About (49%) of the patients would recommend this private health facility to others.

Relationships between the patients' overall satisfaction and socio-demographic characteristics are presented in Table 3. It was found that patients' age, educational level, nationality, occupation, and income significantly predicted pa-tient satisfaction in the private health facility (p-value< 0.05). No statistical relationship was detected between pa-tients' gender, health insurance and satisfaction.

Reasons for visiting private health facilities
The patients were asked to identify their reasons for visiting the private health facility and the responses are shown in Figure 1. The most commonly reported reason for seeking health care in the private health facility was the long time to receive an appointment in governmental hospitals (29%), followed by good and rapid services in the private health facility (19%).

Table 1: Socio-demographic characteristics of the study population, Qassim, KSA 2019.

Characteristics	Frequency n(%)
Sex	
Male	943 (77.3)
Female	277 (22.7)
Age group (years)	
18-25	81 (6.6)
26-35	464 (38.0)
36-45	460 (37.7)
46-55	158 (13.0)
55-60	34 (2.8)
>60	23 (1.9)
Nationality	
Saudi	1163 (95.3)
Non-Saudi	57 (4.7)
Education	
<Secondary school	20 (1.6)
Secondary school	146 (12.0)
Diploma	320 (26.2)
Bachelor	574 (47.1)
Postgraduate	160 (13.1)
Occupation (n=1218)	
Government employee	862 (70.7)
Private employee	124 (10.2)
Freelancer	62 (5.1)
Student	44 (3.6)
Others	126 (10.3)
Patients' Resident	
Buraydah	581 (47.6)
Unizah	167 (13.7)
Alrass	129 (10.6)
Almithnaib	61 (5.0)
Albukaurayha	61 (5.0)
Aglatalsugoor	59 (4.8)
Albadayha	59 (4.8)
Alasyiah	45 (3.7)
Alnabhaniah	30 (2.5)
Aoun Aljawa	20 (1.6)
Algwarah	8 (0.7)
Total monthly income	
<5000 SR	222 (18.2)
5000-10,000 SR	342 (28.0)
11,000-15,000 SR	394 (32.3)
>15,000 SR	262 (21.5)
Health insurance	
Yes	180 (14.8)
No	1040 (85.2)

Table 2: Patients' satisfaction with private health facilities in Qassim, KSA 2019

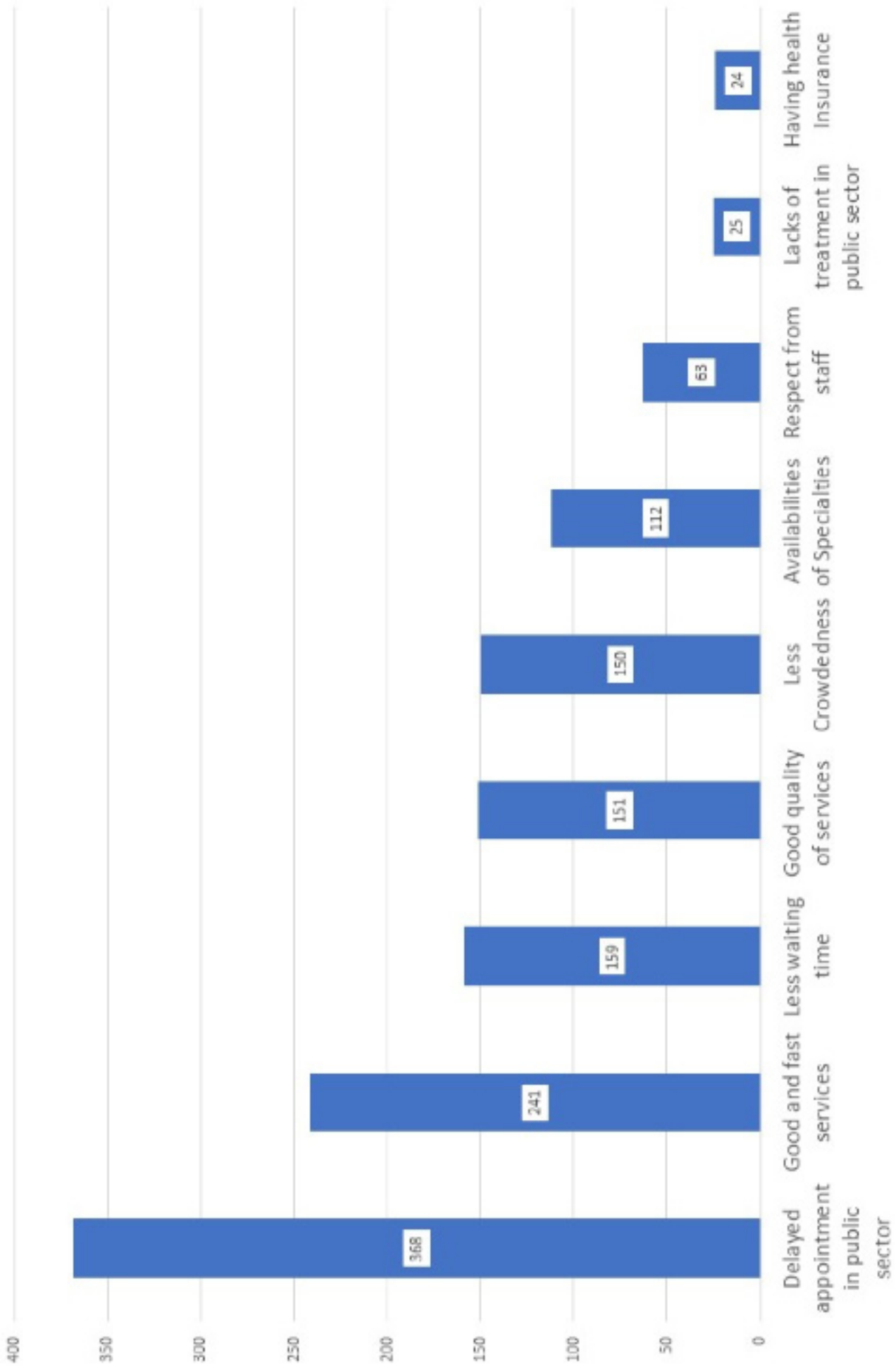
Dimension	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1	Total	Mean (±SD)
	n (%)	n (%)	n (%)	n (%)	n (%)	N	
Accessibility:							
Easy accessibility	302 (24.9)	477 (39.3)	79 (6.5)	215 (17.7)	142 (11.7)	1215	3.4 (±1.34)
Suitable working hours	379 (31.4)	563 (46.7)	63 (5.2)	139 (11.5)	62 (5.1)	1206	3.9 (±1.12)
Health Facility:							
I feel comfortable in the waiting room.	248 (20.4)	430 (35.4)	71 (5.8)	307 (25.3)	159 (13.1)	1215	3.2 (±1.57)
Less crowd	177 (14.6)	399 (32.8)	102 (8.4)	334 (27.5)	204 (16.8)	1216	3.0 (±1.36)
Uses the latest technology.	177 (14.6)	373 (30.7)	300 (24.7)	237 (19.5)	128 (10.5)	1215	3.2 (±1.21)
Waiting time:							
Less waiting time.	207 (17.0)	428 (35.2)	89 (7.3)	290 (23.9)	201 (16.5)	1215	3.1 (±1.38)
Facility provides rapid health services.	206 (16.9)	435 (35.7)	114 (9.4)	292(24.0)	170 (14.0)	1217	3.2 (±1.34)
Health providers and staff:							
Give respect and provide help	317 (26.1)	561 (46.1)	90 (7.4)	155(12.7)	94 (7.7)	1217	3.7 (±1.20)
Effective communication between clients and health staff	246 (20.2)	535 (43.9)	123 (10.1)	209 (17.2)	105 (8.6)	1218	3.5 (±1.23)
Doctors make sure that I understand instructions.	235 (19.3)	522(42.9)	101 (8.3)	226 (18.6)	132 (10.9)	1216	3.4 (±1.28)
Facility has professional doctors.	188 (15.5)	378 (31.2)	299 (24.7)	198 (16.4)	148 (12.2)	1211	3.2 (±1.24)
Doctor involve me in management plan	211 (17.4)	458 (37.7)	136 (11.2)	282 (23.3)	127 (10.5)	1214	3.2 (±1.28)
General Satisfaction							
Overall satisfaction	176(14.4)	349(28.6)	298(24.5)	190(15.6)	205(16.8)	1218	3.1 (±1.29)
I will recommend this facility to others	200 (16.5)	397 (32.8)	224 (18.5)	207 (17.1)	182(15.0)	1210	3.2 (±1.31)

Table 3: Patients' demographic characteristics and their association with the overall satisfaction with the private health facilities in Qassim, KSA 2019 (n=1218).

Variables	Total n (%)	Satisfied n (%)	Neutral n (%)	Dissatisfied n (%)	p-value*
Age group (years)					
18-25	80 (6.6)	25 (31.3)	22 (27.5)	33 (41.2)	
26-35	463 (38)	184 (39.7)	124 (26.8)	155 (33.5)	
36-45	460 (37.8)	215 (46.7)	104 (22.6)	141(30.7	**<0.057**
46-55	158 (13)	75 (47.5)	34 (21.5)	49 (31)	
56-60	34 (2.8)	13 (38.2)	9 (26.5)	12 (35.3)	
>60	23 (1.8)	13 (56.5)	5 (21.7)	5 (21.7)	
Gender					
Male	941 (77.3)	425 (43)	230 (24.4)	306 (32.5)	0.911
Female	277(22.7)	120 (43.3)	68 (24.5)	89 (32.1)	
Nationality					
Saudi	1161 (95.3)	486 (41.9)	290 (25)	385 (33.1)	**< 0.001**
Non-Saudi	57 (4.7)	39 (68.5)	8 (14)	10 (17.5)	
Educational level					
<Secondary school	19 (1.6)	7 (36.8)	4 (21.1)	8 (42.1)	
Secondary school	146 (12)	51 (34.9)	28 (19.2)	67 (45.9)	**< 0.001**
Diploma	320 (26.2)	159 (49.7)	83 (25.9)	78 (24.4)	
Bachelor	574 (47.1)	228 (39.7)	150 (26.1)	196 (34.2)	
Post-graduation	159 (13.1)	79 (49.7)	33 (20.8)	47 (29.5)	
Occupation					
Governmental employee	862 (70.8)	403 (46.7)	212 (24.6)	247 (28.7)	
Private employee	124(10.2)	49 (39.6)	22 (17.7)	53 (42.7)	**<0.001**
Free worker	62 (5.1)	23 (37.1)	18 (29)	21 (33.9)	
Student	44 (3.6)	18 (40.9)	8 (18.2)	18 (40.9)	
Others	126 (10.3)	32 (25.4)	38 (30.2)	56 (44.4)	
Total monthly income					
<5000 SR	221 (18.1)	69 (31.2)	53 (24)	99 (44.8)	
5000-10,000 SR	342 (28.1)	140 (40.9)	91 (26.6)	111 (32.5)	**<0.001**
11,000-15,000 SR	393 (32.3)	180 (45.8)	99 (25.2)	114 (29)	
>15,000 SR	262 (21.5)	136 (51.9)	55 (21)	71 (27.1)	
Health insurance					
Yes	179 (14.7)	85 (47.5)	33 (18.4)	61 (34.1)	0.567
No	1039 (85.3)	440 (42.3)	265 (25.5)	334 (32.1)	

*Mann Whitney-U or Kruskal-Wallis p-value

Figure 1: Reasons identified by patients about utilization of the private health facilities Qassim, KSA (n=1293)



Discussion

This survey was an attempt to assess the level of patients' satisfaction with the various aspects of health care in the private health facilities at Qassim region of Saudi Arabia. Patient satisfaction is a multi-dimensional concept, which is not only influenced by physician-related factors but also aspects of the patient's experience with the health facility.

In this survey, the overall satisfaction of patients with their private health facilities was 43%. This is much lower than reported in a multi-country survey in Eastern Mediterranean Region (EMRO) , which reported 100% of the diabetic patients in private sector were satisfied in Saudi Arabia (25). Ministry of Health, KSA has a regular program for examining the patient experience at public sector facilities. In the third quarter of 2019, overall satisfaction in the Qassim region was 71.4% which is much higher than the private sector in our study (12). Our results are comparable to the studies done in Tehran (45%) and Addis Ababa, Ethiopia(47.9%) (26,27), but lower than some earlier studies from Nigeria (83%) and (66.8%) (28,29).On a scale of five the mean overall satisfaction score was 3.1 (±1.29) in our study which is comparable to a recent study in Riyadh private health care organizations 3.14 (±1.24) (30). Studies about satisfaction in private health care facilities from Hail and Najran have reported slightly higher satisfaction on a scale of 5 i.e. 3.6 and 3.9 respectively compared to our study (18,20). These differences in the satisfaction scores can be attributed to differences in type of facilities included, tools used for assessment of satisfaction and population char-acteristics across the studies.

In our study, the highest satisfaction of the respondents was with working hours (3.9/5) followed by attitude of staff (3.7/5). This is different as compared to studies from Hail and Najran regions of Saudi Arabia where staff were rated highest while the convenience (working hours) were least rated among all dimensions (18,20). In our study, satisfaction with staff behavior was about 72% which is comparable to MoH facilities 73.8% (12). However, only 55% in our study participants were satisfied with physicians involving patients in management plan compared to 72% in public sector health facilities. Furthermore, satisfaction with explanation by the doctors was lower in our study 63% compared to 73% - 77% in a public sector hospital (12).

We found that the proportion of satisfied participants was highest in older age groups compared to young age groups. This finding is consistent with a study from Hail (18), while other studies from outside have reported no as-sociation of age with satisfaction (31,32). We found that non-Saudis were more satisfied than Saudi participants. This could be due to fact that expectations of expatriates may be lower than locals as most of the expatriates are from other developing countries where quality of health care is poor. Another study from Jeddah, KSA did not find a significant difference is satisfaction levels of Saudis and non-Saudi participants (33). In our study there was no significant difference in the satisfaction of those who are insured and those who are not insured. This finding is consistent with a study conducted in Riyadh, where no difference in satisfaction was observed with respect to insurance status of participants (30).This indicates that the satisfaction with services lies within therapeutic and non-therapeutic aspects of care delivery.

The main reasons for choosing the private health facilities reported by our study population included; long appointment time in governmental hospitals and good and rapid services in private facility. This finding is different than an earlier study from Riyadh, where the main reasons for selecting private outpatient clinics were cleanliness, location and staff courtesy followed by availability of modern equipment, less waiting time and appropriate working hours (17). Other investigators have reported that good doctors, previous experience and a familiar doctor in the facility were main reasons for selecting a private facility (34,35). This finding of our study could indicate that rating of staff is comparable between public and private hospitals, however workings hours and waiting time are more favorable in the private sector. This calls for Ministry of Health to re-design the service delivery in the region in terms of working hours such as extended hour services, evening clinics and improve appointment management systems to reduce waiting times.

This study is one of its kind in the country to assess the satisfaction with and reasons for choosing private health facilities. We included a large representative sample from Qassim region which is indicated by proportionate representation of participants from all districts of Qassim region. However, there are some limitations which need to be considered while interpreting the results of this study. First, data was collected through an online questionnaire which could eliminate patients of older ages who might have very limited access to technology. We assume that this limitation would have minimal effects on validity of our results as age distribution in our sample is almost similar to the general population composition. Second, participants in our study were limited to only those who visited emergency or outpatients departments in the private health facility. Thus, the results may not be generalizable to patients using inpatient services at private health facilities. Third, data was collected using self-administered questionnaire, which may affect the validity of the respondents. This, however is a minimal limitation given the high literacy rate in the Kingdom and in our sampled population. Furthermore, a validated translation of questionnaire was used for data collection. Finally, any comparison with other studies should be interpreted cautiously as the type of facilities, disease conditions and nature of disease could vary and affect the patients' satisfaction.

Conclusions

Patients reported reasonable satisfaction with private health facilities in Qassim. The highest satisfaction was with the working hours and the respect and help that they found from the staff. Patients' socio-demographic characteristics like age, nationality, educational status, income and occupation were associated with their overall satisfaction. The long waiting time for appointments in governmental

private health facilities. This calls for redesigning of public health care facilities in terms of working hours and managing appointments. Further studies with a larger sample size and a more representative sample of facilities and patients should be conducted to be able to get more valid and generalizable results of patient satisfaction in private health care facilities in the country.

Abbreviations:
EMRO: Eastern Mediterranean Region Office.
KSA: Kingdom of Saudi Arabia.
MoH: Ministry of Health.
PHC: Primary Health Care.
SPSS: Statistical Package for Social Sciences

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Documentation of paediatric observations in an urgent care setting; a Quality Improvement Project

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Abstract

Background: Children with seriously life-threatening illnesses in are rare in primary care and fever is one of the most common symptoms they present with. The NICE 2013 guideline on the management of a feverish child intended to improve outcomes. This study sought to identify the frequency of clinicians documenting paediatric observations

Methodology: Patients under 5 years presenting to an urgent care centre for face to face appointments were audited for a 7 day period looking to see which of the parameters from the NICE guideline were documented. Information regarding the NICE feverish child guideline was shared with colleagues and a re-audit was done after 3 months.

Results: Excluding circulation and temperature, the vital signs outlined in the NICE feverish child guidelines were infrequently measured by clinicians. A good improvement of measurements across the board was noted on re-audit 3 months later following educational information being shared in written format and informally circulated.

Conclusion: This quality improvement study supports existing research suggesting that GPs seldom rely on vital signs, particularly when assessing children who they do not think have a serious infection

Key words: NICE feverish child guideline, vital signs, paediatric observations

Introduction

Serious or life threatening illness in children in a primary care setting is thankfully rare. It has been reported that the prevalence of serious illness is 0.8% in primary care and 7.2% in secondary care (1). Early recognition and treatment of febrile children with serious infections improves prognosis, however, early detection can be difficult.

Fever is one of the most common symptoms among children presenting to primary care. Most of these children will have self-limiting viral infections and only a small number will have a serious illness (2). Thus it is important that guidance is available to help clinicians distinguish the many who have minor short-lived conditions from the occasional child with a serious or even life threatening infection.

The National Institute for Health and Clinical Excellence (NICE) 2013 guideline for the management of children with feverish illness is intended to give a guidance on the correct assessment and management of children and applies to a primary care setting (3).

The traffic light system developed only applies to feverish children under the age of 5. It includes to score a child on clinical features and signs that have already been extensively researched and are in use for the unwell child (4). The indication to refer children for more in depth investigation and further intense management is based on those who score 'red' on such features. The scoring is split into categories - 'colour', 'activity; 'respiratory', 'circulation and hydration' and 'temperature'.

There is a clear need for this quality improvement project in identifying how often each of these parameters are measured in a child presenting to an urgent care setting under the age of 5. Objective parameters guide clinicians in an urgent care setting. They face many unwell children with markers of acute illness and knowing these vital signs help guide them to how extensively a child is investigated and whether they are referred to secondary care.

We seek to identify the frequency of documentation of clinicians in each of the parameters highlighted in the NICE guideline in acutely unwell children under the age of 5.

Methodology

This study setting was in an 'out of hours' setting; an urgent primary care setting. Permission was sought and granted from the clinical director.

The criteria was to include all acutely unwell children aged 5 and under presenting to the clinic for face to face appointment to see a clinician in a one week period. Patients presenting with simple complaints such as medication queries or eczema were excluded from the study.

The objective when collecting information was to identify which of the parameters mentioned in the NICE guideline if any were measured. These were 'colour', 'activity; 'respiratory', 'circulation and hydration' and 'temperature'. If mention was made of these parameters either numerically or in free text it was noted. Note that temperature is not a separate entity in the NICE guideline but forms part of the 'other' category. In order to simplify the study and measure this component it was added as a category.

The interim goal was education and the reiteration of the importance of objectively measuring these parameters in children presenting acutely unwell to clinicians. To this effect information on this and the NICE guideline was circulated to all clinicians working in the urgent care setting. This was emphasised further with informal information sharing with colleagues.

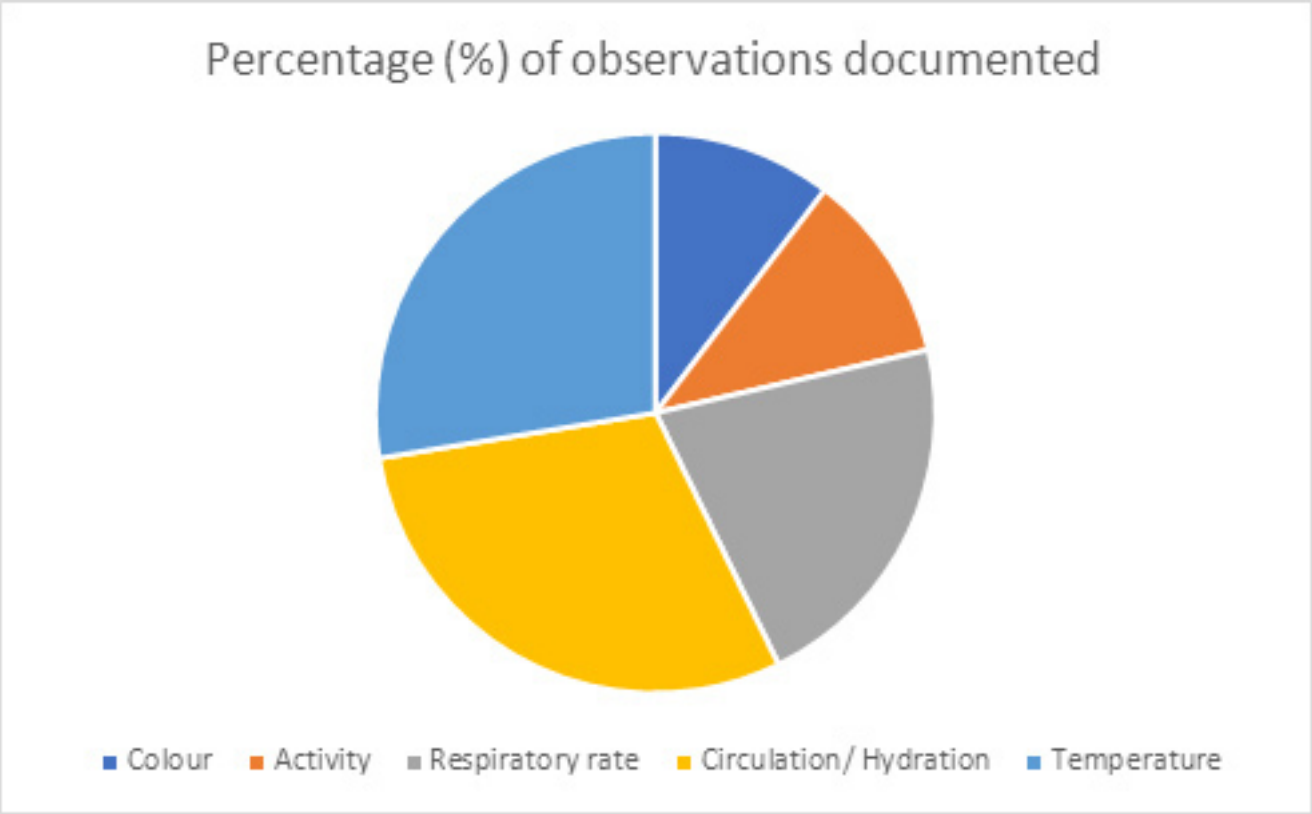
Data was shared via an emailing system. Clinicians were advised that a re-audit was going to take place after a period of time.

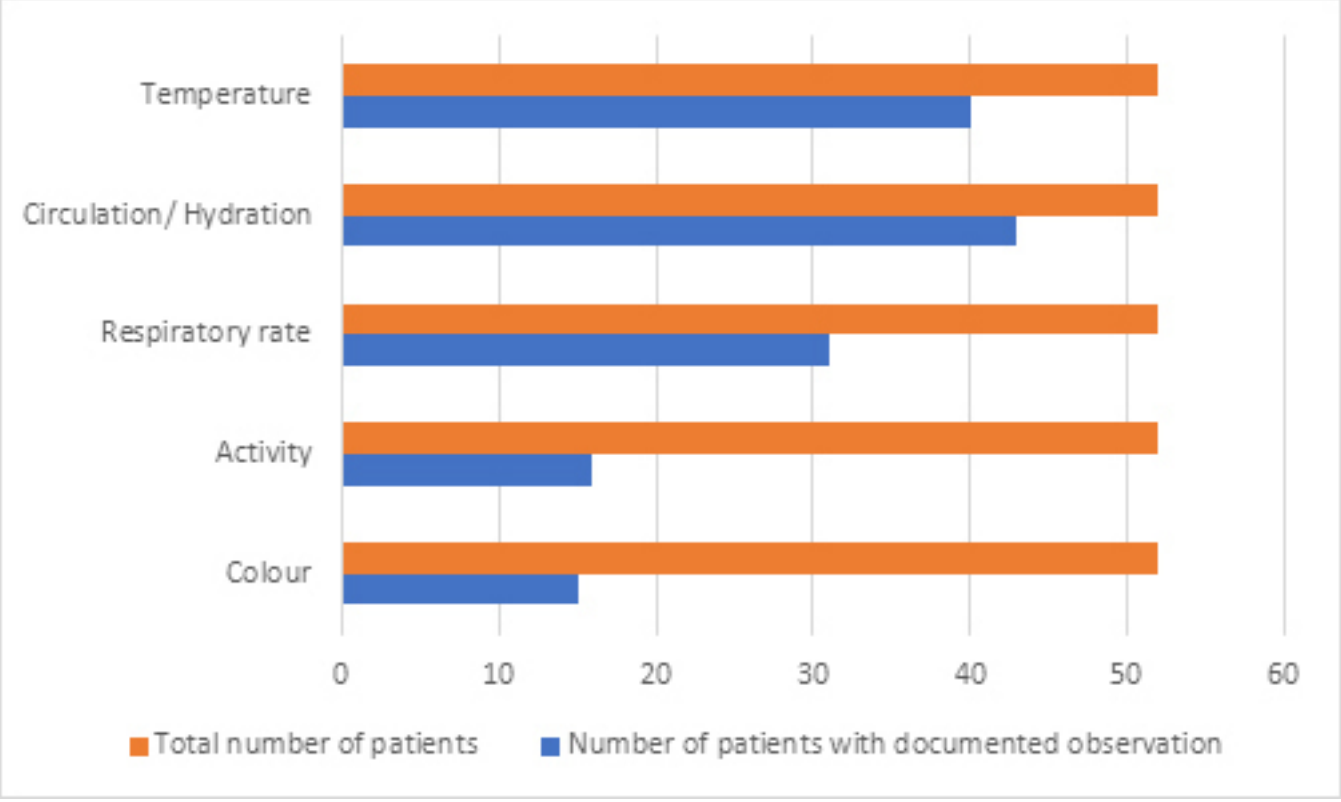
The re-audit was done after 3 months. No notice was given to clinicians that the re-audit was to commence. The same parameters were measured again for a one week period.

Results

52 patients were looked at in the first audit. Of those the most frequently documented observation was fever and heart rate or capillary refill time. Colour and activity were the least commented on.

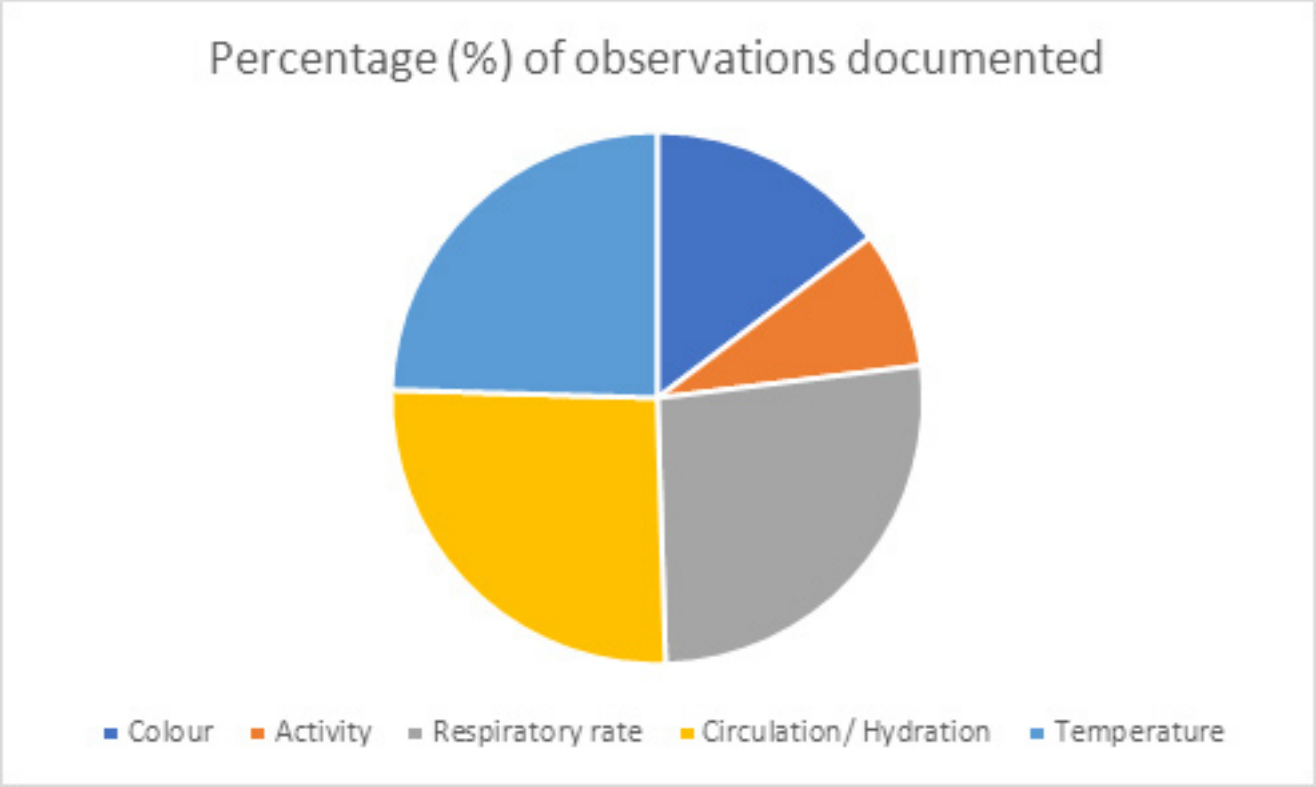
Colour	Activity	Respiratory rate	Circulation/hydration	Temperature
15	16	31	43	40

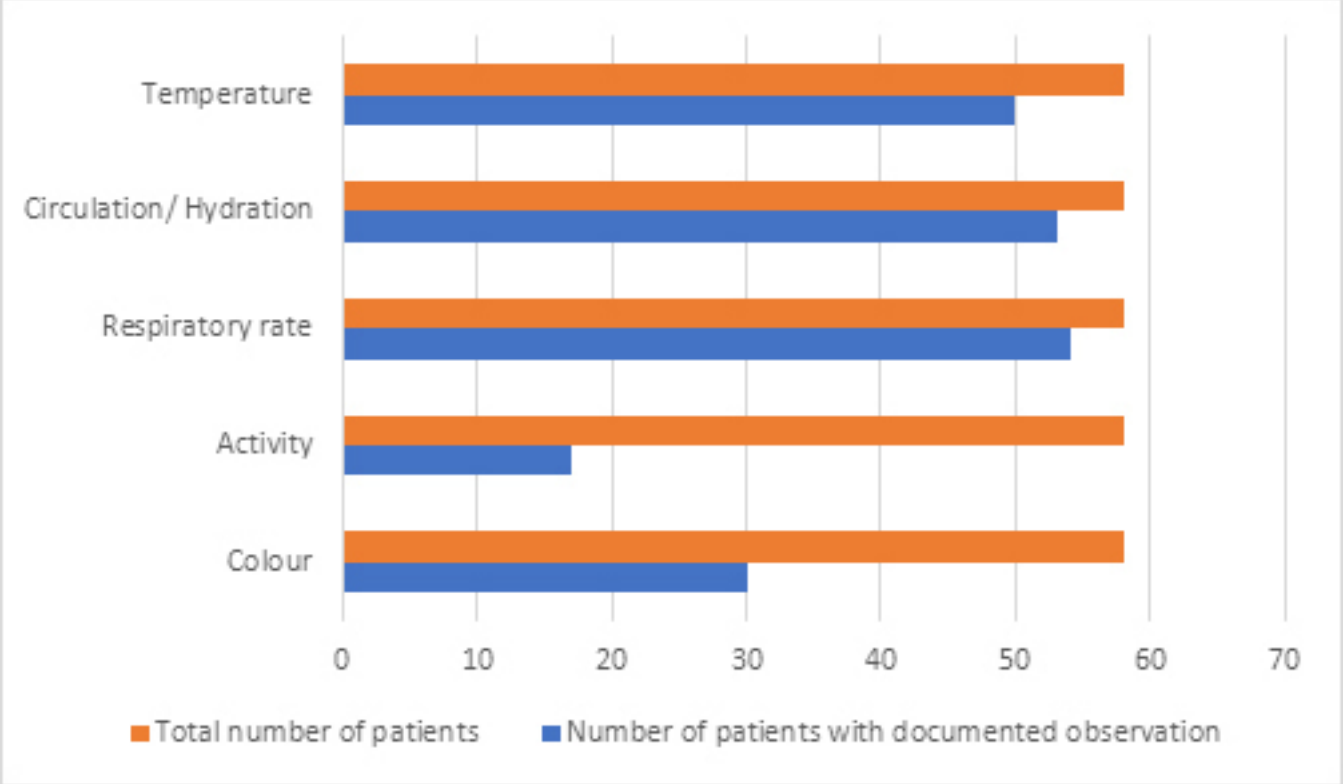




58 patients were collected in the second audit. There was an improvement across the board in documentation of all observations. Temperature, heart rate and respiratory rate were the most documented and activity was the least commented on.

Colour	Activity	Respiratory rate	Circulation/hydration	Temperature
30	17	54	53	50





Discussion

Summary of main findings

Excluding circulation and temperature, the vital signs outlined in the NICE feverish child guidelines were infrequently measured by clinicians. Information collated included written figures or free text. A good improvement of measurements across the board was noted on re-audit 3 months later following educational information being shared in written format and informally circulated.

This quality improvement study supports existing research suggesting that GPs seldom rely on vital signs, particularly when assessing children who they do not think have a serious infection (7).

Strengths and limitations of the study

The age group chosen reflects those targeted with the NICE guidelines. The urgent primary care setting was excellent as a good number of children were seen on a daily basis and so a direct comparison could be made in this quality improvement project. The out of hours setting chosen is recognised to provide a high standard of care and so is reflective of good general practice on a wider scale.

It was not possible in this short study to receive feedback from the clinicians as to why the recordings of vital signs was low particularly on the first audit.

The time frame was relatively short leaving a short window for change to take place. Conversely the improvement in vital sign recording could reflect that the information was fresh in their mind.

Only measurement of temperature from the category 'other' in the NICE framework was taken and formally recorded. This could limit the use of this study comparison to others looking at this particular guideline.

The objective of this study was not to look at the outcome of these measurements and thus this was not looked at.

Comparison with existing literature

It has been suggested by a previous study that vital signs are not routinely measured but clinicians feel they are more useful with children who look clinically unwell (5). This notion is not entirely unfounded as there is a study that showed that assessing feverish unwell children overall was a powerful indicator of serious illness (6). The NICE feverish child guideline followed in this study does give weight to activity and colour which are objective indicators which clinicians may be taking into consideration when making their assessment but perhaps not writing down.

The NICE feverish child guideline reviewed literature which indicated strong evidence that a fast respiratory rate was associated with serious illness as was a high fever, particularly in infants 6 months or younger (3). Interestingly it provided evidence from strong prospective studies showing that the overall sensitivity of prolonged capillary refill time for serious illness or dehydration was only 60%, but in children with a greater risk of serious disease (those with a petechial rash), a refill time ≥3 seconds was strongly associated with meningococcal disease (odds ratio 29). It also found that there was little evidence of heart rate being an indicator of serious illness but recommended it based on the Delphi consensus.

Implications for future research and clinical practice

The results from this study confirm existing research that General Practitioners in the UK do not measure vital signs in acutely unwell children (8). Some suggestions why this could be, range from equipment to time being obstacles in measuring these observations or that some clinicians may find subjective assessments such as a 'gut feeling' guiding them.

Measuring vital signs accurately can be problematic in a short GP consultation. An example of this is the measuring of respiratory rate which is recommended to be a full minute (9).

Previous studies have alluded to the fact that General Practitioners find the activity or behaviour of a child to be more useful when assessing how unwell a child is compared to other vital signs (7). A large prospective study in Belgium found that 'gut feeling' was a hugely important guideline in the assessment of a seriously ill child (10). The NICE feverish child guidance has taken this into account by highlighting 'colour' and 'activity' in the assessment.

We have found a good improvement on the objective measurement and documentation of the vitals highlighted in the NICE feverish child guideline following reiteration and re-education of colleagues using written and informal information sharing. Nevertheless a key aspect of diagnosis in general practice is assessing change over time. It is much easier to assess clinical change if objective measurements have been accurately made and recorded.

In conclusion, current practice is to measure vital signs infrequently, with the exception of circulation and temperature. If measurement of vital signs is to become an accepted part of the good clinical care of children, then accurate measurement techniques and evidence for their diagnostic value in primary care are needed.

The existing evidence supports the diagnostic value of global assessment, and we suggest that this also should continue to be assessed and documented during assessments of unwell children.

Appendix

NICE National Institute for Health and Care Excellence

Traffic light system for identifying risk of serious illness*

	Green – low risk	Amber – intermediate risk	Red – high risk
Colour (of skin, lips or tongue)	• Normal colour	• Pallor reported by parent/carer	• Pale/mottled/ashen/ blue
Activity	• Responds normally to social cues • Content/smiles • Stays awake or awakens quickly • Strong normal cry/not crying	• Not responding normally to social cues • No smile • Wakes only with prolonged stimulation • Decreased activity	• No response to social cues • Appears ill to a healthcare professional • Does not wake or if roused does not stay awake • Weak, high-pitched or continuous cry
Respiratory		• Nasal flaring • Tachypnoea: – RR >50 breaths/ minute, age 6–12 months – RR >40 breaths/ minute, age >12 months • Oxygen saturation ≤95% in air • Crackles in the chest	• Grunting • Tachypnoea: RR >60 breaths/minute • Moderate or severe chest indrawing
Circulation and hydration	• Normal skin and eyes • Moist mucous membranes	• Tachycardia: – >160 beats/minute, age <12 months – >150 beats/minute, age 12–24 months – >140 beats/minute, age 2–5 years • CRT ≥3 seconds • Dry mucous membranes • Poor feeding in infants • Reduced urine output	• Reduced skin turgor
Other	• None of the amber or red symptoms or signs	• Age 3–6 months, temperature ≥39°C • Fever for ≥5 days • Rigors • Swelling of a limb or joint • Non-weight bearing limb/not using an extremity	• Age <3 months, temperature ≥38°C • Non-blanching rash • Bulging fontanelle • Neck stiffness • Status epilepticus • Focal neurological signs • Focal seizures

CRT, capillary refill time; RR, respiratory rate

This traffic light table should be used in conjunction with the recommendations in the guideline on investigations and initial management in children with fever. See http://guidance.nice.org.uk/CG160 (update of NICE clinical guideline 47).

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Public Awareness, and Perception towards Chronic Kidney Disease and its Risk Factors in Southern Region, Saudi Arabia

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Abstract

Background: Worldwide, CKDs are the 12th cause of death and the 17th cause of disability, respectively. About 10-13% of the general population had one of the chronic kidney diseases counting more than 500 million persons worldwide. Early diagnosis and treatment of CKD will play an important role in delaying CKD progression [12].

Aim: The current study aims to determine the prevalence and awareness of CKD among the general population and its determinants in Southern region of Saudi Arabia.

Methods: A descriptive cross-sectional approach was used targeting all accessible population in Southern Saudi Arabia (including four regions, Aseer region, Albaha region, Najran region, and Jazan region), aged18 years or more and accepting to participate in the study. Data were collected from participants using an online pre-structured questionnaire. The questionnaire covered the following data: participants' socio-demographic data, participants' awareness, and participants' perception towards CKDs, preventive measures and risk. The questionnaire was uploaded online using social media platforms by the researchers and their friends during the period from 20 March 2021 to 20 June 2021.

Results: A total of 1317 participants fulfilling the inclusion criteria completed the study questionnaire. Participants' ages ranged from 18 to 69 years with a mean age of 34.1 12.9 years old. Exactly 255 (19.4%) reported that they had a family member with CKD and 130 (9.9%) of the study respondents had DM, 98 (7.4%) had hypertension, while 20 (1.5%) complained of CKD. Exactly 93% of the study participants had heard about CKDs and 80.8% correctly defined the diseases as a kidney condition that was unable to filter waste, toxins, and fluids from the body. A total of 84.3% reported that chronic kidney disease progresses to kidney failure and 42.9% agreed that chronic kidney disease may not have any symptoms until advanced. The most reported source of knowledge were social media (56%), followed by mass media (22.3%), work (22.1%), books (20.3%), health education campaigns (15.8%), and others (31%).

Conclusion: In conclusion, the current study revealed that public awareness in Southern region of Saudi Arabia about CKD and its risk factors is low in contrast to their perception towards the disease and its associated risk. Having information from scientific sources such as books, health education campaigns or study was associated with high awareness level.

Key words: Chronic kidney disease, awareness, perception, population, Saudi Arabia, risk factors

Introduction

Chronic kidney disease (CKD) is a gradual loss of kidney function for more than 3 months (1-3). CKD is a silent disease where the patient will not be aware of the kidney disease until they have lost 90% of their kidney function. Given this, increasing awareness of CKD will encourage high risk patients to have regular screening done. Early detection of CKD allows proper management that could slow down CKD progression, prevent cardiovascular and other comorbidities and enable timely initiation of dialysis (4-7).

Globally, CKDs are the 12th cause of death and the 17th cause of disability, respectively (8). About 10-13% of the general population has one of the chronic kidney diseases counting more than 500 million persons worldwide (9, 10). Lately, the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) classified low glomerular filtration rate (GFR) as the 12th leading risk factor for death in general, and the 14th risk factor for Disability-Adjusted Life-Years (DALYs) among 79 risk factors in 2013 (8, 11).

Early discovery and therapy of CKD in its early stages have a significant role in the prevention or postponing of disease progression (12). Many clinical practice guidelines for CKD advise screening of people with high risk for CKD (13, 14) and numerous screening curricula have been performed worldwide to find general population with early stages of CKD (15). Unfortunately, chronic kidney disease is "under-diagnosed" and "under-treated" resulting in decreased chances for prevention. Lack of appropriate and precise definition and classification of stages in the progression of chronic kidney disease stands behind that lost diagnosis. A clinically relevant classification is based mainly on laboratory assessment of the severity of kidney disease, correlation of stage of kidney function with complications, and stratification of risks for loss of kidney function and development of cardiovascular disease (16, 17).

Public awareness regarding CKD is an important predictor for undergoing screening programs which is the main strategy to rule in and minimize the CKD burden (18, 19). Assessing the public awareness of CKD is a cornerstone for health care planners, researchers, and kidney health organizations for establishing a proper health education campaign. The study aims to determine the prevalence and awareness of CKD among the general population and its determinants in Southern region of Saudi Arabia.

Methodology

A descriptive cross-sectional approach was used targeting all accessible population in Southern Saudi Arabia (including four regions, Aseer region, Albaha region, Najran region, and Jazan region) aged 18 years or more and accepting to participate in the study. A total of 1,596 individuals received the study survey. Exactly 1,317 respondents were eligible and completed the study questionnaire with a participation rate of 82.5%. After obtaining permission from the Institutional ethics committee, data collection started. Data were collected from participants using an online pre-structured questionnaire. The researchers constructed the survey tool after intensive literature review and expert's consultation. The tool was reviewed using a panel of 3 experts for validation and applicability. Tool reliability was assessed using a pilot study of 35 participants with reliability coefficient (α-Cronbach's) of 0.78 for awareness items. The questionnaire covered the following data: participants' socio-demographic data like age, gender, education, work and monthly income. The second section covered participants' medical history and family history of CKDs. The third part covered participants' awareness using multiple responses and mutually exclusive questions. The fourth part covered participants' perception towards CKDs, preventive measures and risk. The questionnaire was uploaded online using social media platforms by the researchers and their friends during the period from 20 March 2021 to 20 June 2021. All accessible and eligible population in the study setting were invited to fill the attached tool.

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 knowledge and awareness items, each correct answer was scored one point and total summation of the discrete scores of the different items was calculated. A patient with score less than 60% (0-16 points) of the total score was considered to have poor awareness while good awareness was considered if they had a score of 60% (17 points or more) of the total or more. Descriptive analysis based on frequency and percentage distribution was done for all variables including participants socio-demographic data, family and personal history of chronic kidney diseases, and source of information regarding chronic kidney diseases. Also, participants' awareness regarding CKDs, risk factors, disease nature, risk factors, and diagnosis methods were shown in frequency tables. Frequency distribution for participants' perception regarding CKDs was also tabled. Cross tabulation was used to assess distribution of public awareness level regarding CKDs according to their personal data, disease history, and source of information. Relations were tested using Pearson chi-square test and exact probability test for small frequency distributions.

Results

A total of 1,317 participants fulfilling the inclusion criteria completed the study questionnaire. Participants' ages ranged from 18 to 69 years with mean age of 34.1 12.9 years old. Exactly 944 (71.7%) were females and 723 (54.9%) were married while 549 (41.7%) were single. As for educational level, 1,021 (77.5%) had university level of education or above and 260 (19.7%) had secondary level of education. Considering work, 390 (29.6%) were not working or retired while 436 (33.1%) were non-health care workers and only 94 (7.1%) were health care workers. Exactly 255 (19.4%) reported that they had a family member with CKD and 130 (9.9%) of the study respondents had DM, 98 (7.4%) had hypertension, while 20 (1.5%) complained of CKD (Table 1).

Table 1. Bio-demographic data of study participants, Southern Saudi Arabia

Bio-demographic data	No	%
Age in years		
18-34	695	52.8%
35-44	309	23.5%
45-64	285	21.6%
65+	28	2.1%
Gender		
Male	373	28.3%
Female	944	71.7%
Marital status		
Single	549	41.7%
Married	723	54.9%
Divorced / widow	45	3.4%
Educational level		
Below secondary	36	2.7%
Secondary	260	19.7%
University/ above	1021	77.5%
Work		
Not working / retired	390	29.6%
Student	397	30.1%
Non-health care worker	436	33.1%
Health care worker	94	7.1%
Monthly income		
< 3000 SR	581	44.1%
3000-6000 SR	191	14.5%
6000-10000 SR	183	13.9%
> 10000 SR	362	27.5%
Family history of CKD		
Yes	255	19.4%
No	1062	80.6%
Have chronic diseases?		
None	1038	78.8%
DM	130	9.9%
HTN	98	7.4%
CKD	20	1.5%
Autoimmune disease	17	1.3%
Others	100	7.6%

Table 2. Awareness regarding chronic kidney disease and its Risk Factors in Southern Region of Saudi Arabia. Exactly 93% of the study participants had heard about CKDs and 80.8% correctly defined the diseases as a kidney condition that was unable to filter waste, toxins, and fluids from the body. A total of 84.3% reported that chronic kidney disease progresses to kidney failure and 42.9% agreed that chronic kidney disease may not have any symptoms until advanced. As for symptoms, the most reported were tiredness (61.6%), followed by poor appetite (32.6%), difficulty sleeping (27.3%), itchy skin (21.7%), and shortness of breath (21.5%). Exactly 87.6% of the study participants agreed that treatments for kidney failure include kidney transplant and dialysis, 83.3% know that dialysis for renal failure is to remove toxins, and 88.5% said adherence to treatment strategy will help people to live healthily. As for risk factors, the most identified diseases were kidney diseases like stones or infections (67.8%), followed by cardiomyopathy (67.8%), hepatic failure (56%), DM (43.7%), hypertension (43.2%), obesity (36.1%), and autoimmune diseases (24.8%). Considering drugs that may cause CKDs, NSAIDs were the most identified (42%), followed by antibiotics (37.7%), diuretics (22.2%), antidiabetics (17.8%), antipsychotics (13.7%), and anticoagulants (10.6%). Exactly 50.3% of the participants agreed that Family members with kidney disease increase risk for CKD, 36.9% reported that kidney disease is diagnosed with a simple blood test, and 34.4% know that Glomerular filtration rate is a measure for functioning kidney.

Table 2. Awareness regarding chronic kidney diseases and its Risk Factors in Southern Region of Saudi Arabia

Awareness items		No	%
Heard about CKD	Yes	1225	93.0%
	No	92	7.0%
CKD is?	kidney condition that is unable to filter waste, toxins, and fluids from body	1064	80.8%
	Inflammation / infection of kidney	62	4.7%
	Kidney stones	44	3.3%
	Don't know	147	11.2%
Chronic kidney disease progresses to kidney failure	Yes	1110	84.3%
	No	9	.7%
	Don't know	198	15.0%
Chronic kidney disease may not have any symptoms until advanced	Yes	565	42.9%
	No	262	19.9%
	Don't know	490	37.2%
If symptomatic, what could be the symptoms?	Tiredness	811	61.6%
	Poor appetite	430	32.6%
	Difficulty sleeping	360	27.3%
	Itchy skin	286	21.7%
	Shortness of breath	283	21.5%
	Don't know	481	36.5%
Treatments for kidney failure include kidney transplant and dialysis	Yes	1154	87.6%
	No	16	1.2%
	Don't know	147	11.2%
Dialysis for renal failure to remove toxins	Yes	1097	83.3%
	No	38	2.9%
	Don't know	182	13.8%
Adherence to treatment strategy will help people to live healthy	Yes	1165	88.5%
	No	16	1.2%
	Don't know	136	10.3%
Do you think the following disorders could be a risk factor for having CKD?	Kidney diseases	893	67.8%
	Cardiomyopathy	893	67.8%
	Hepatic failure	738	56.0%
	DM	576	43.7%
	Hypertension	569	43.2%
	Obesity	475	36.1%
	Autoimmune diseases	327	24.8%
	Don't know	217	16.5%
Do you think the following medications could be a risk factor for having CKD?	NSAIDs	553	42.0%
	Antibiotics	496	37.7%
	Diuretics	293	22.2%
	Antidiabetics	234	17.8%
	Antipsychotics	180	13.7%
	Anticoagulants	140	10.6%
	Don't know	505	38.3%
Family members with kidney disease increase risk for CKD	Yes	662	50.3%
	No	169	12.8%
	Don't know	486	36.9%
Kidney disease is diagnosed with a simple blood test	Yes	486	36.9%
	No	270	20.5%
	Don't know	561	42.6%
Glomerular filtration rate is a measure for functioning kidney	Yes	452	34.3%
	No	17	1.3%
	Don't know	848	64.4%

Figure 1. Overall awareness level regarding CKD and its Risk Factors in Southern Region of Saudi Arabia. Exactly 377 (28.6%) participants had good awareness level regarding CKDs while 940 (71.4%) had poor awareness level.

Figure 2. Source of knowledge regarding CKD and its Risk Factors in Southern Region of Saudi Arabia. The most reported sources of knowledge were social media (56%), followed by mass media (22.3%), work (22.1%), books (20.3%), health education campaigns (15.8%), and others (31%).

Figure 1. Overall awareness level regarding CKDs and its Risk Factors in Southern Region of Saudi Arabia

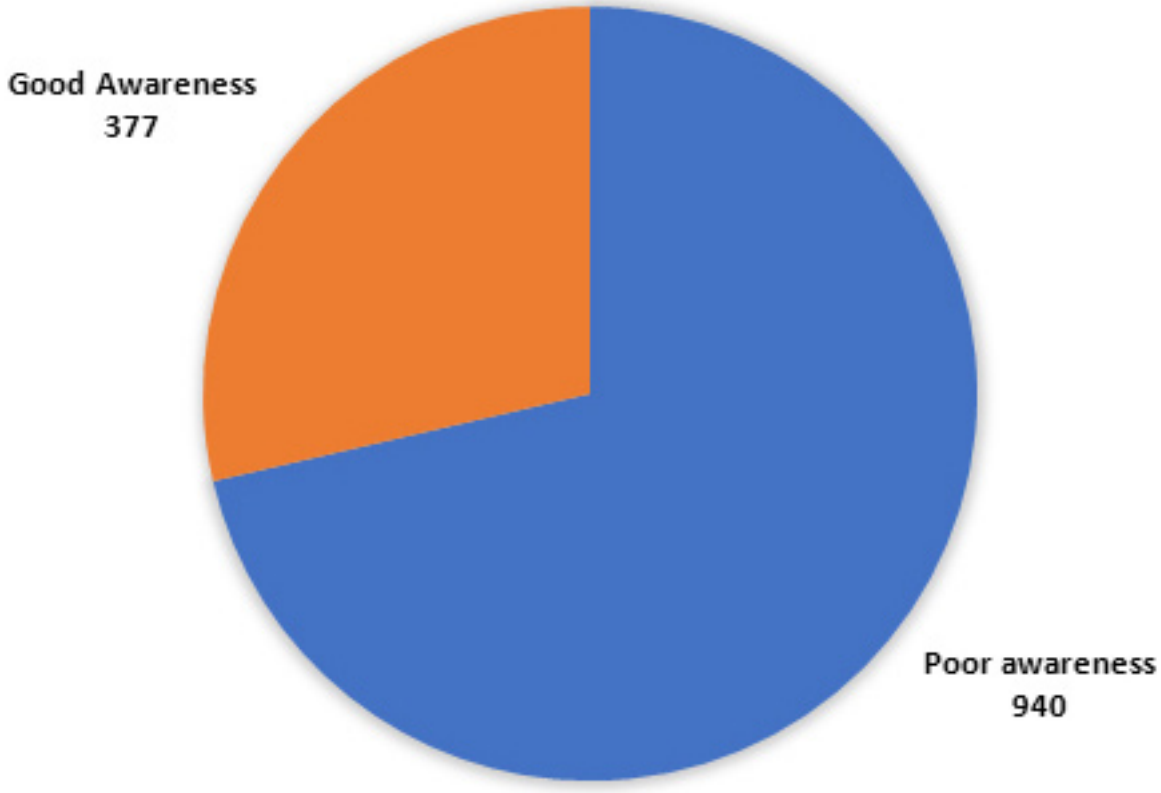

Figure 2. Source of knowledge regarding CKD and its Risk Factors in Southern Region of Saudi Arabia

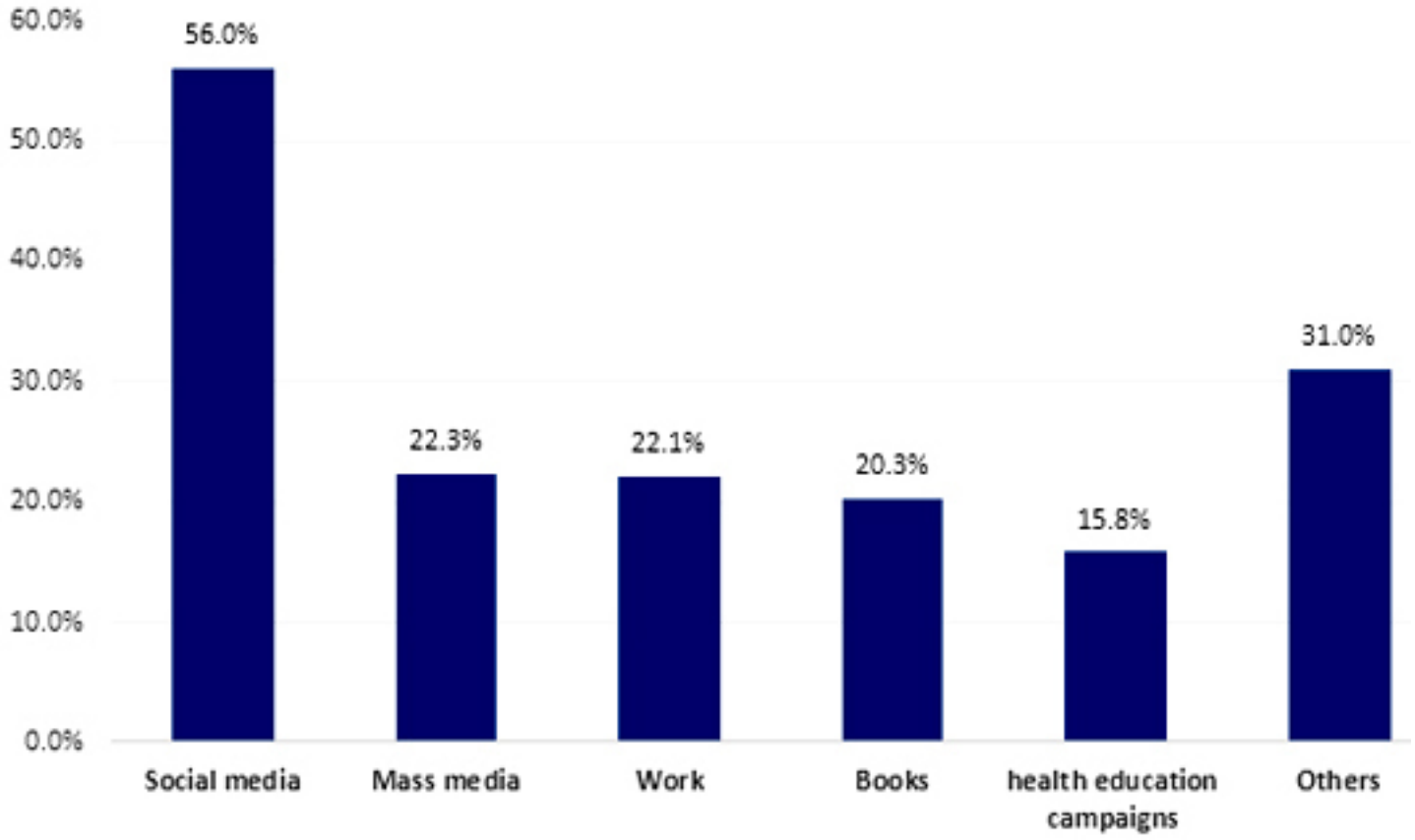

Table 3. Distribution of participants awareness level regarding CKDs by their bio-demographic data

Factors	Knowledge level				p-value
	Poor (0-16)		Good (17-27)		
	No	%	No	%	
Age in years					
18-34	477	68.6%	218	31.4%	
35-44	239	77.3%	70	22.7%	.011*
45-64	208	73.0%	77	27.0%	
65+	16	57.1%	12	42.9%	
Gender					
Male	262	70.2%	111	29.8%	.567
Female	678	71.8%	266	28.2%	
Marital status					
Single	363	66.1%	186	33.9%	.001*
Married	546	75.5%	177	24.5%	
Divorced / widow	31	68.9%	14	31.1%	
Educational level					
Below secondary	29	80.6%	7	19.4%	.083
Secondary	197	75.8%	63	24.2%	
University/ above	714	69.9%	307	30.1%	
Work					
Not working / retired	307	78.7%	83	21.3%	
Student	255	64.2%	142	35.8%	.001*
Non-health care worker	332	76.1%	104	23.9%	
Health care worker	46	48.9%	48	51.1%	
Monthly income					
< 3000 SR	415	71.4%	166	28.6%	
3000-6000 SR	143	74.9%	48	25.1%	.478
6000-10000 SR	133	72.7%	50	27.3%	
> 10000 SR	249	68.8%	113	31.2%	
Family history of CKD					
Yes	158	62.0%	97	38.0%	.001*
No	782	73.6%	280	26.4%	
Have chronic diseases?					
None	752	72.4%	286	27.6%	
DM	87	66.9%	43	33.1%	
HTN	66	67.3%	32	32.7%	.170$
CKD	15	75.0%	5	25.0%	
Immunosuppressive disease	13	76.5%	4	23.5%	
Others	63	63.0%	37	37.0%	
Source of information					
Social media	505	71.6%	200	28.4%	
Health education / campaigns	115	57.8%	84	42.2%	
Mass media	185	65.8%	96	34.2%	.001*$
Books	110	43.1%	145	56.9%	
Work	135	48.6%	143	51.4%	
Others	302	77.4%	88	22.6%	

P: Pearson X2 test $ Exact probability test * P < 0.05 (significant)

Table 3. Distribution of participants awareness level regarding CKDs by their bio-demographic data. Good awareness level regarding CKDs was detected among 42.9% of old aged participants compared to 31.4% of those who were aged 18-34 years with detected statistical significance (P=.011). Also, 33.9% of single participants had good awareness level versus 24.5% of the married group (P=.001). Good awareness was also detected among 51.1% of health care workers in comparison to 21.3% of non-working group (P=.001). Exactly 38% of participants with a family history of CKDs had good awareness level compared to 26.4% of others without (P=.001). Also, 56.9% of participants who had their information from books had good awareness versus 42.2% who reported for health education and 22.6% of those from other sources (P=.001).

Table 4. participants' perception towards chronic kidney disease and its Risk Factors in Southern Region of Saudi Arabia. Exactly 90.7% of the study participants agreed that they will go to a health facility if they have signs of kidney disease, 89.4% agreed that early detection of CKD is important to slow its progress, 76.9% reported that chronic kidney disease carries high risk of death, 75.6% think that it is possible to prevent chronic kidney disease. Only 46.2% think that is not too expensive to have a kidney screening test.

Table 4. participants' perception towards chronic kidney diseases and its Risk Factors in Southern Region of Saudi Arabia

Perception items	Disagree		Neutral		Agree	
	No	%	No	%	No	%
Kidney function test is necessary though there is no sign of CKD	112	8.5%	248	18.8%	956	72.6%
It is not too expensive to have a kidney screening test	190	14.7%	505	39.1%	596	46.2%
Chronic kidney disease carries high risk of death	71	5.4%	233	17.7%	1012	76.9%
I will go to a health facility if I have signs of kidney disease	38	2.9%	85	6.5%	1193	90.7%
It is possible to prevent chronic kidney disease	77	5.9%	244	18.5%	995	75.6%
Early detection of CKD is important to slow its progress	44	3.3%	95	7.2%	1177	89.4%

Discussion

Early detection and treatment of CKD is an important reliever of associated high economic and public health burden (20). Recently, there has been a necessity for a transition from costly hospital-based intervention to a less expensive approach with the highest health benefits and economic value of preventive measures, particularly, when applied early (21). And since lifestyle and environmental factors influence the major risk factors of CKD, population-based preventive strategies appear the cheapest and best solution. Improving awareness regarding health issues enhances health behaviour, (22) with assessing the elements of health influences positively on beneficial management of kidney disease (23). Awareness and perception of CKD with its related risk factors improves risk perception and obtainability for screening for early diagnosis (24). This provides opportunities for early treatment; reduces morbidity, mortality, and health care costs. Low level of awareness is associated with lower perceived susceptibility to CKD (25). Disease prevention by improving awareness and risk factors would add value to the quality of life and increase productivity (26). The current study aimed to assess the public awareness, and perception towards CKD and its risk factors in Southern Region of Saudi Arabia. Also, to detect participants' awareness determinants and related factors.

The study results showed that more than one quarter of the study participants (28.6%) had good awareness level regarding CKD and its related risk factors. The vast majority of the participants (93%) had heard about CKDs and more than three quarters (80.8%) correctly defined the diseases as a kidney condition that is unable to filter waste, toxins, and fluids from the body. As for disease progression and nature, more than three quarters (84.3%) correctly knew that chronic kidney disease progresses to kidney failure but less than half of them (42.9%) knew that chronic kidney disease may not have any symptoms until advanced. Considering symptoms, the most reported were tiredness which was known by two thirds of the participants, followed by poor appetite (32.6%), difficulty sleeping (27.3%), itchy skin (21.7%), and shortness of breath (21.5%). With regard to treatment approaches for CKDs, the highest portion (87.6%) of the study participants correctly defined those treatments for kidney failure include kidney transplant and dialysis, and they know that dialysis for renal failure to remove toxins and adherence to treatment strategy will help people to live healthilyy. Regarding risk factors, high awareness was detected for some diseases including kidney diseases like stones or infections, cardiomyopathy, and hepatic failure while DM, hypertension, and obesity were known for less than half of the participants but less than one quarter reported for autoimmune diseases. As for drugs that may cause CKDs, NSAIDs were the most identified (42%), followed by antibiotics (37.7%), diuretics (22.2%), and antidiabetics. About half of the participants correctly know that family members with kidney disease increase risk for CKD, while one third reported that kidney disease is diagnosed with a simple blood test, and know that Glomerular filtration rate is a measure for functioning kidney. Awareness level was significantly higher among young aged and old aged participants than others at their middle age. Also, participants with positive family history for CKDs had higher awareness besides those who work in the health care field. Considering source of information, social media had the upper hand among participants followed by mass media and work place.

Similar studies showed different levels of public awareness regarding CKDs. In Nigeria, Oluyombo R et al (27), found that about 34% of community participants had heard of kidney disease with 59.3% from the media and 35.3% from health workers. The level of knowledge of CKD was good in 27.1%. About two thirds do not know the correct location of the kidneys. Only 24.5% know that NSAIDs cause higher risk of kidney disease. A laboratory test for kidney function was known by 4.4%; 45.9% and 47.8% think that CKD can be cured by spiritual means and herbal concoctions respectively. In Australia, Gheewala PA et al (28), assessed that the median CKD knowledge scores of the public was 12 out of 24 (50%). In Iran, a lower level of knowledge regarding CKD was detected were 10.4% knew that CKD could be asymptomatic in the initial stages. Only 12.7% knew diabetes and 14.4% knew hypertension was a CKD risk factor (29). In the United States (US), the awareness of CKD among people with low glomerular filtration rate was 24.3% (30), while in Australia, only 2.8% and 8.6% of the population studied were able to cite hypertension and diabetes respectively as risk factors of CKD (31). In a study among African Americans, only 23.7% knew at least one laboratory test for kidney disease and <3.0% agreed that CKD is an important health condition (32). In Saudi Arabia, Alobaidi S et al (33), estimated that the mean (SD) kidney disease knowledge score of the study population was 11.99 (± 4.70), with scores ranging from 0 to 22. 42.9% of the respondents had knowledge scores less than 11. Another study was conducted by Alateeq FAS et al (34), and concluded that the awareness towards CKD manifestation is relatively low, which necessitates the important of community-based intervention including health educational programs.

Regarding perception towards CKDs and its related risk factors, the current study showed that the vast majority (90.7%) of the study participants agreed that they will go to a health facility if they have signs of kidney disease, and 89.4% agreed that early detection of CKD is important to slow its progress. As for complications and risk of CKDs, about three quarters see that chronic kidney disease carries high risk of death, and also think that it is possible to prevent chronic kidney disease. Less than half of the participants think that it is not too expensive to have a kidney screening test.

Conclusions and recommendations

In conclusion, the current study revealed that public awareness in Southern Saudi Arabia about CKD and its risk factors is low in contrast to their perception towards the disease and its associated risk. Having information from scientific sources such as books, health education campaigns or study was associated with high awareness level. Periodic public health education campaigns about kidney health and associated risk factors for CKDs should be recommended in the Saudi community. Also, application of continuous community-based screening programs mostly reduces the burden of CKD, as well as, increases the level of public awareness.

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Quality of life for Cardiovascular Patients in Saudi Arabia

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Abstract

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Background: Cardiovascular diseases (CVD) are a global issue bearing a heavy burden of illness. The studies conducted on the quality of life for Cardiovascular patients is still limited in Saudi Arabia. The current study aims to investigate Quality of life for Cardiovascular Patients in Saudi Arabia 2020. We want to assess the quality of life for cardiac patients and its connection with certain factors.

Objectives: assess the extent of effect of mental and physical wellbeing and social relations on the quality of life of patients with cardiovascular disease .

Methods: It was a descriptive cross sectional study of all adults Saudi patients who had cardiovascular diseases or who had cardiac surgery at least for the previous 5 years, performed between February 2021 And December 2021 at different regions in Saudi Arabia. We used a form of online survey SF-36 that was distributed through the network.

Results: 470 participants were included in the study; 47.9% females and 52.1% males. Overall, female, divorced, high BMI, patients with co-morbidities, patients aged above 55 years, patients who have low education level and the patients who were working in the non-health sector showed poor quality of life compared to other participants.

Conclusion: Recognizing the factors that lower the quality of life for cardiovascular patients in the Saudi community is important and essential to address their needs and give better Quality of Life.

Key words : Quality of life, Cardiovascular diseases, Cardiac surgery, Saudi Arabia, survey SF-36.

List of abbreviations:
(CVD): Cardiovascular diseases
(CHD): Coronary Heart Disease
(QoL): Quality of life
(HRQoL): Health-Related Quality of Life
(BMI): Body Mass Index

Introduction

Cardiovascular diseases (CVD) are a global issue bearing a heavy burden of illness and it's prevalence in KSA was 5.5%, recorded by the only nationally representative research conducted in Saudi Arabia[1]. The World Health Organization (WHO) defined CVD as a general term for a group of disorders that affect the heart and blood vessels[2]. Patients with CVD experience severe physical and mental consequences [3]. Traditional outcome indicators such as morbidity and mortality are not adequate to determine the benefits of medical treatment for chronic diseases such as CVD [4].This is because functional ability, psychological status, and social interaction are not measured by traditional measures [5]. The health-related quality of life (HRQoL) is widely used as an indicator of the outcome of CVD and it includes measurements of physical, mental, emotional and social functioning. Several studies have reported the relevance of HRQoL to CVD [5]. In 2015 research conducted in Saudi Arabia found that in all domains Saudi patients with HF reported low QoL [6]. Quality of life of heart failure patients is lower than that of the general population and of other patients with other chronic diseases. In these patients, female sex, being older, comorbidity, symptoms that are advanced, and recent hospitalizations are important determinants in the health-related quality of life [7]. In HF patients, bad HRQoL is correlated with hospital readmission and death [8]. Also women with heart disease significantly have poorer quality of life than men [9]. The incidence of impaired HRQoL in both men and women was higher among the high-risk category [5]. The levels of educational attainment, socioeconomic status, the primary source of income, age, social support, and total spiritual well-being were found to be important predictors of QoL[10]. Another study reported that physical activity was the lowest among the four general areas of quality of life and multiple studies reported the most important factors affecting the quality of life were sex, age, education, marital status, occupational status, duration of suffering, and number of hospitalizations [11]. Later in 2019, a study conducted among 100 HF outpatients showed that HF has a significant influence on QoL [12]. Another research conducted in Jeddah for post-cardiac surgery showed that HRQoL impairment was linked to the prevalence of comorbidities such as hypertension, diabetes, and prior cerebrovascular stroke [13]. Regarding QoL after cardiac surgery studies have shown that, five-year survival and HRQOL could be equal to the general population[14]. Better quality of life after coronary artery bypass graft surgery was associated with a lower level of anxiety and women scored lower on the physical dimensions of quality of life [15]. Major variations in the quality of life of cardiac patients are related to gender and exercise performance [16]. The studies conducted on the quality of life for cardiovascular patients is still limited in Saudi Arabia, and it is considered the principal cause of disability and death among young individuals. This study aims to investigate Quality of life for cardiovascular patients in Saudi Arabia 2020. We wanted to assess the quality of life for cardiac patients and its connection with certain factors. The final aim is to assess the extent of effect of mental and physical wellbeing and social relations on the quality of life of patients with cardiovascular disease.

Methodology

Study design: a descriptive cross-sectional study

Study setting: an electronic online survey was conducted

Study population: The inclusion criteria were as follows: All male and female cardiac patients or those who have cardiac surgery above 18 years old from the general population and who agreed to participate. The exclusion criteria were as follows: All non-cardiac patients and those below 18 years.

Study instrument:.
The newly developed self-administered English version of the Questionnaire was adopted from the The Short Form (36) Health Survey (SF-36). The draft of our initial questionnaire was made in the English language. The questionnaire included three sections: section A consisted of sociodemographic, details, Section B had items with Numerical Rating Scale for eight dimensions: vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health.

Section C included medical history and other associated risk factors of cardiac disease. A standardized methodology was followed in the validation of this questionnaire that included focus group discussion, expert evaluation, pilot study, reliability and validity assessment, etc. The content validity, face validity, and construct validity of the developed questionnaire were examined. Content validity and face validity were established by expert evaluation and focused group discussions. Construct validity was established by exploratory factor analysis with varimax rotation to test the hypothesized domain structure and examine its substructure. Internal consistency was examined, but test/retest reliability could not be performed because of the paucity of time. The homogeneity of the question items in each domain was evaluated using Cronbach's α coefficient. A coefficient of 0.7 or higher is preferred for a questionnaire to be internally consistent. In the first step, two independent professional bilingual translators translated the original English version of the questionnaire into the Arabic version (forward translation). One of the translators was from a non-medical field and another from the medical field (doctor) and both were native Arabic speakers. The Minimal Translation Criteria were followed with two independent bilingual health professionals for forward translating the questionnaire [14]. Translators were informed of the target audience of the translation and the medium in which the instrument would be administered. In the second step, a meeting involving the two independent professional bilingual translators and a member from the research group was conducted to review, reconcile, and harmonize the forward translation. Another two independent bilingual translators then translated this

then translated this reconciled forward translation back into English. The translated, culturally adapted version of the Questionnaire to assess Physical activity during the pandemic was pilot tested in 20 samples (5) (17).

Ethical considerations: The study was approved by the research ethics committee of Taif university.

Statistical Analysis: The data collected were analysed using SPSS version 23 (IBM Corp. Chicago, USA). The normality of the main continuous variable was tested for normality and found that it was normally distributed (Shapiro–Wilk test, $p>0.05$). Continuous variables were expressed using mean and standard deviations and categorical variables using frequencies and percentages. Student's t test and Analysis of variance were used to compare the differences in DLQI scores between different groups. Pearson's Chi-square test was used to evaluate the statistical relationship between categorical variables. A P-value of ≤0.05 was considered statistically significant.

Result

Our study evaluated the health-related quality of life among cardiovascular patients during the COVID-19 pandemic using the Arabic version of RAND 36-Item Short Form Survey. The study included 470 participants who gave consent to participate and comprised 47.9% females and 52.1% males. The sociodemographic characteristics of the participants are given in Table 1. The 36-Item form is subdivided into nine subdomain scales, namely: Physical functioning, role limitations due to physical health, role limitations due to emotional problems, Energy/fatigue, Emotional well-being, Social functioning, Pain, General health, and health change. The mean scores, variability, and reliability of each of these subdomains are given in Table 2.

When we compared the score of each subdomain items between two genders, it was found that all of the subdomains except general health and health change showed statistically significant differences. The female patients showed lower scores in physical functioning, role limitations due to physical health, role limitations due to emotional problems, Energy/fatigue, emotional well-being, and pain compared to male patients ($p<0.05$) whereas, male patients showed lesser scores (better quality of life) in social functioning than female patients ($p<0.05$) [Table 3].

Patients who were aged more than 55 years showed lesser scores in Physical functioning, role limitations due to physical health, role limitations due to emotional problems, Energy/fatigue, pain, general health, and health change compared to those who were less than 55 years old ($p<0.05$). But social functioning scores were lesser in patients aged less than 55 years ($p<0.05$). There was no statistically significant difference observed in emotional well-being between the two age groups [Table 4]. The comparison of scores between different residence types didn't show any statistically significant difference in any of the subdomains ($p>0.05$) [Table 5].

When we evaluated the scores between patients who are working in the health sector and non-health sector, it was found that patients who worked in the health sector showed higher scores (67.1 ± 31.2) in the subdomain of physical functioning compared to others (55 ± 28.3) which showed statistically significant difference ($p<0.05$). The scores of the other eight subdomains didn't show any statistically significant differences [Table 6].

The comparison of scores of 9 subdomains between different educational levels showed higher functioning among patients with post-graduate qualification compared to other scores in all domains except social functioning ($p<0.05$). The social functioning scores were lesser in patients with post-graduate qualifications compared to others ($p<0.05$) [Table 7]. When we evaluated the different item scores according to BMI of the patients, it was found that those who were obese showed lesser scores in Physical functioning, role limitations due to physical health, role limitations due to emotional problems, Energy/fatigue, Pain, General health and Health change that showed statistically significant differences [Table 8].

The comparison of scores of subdomains between the different marital statuses showed that divorced or widower had lesser scores in all domains except social functioning ($p<0.05$). The social functioning scores were lesser among married patients compared to others which also showed a statistical significance ($p<0.05$) [Table 9]. According to different regions, the score comparison of patients showed a statistically significant difference in all domains except the pain scores [Table 10]. When we compared the scores based on the smoking status, patients who never smoked has statistically significantly lesser physical functioning scores, role limitations due to physical health, pain, and health change compared to those who smoked and ex-smokers [Table 11]. The patients who had at least one comorbidity, showed lesser scores compared to those who didn't have any comorbidities, which showed a statistically significant difference [Table 12].

Table 1: Sociodemographic details			
		N	%
Age	<18 years	14	3.0
	18-25 years	40	8.5
	26-35 years	38	8.1
	36-45 years	69	14.7
	46-55 years	93	19.8
	56-65 years	117	24.9
	>66 years	99	21.1
Gender	Male	245	52.1
	Female	225	47.9
Marital status	Married	338	71.9
	Single	73	15.5
	Divorced or Widower	59	12.6
Job sector	Non-Health Sector	430	91.5
	Health sector	40	8.5
Educational level	Primary school	63	13.4
	Middle school	56	11.9
	Secondary or high school	152	32.3
	Graduate	188	40.0
	Post-graduate	11	2.3
Province living/ Residence	North	104	22.1
	South	117	24.9
	East	82	17.4
	West	105	22.3
	Central	62	13.2

Table 2: Mean scores for the domains of RAND 36-Item Health Survey						
	N of items	Alpha	Mean	SD	Minimum	Maximum
Physical functioning	10	0.927	56.07	28.70	.00	100.00
Role limitations due to physical health	4	0.847	50.43	41.33	.00	100.00
Role limitations due to emotional problems	3	0.854	57.16	43.53	.00	100.00
Energy/fatigue	4	0.610	49.24	19.84	.00	100.00
Emotional well-being	5	0.716	57.10	19.21	4.00	100.00
Social functioning	2	0.871	38.99	29.52	.00	100.00
Pain	2	0.639	54.34	20.78	.00	90.00
General health	5	0.616	50.79	18.11	.00	100.00
Health change	1	-	64.10	30.45	.00	100.00

Table 3: Comparison of scale scores between two genders				
		Mean	SD	P value
Physical functioning	Male	62.1	28.1	<0.001
	Female	49.5	27.9	
Role limitations due to physical health	Male	58.4	41.9	<0.001
	Female	41.8	39.0	
Role limitations due to emotional problems	Male	63.0	42.6	0.002
	Female	50.8	43.8	
Energy/fatigue	Male	51.4	19.7	0.012
	Female	46.8	19.8	
Emotional well-being	Male	59.5	19.2	0.005
	Female	54.5	18.9	
Social functioning	Male	35.5	29.9	0.008
	Female	42.8	28.7	
Pain	Male	57.1	23.0	0.018
	Female	51.9	18.3	
General health	Male	52.2	18.2	0.086
	Female	49.3	18.0	
Health change	Male	65.8	30.5	0.201
	Female	62.2	30.4	

Table 4: Comparison of scale scores between two genders				
		Mean	SD	P value
Physical functioning	<=55 years	63.3	24.5	<0.001
	>55 years	47.6	31.0	
Role limitations due to physical health	<=55 years	55.1	39.3	0.005
	>55 years	44.9	43.0	
Role limitations due to emotional problems	<=55 years	63.6	41.1	<0.001
	>55 years	49.5	45.1	
Energy/fatigue	<=55 years	53.7	17.3	<0.001
	>55 years	44.1	21.4	
Emotional well-being	<=55 years	58.9	18.5	0.424
	>55 years	54.9	19.9	
Social functioning	<=55 years	34.4	26.5	0.009
	>55 years	44.4	32.0	
Pain	<=55 years	58.0	18.9	0.023
	>55 years	50.1	22.1	
General health	<=55 years	55.1	14.7	<0.001
	>55 years	45.7	20.3	
Health change	<=55 years	69.5	27.7	<0.001
	>55 years	57.8	32.4	

Table 5: Comparison of scale scores between different residence types				
	Residence	Mean	SD	P value
Physical functioning	Urban	56.8	28.0	0.392
	Rural	54.2	30.5	
Role limitations due to physical health	Urban	52.0	41.6	0.185
	Rural	46.3	40.6	
Role limitations due to emotional problems	Urban	58.3	42.9	0.362
	Rural	54.2	45.2	
Energy/fatigue	Urban	50.0	18.9	0.161
	Rural	47.1	22.2	
Emotional well-being	Urban	56.6	19.6	0.334
	Rural	58.5	18.0	
Social functioning	Urban	38.5	29.3	0.576
	Rural	40.2	30.3	
Pain	Urban	55.2	19.7	0.219
	Rural	52.2	23.3	
General health	Urban	50.5	17.8	0.532
	Rural	51.6	19.0	
Health change	Urban	64.3	30.0	0.854
	Rural	63.7	31.7	

Table 6: Comparison of scale scores between different Job sector				
		Mean	SD	P value
Physical functioning	Health sector	67.1	31.2	0.011
	Other	55.0	28.3	
Role limitations due to physical health	Health sector	52.5	35.7	0.740
	Other	50.2	41.8	
Role limitations due to emotional problems	Health sector	58.3	39.0	0.859
	Other	57.1	44.0	
Energy/fatigue	Health sector	53.1	11.0	0.196
	Other	48.9	20.4	
Emotional well-being	Health sector	51.7	15.1	0.063
	Other	57.6	19.5	
Social functioning	Health sector	35.6	24.6	0.452
	Other	39.3	29.9	
Pain	Health sector	58.8	16.7	0.180
	Other	53.9	21.1	
General health	Health sector	53.5	11.9	0.322
	Other	50.5	18.6	
Health change	Health sector	58.8	29.2	0.246
	Other	64.6	30.5	

Table 7: Comparison of scale scores between different Educational level				
		Mean	SD	P value
Physical functioning	Primary school	28.7	24.6	<0.001
	Middle school	49.6	27.7	
	Secondary or high school	60.3	25.5	
	Graduate	63.1	27.0	
	Post-graduate	66.4	29.9	
Role limitations due to physical health	Primary school	23.4	35.6	<0.001
	Middle school	43.8	41.9	
	Secondary or high school	54.6	40.4	
	Graduate	57.2	40.1	
	Post-graduate	65.9	40.7	
Role limitations due to emotional problems	Primary school	31.7	41.7	<0.001
	Middle school	51.2	46.3	
	Secondary or high school	61.0	42.2	
	Graduate	63.3	41.6	
	Post-graduate	75.8	39.7	
Energy/fatigue	Primary school	36.0	19.5	<0.001
	Middle school	44.8	23.7	
	Secondary or high school	50.8	19.8	
	Graduate	53.2	16.8	
	Post-graduate	58.6	12.9	
Emotional well-being	Primary school	51.9	17.7	0.047
	Middle school	55.8	23.0	
	Secondary or high school	56.1	18.7	
	Graduate	59.7	18.6	
	Post-graduate	62.9	19.8	
Social functioning	Primary school	52.8	31.8	<0.001
	Middle school	47.3	30.4	
	Secondary or high school	35.7	28.7	
	Graduate	35.0	27.3	
	Post-graduate	31.8	31.8	
Pain	Primary school	42.7	19.8	<0.001
	Middle school	51.9	23.3	
	Secondary or high school	56.3	20.3	
	Graduate	58.3	19.0	
	Post-graduate	49.6	24.6	
General health	Primary school	39.5	20.7	<0.001
	Middle school	44.5	21.3	
	Secondary or high school	52.6	14.4	
	Graduate	54.5	16.6	
	Post-graduate	58.6	23.0	
Health change	Primary school	48.0	33.4	<0.001
	Middle school	64.3	32.3	
	Secondary or high school	66.3	28.7	
	Graduate	68.0	28.6	
	Post-graduate	59.1	34.0	

Table 8: Comparison of scale scores according to different BMIs				
		Mean	SD	P value
Physical functioning	Underweight	62.7	24.1	<0.001
	Normal	63.0	28.2	
	Overweight	55.4	27.8	
	Obese	47.8	29.2	
Role limitations due to physical health	Underweight	49.0	40.7	0.005
	Normal	57.6	39.3	
	Overweight	52.5	41.5	
	Obese	40.2	41.9	
Role limitations due to emotional problems	Underweight	55.6	40.1	0.020
	Normal	65.7	40.6	
	Overweight	56.3	43.3	
	Obese	49.3	46.5	
Energy/fatigue	Underweight	52.9	17.9	<0.001
	Normal	53.1	16.5	
	Overweight	49.9	20.0	
	Obese	43.3	22.6	
Emotional well-being	Underweight	61.7	19.3	0.602
	Normal	56.9	17.2	
	Overweight	56.3	20.5	
	Obese	57.9	19.9	
Social functioning	Underweight	38.5	22.1	0.771
	Normal	36.8	28.3	
	Overweight	39.9	29.7	
	Obese	40.2	32.5	
Pain	Underweight	61.9	20.1	0.048
	Normal	55.6	17.1	
	Overweight	55.2	21.5	
	Obese	49.9	23.5	
General health	Underweight	56.5	10.7	0.013
	Normal	53.6	14.1	
	Overweight	50.2	20.0	
	Obese	47.2	20.3	
Health change	Underweight	75.0	28.6	0.015
	Normal	66.5	28.1	
	Overweight	65.6	30.5	
	Obese	57.5	32.2	

Table 9: Comparison of scale scores according to different marital status				
		Mean	SD	P value
Physical functioning	Married	58.3	27.3	<0.001
	Single	64.5	26.0	
	Divorced or Widower	32.7	28.6	
Role limitations due to physical health	Married	53.8	41.4	<0.001
	Single	56.8	36.1	
	Divorced or Widower	22.9	36.3	
Role limitations due to emotional problems	Married	56.9	42.9	0.002
	Single	69.9	40.9	
	Divorced or Widower	42.9	46.3	
Energy/fatigue	Married	50.7	18.3	<0.001
	Single	55.2	20.5	
	Divorced or Widower	33.6	20.4	
Emotional well-being	Married	57.6	18.3	0.003
	Single	60.9	22.3	
	Divorced or Widower	49.8	18.6	
Social functioning	Married	38.8	28.5	<0.001
	Single	29.8	28.8	
	Divorced or Widower	51.7	32.1	
Pain	Married	55.5	20.2	<0.001
	Single	60.2	20.6	
	Divorced or Widower	42.3	19.7	
General health	Married	52.2	17.0	<0.001
	Single	55.6	15.6	
	Divorced or Widower	36.9	20.5	
Health change	Married	65.8	28.6	<0.001
	Single	70.5	31.8	
	Divorced or Widower	46.2	32.8	

Table 10: Comparison of scale scores according to different provinces				
		Mean	SD	P value
Physical functioning	North	53.7	29.8	0.007
	South	55.1	31.8	
	East	63.4	27.9	
	West	59.3	23.0	
	Central	46.8	28.0	
Role limitations due to physical health	North	51.0	38.9	<0.001
	South	48.5	41.0	
	East	64.6	40.1	
	West	51.0	40.9	
	Central	33.5	42.7	
Role limitations due to emotional problems	North	52.9	39.3	<0.001
	South	53.6	45.7	
	East	70.7	39.7	
	West	64.1	43.3	
	Central	41.4	45.4	
Energy/fatigue	North	50.0	13.8	<0.001
	South	48.3	24.7	
	East	53.6	18.0	
	West	54.0	13.9	
	Central	36.0	23.3	
Emotional well-being	North	49.8	14.8	<0.001
	South	60.8	21.2	
	East	65.4	16.8	
	West	57.3	14.7	
	Central	51.2	25.0	
Social functioning	North	40.4	21.8	<0.001
	South	37.0	32.8	
	East	29.3	30.9	
	West	40.5	25.8	
	Central	50.8	34.2	
Pain	North	54.0	14.5	0.061
	South	53.7	24.9	
	East	57.3	22.2	
	West	57.6	18.8	
	Central	47.1	23.7	
General health	North	50.9	11.9	<0.001
	South	54.4	18.5	
	East	54.9	21.0	
	West	53.8	11.2	
	Central	33.2	21.3	
Health change	North	61.3	27.8	<0.001
	South	60.5	32.7	
	East	73.5	29.7	
	West	72.6	22.6	
	Central	48.8	34.9	

Table 11: Comparison of scale scores based on smoking status				
		Mean	SD	P value
Physical functioning	Active smoker	64.4	23.7	0.019
	Ex-smoker	55.0	30.8	
	Never smoker	54.1	28.5	
Role limitations due to physical health	Active smoker	58.8	40.9	0.004
	Ex-smoker	56.1	42.5	
	Never smoker	44.4	40.0	
Role limitations due to emotional problems	Active smoker	62.3	43.4	0.418
	Ex-smoker	58.0	41.5	
	Never smoker	55.0	44.8	
Energy/fatigue	Active smoker	50.1	18.3	0.436
	Ex-smoker	50.6	18.5	
	Never smoker	48.1	21.1	
Emotional well-being	Active smoker	55.4	18.6	0.309
	Ex-smoker	55.8	18.8	
	Never smoker	58.4	19.6	
Social functioning	Active smoker	37.7	29.4	0.762
	Ex-smoker	38.1	28.3	
	Never smoker	39.9	30.4	
Pain	Active smoker	60.5	21.5	0.026
	Ex-smoker	51.5	22.0	
	Never smoker	54.2	19.5	
General health	Active smoker	51.5	17.2	0.612
	Ex-smoker	51.7	16.3	
	Never smoker	50.0	19.4	
Health change	Active smoker	64.0	30.5	0.045
	Ex-smoker	59.2	29.0	
	Never smoker	67.1	31.0	

Table 12: Comparison of scale scores according to Comorbidity				
	Comorbidity	Mean	SD	P value
Physical functioning	Present	53.1	28.7	<0.001
	Absent	67.1	26.1	
Role limitations due to physical health	Present	45.9	40.8	<0.001
	Absent	67.0	39.1	
Role limitations due to emotional problems	Present	52.0	43.6	<0.001
	Absent	76.3	37.7	
Energy/fatigue	Present	46.6	19.1	<0.001
	Absent	59.1	19.5	
Emotional well-being	Present	54.0	18.5	<0.001
	Absent	68.4	17.5	
Social functioning	Present	41.2	29.2	0.002
	Absent	30.8	29.5	
Pain	Present	52.8	20.8	0.001
	Absent	62.2	19.2	
General health	Present	48.4	18.3	<0.001
	Absent	59.8	14.4	
Health change	Present	60.3	31.0	<0.001
	Absent	78.3	23.7	

Discussion

Few studies have analyzed HRQoL in Saudi Arabia. Health-related quality of life (HRQoL) is considered a significant outcome indicator in chronic diseases, including cardiovascular disease (CVD), which is known to be associated with impaired HRQoL. The aim of this research was to assess the quality of life for cardiovascular patients in Saudi Arabia in the year 2020.

The study sample was 470 with 47.9% females and 52.1% males. In an analysis of Gender Differences in Quality of Life Among Cardiac Patients, women scored lower on both the mental and physical components of quality of life. Over the course of a 12-month longitudinal follow-up, women with cardiac disease reported slightly poorer quality of life than men with cardiac disease [9]. A study reported chronic conditions such as arthritis, back problems, diabetes and high blood pressure are found more frequently in women [10]. Males consistently reported significantly higher physical activity levels than females [19].

In our study we found that there is a high association of gender in most of the subdomain items. A similar result was found in Iran and Jordan which showed that there is a relationship between sex and patient quality of life in a way that men have better QoL than women [11,15]. his shows the role of gender as an effective factor for Quality of Life. Despite the fact that normative information shows that women report a lower quality of life than men [9]. The results give us the meaning of that as generally in most of the aspects the women have a lower quality of life than men which could be due to the nature of the body structure and the differences between genders.

The findings of our study showed that patients over 55 years old had lower physical and social performance, physical health, and emotional problems. In most studies, it has been shown that the higher the age, the lower the quality of life of patients, and it has been the case in a study in Iran [11]. In other similar studies, age was associated with a decline in general and psychological health [23][24]. In contrast research done in 2008 [24] , found that there are no independent variables relating to the quality of life in the social realm. In addition, in 2020, a study in Jeddah, Saudi Arabia [13], revealed that there was no relationship between the quality of life of heart patients and age. These results were expected because people who suffer from heart disease have a poor quality of life, especially among the elderly, as there is difficulty in exercising and increasing physical activity. On the other hand, the general health of the elderly is affected by advancing age, and the incidence of chronic diseases increases.

In this study, we found that patients who worked in the health sector showed higher scores (better scores) in the subdomain of physical functioning compared to patients who worked in the non-health sector while other subdomains showed no significant differences. This disagrees with a previous study conducted on nurses with cardiovascular diseases that showed, when they compared the high work burnout group to the low job burnout group, they noticed that both physical and mental functioning deteriorated (by 2.53 and 3.02 points, respectively, p;0.05) [26]. Another study compared between health care workers who worked with COVID-19 patients and those who worked in other departments during the COVID-19 pandemic found, Level of anxiety was high as observed in 31.8 percent of patients in a group of health care workers who treated COVID-19

while only 16.4 percent in other groups of health care workers [27]. This difference could be attributed to the low number of participants in health sector and needs more specification and study.

The comparison of scores of 9 subdomains between different educational levels showed higher functioning among patients with post-graduate qualification compared to other scores in all domains except social functioning ($p<0.05$). Higher educational levels were also linked to better QoL at an Iranian hospital [10]. Association of overall health related quality of life and education of the patient in a Dhaka report showed that among the CHD patients, 24.9% were graduates, 23.5% had secondary education, 20.3% had higher secondary education, and 6.0% were illiterate. The majority of graduates (75.9%) and secondary educated (84.3%) had average quality of life. The majority of primary educated (67.9%) had poor quality of life [22].

In an observational analysis in Europe, important variations in European Quality of Life-5 Dimensions ratings were observed between patients with fewer than 9 years of education and patients with more than 9 years of education (0.72 vs. 0.77; P0.001) [21]. Individuals with a higher level of education could have more access to health-related data, resulting in greater quality care than those with less educational opportunities.

When we evaluated the different item scores according to BMI of the patients, it was found that those who were obese showed lesser scores in physical functioning, role limitations due to physical health, role limitations due to emotional problems, Energy/fatigue, Pain, General health and Health change that showed statistically significant differences. According to Duke activity status index, energy/fatigue, health anxiety, and self-rated health rating, a higher BMI particularly greater than 30 kg/m2 was correlated with lower quality of life [20].

This study showed that divorced or widower had lesser scores in all domains except social functioning. The social functioning scores were lesser among married patients. This finding confirms the previous study which showed that being married had a strong relationship with enhancing some aspects of cardiac patients' quality of life [1-3].

In contrast some studies didn't find any noticeable effect on the patients' quality of life[4].

Our study found that patients who never smoked had statistically significantly lesser physical functioning scores, and role limitations due to physical health, pain, and health change compared to those who smoked and ex-smokers .

Similar results found in other studies showed that smoking affects quality of life [5-7]. A lower quality of life is linked to the existence of cardiovascular risk factors.

This study concluded that the patients who had at least one co-morbidity showed lesser scores compared to those who didn't have any co-morbidities.

Outcomes are comparable with those reported by different studies who concluded that the involvement of comorbidities such as hypertension, diabetes, and prior cerebrovascular stroke was linked to HRQoL impairment. These conditions caused significant impact on decreasing patients' quality of life [1, 2, 8, 9].

Limitation :
Being a study done through an online survey necessitates conducting future studies with different methods in different regions at different hospitals dedicated to their patients to modify the outcome and health care policies towards them

Conclusion

The current study aimed to investigate Quality of life for Cardiovascular Patients in Saudi Arabia 2020. We found lower quality of life for cardiovascular patients associated with many factors like Age, female gender, higher BMI and multiple comorbidities, and identification of these factors requires management plans that can significantly improve the QoL and the outcome of the disease for these patients. We recommend to follow these patients with the QoL survey as part of periodic hospital follow up and educational interventional programs for high risk patients.

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Stress and a sedentary lifestyle are associated with irritable bowel syndrome in medical students from Saudi Arabia

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Abstract

Background: Irritable bowel syndrome (IBS) is a chronic gastrointestinal condition presented by abdominal discomfort due to unknown cause. The prevalence of IBS in the world extends between 5.7% to 34%, with different ranges based on the tools used for diagnosis. Evidence has indicated genetic predisposition and psychosocial stress as risk factors. This study aims to assess the prevalence of IBS with its subtypes in undergraduate medical students using Rome III criteria. We also investigated the association of IBS and emotional disorders including stress among undergraduate medical students in Saudi Arabia.

Methods: This cross-sectional study was conducted in January and February 2021 among undergraduate medical students in Saudi Arabia. Volunteer participants answered the questions relating to demographics and surveys containing the Rome III criteria and the Self-reported Stress questionnaire.

Results: A total of 300 participants were recruited of whom 63.7% were females. The majority of the participants were aged more than 22 years (72.7%). IBS prevalence in undergraduate medical students was 49.3% in Saudi Arabia which was higher than the global prevalence of IBS. There are many associated factors with IBS including female gender, higher academic year, sleeping less than 6 hours and less exercise practicing.

Conclusion: Higher prevalence of IBS was detected in undergraduate medical students in Saudi Arabia than worldwide prevalence. Female gender, higher academic grades, less exercise practicing and sleep disturbance were predictors for IBS. More screening and management of stress causes are needed to decrease medical field stressors.

Key words: Irritable bowel syndrome, medical students, stress, sedentary lifestyle

Introduction

Irritable bowel syndrome (IBS), is a chronic gastrointestinal condition, manifested clinically by recurrent abdominal discomfort or pain that is relieved after bowel emptying and also associated with bowel habits changes [1].

The complete pathophysiology of IBS is still under investigation, but there are some commonly accepted theories including abnormal regulation of serotonin, post-infectious IBS, and bacterial overgrowth [2]. Some evidence also suggests a link of genetic predisposition with IBS [3]. Moreover, some studies suggested that psychosocial factors have been incriminated in IBS predisposition [2]. Traditionally, in practice, IBS was considered as a disease of excluded diagnosis, but lately, Rome III criteria was applied as a tool of choice for diagnosis in research and other clinical study. Using Rome III criteria, three different subtypes of IBS have been established: constipation-predominant, diarrhea-predominant, and alternating diarrhea and constipation [4].

The prevalence of IBS in the world extends between 5.7% and 34%, with different ranges built on the tool used for diagnosis [5]. Women and adults less than 50 years are more likely to be diagnosed with IBS [6,7]. The IBS prevalence is higher in western regions than Asian regions with prevalence of 10%-15% and 1%-10%, respectively [8].

Currently there is lack of evidence produced from Arab countries. A meta-analysis on IBS prevalence has found that no proven studies have been produced from an Arab country [5]. Ranging prevalence of IBS in Middle East has been 11.4% in Saudi Arabia and 34.2% in North-East of Egypt [9,10].

In Saudi Arabia, limited knowledge is known about the IBS prevalence among university students [11]. Various cross-sectional studies, based on diagnostic criteria of Rome III, have suggested IBS is prevalent among undergraduate students as reported in a study conducted in Jeddah and Riyadh, KSA which showed that the prevalence of IBS is 31.8% and 21% of undergraduate students and medical students, correspondingly [11,12]. IBS prevalence rates are changeable, and several factors, such as study methods, diagnostic criteria, and sample size, should be considered. Hasosah et al. have assessed the prevalence of IBS to be 15.6% between medical students of Jeddah, KSA. In this study, the authors reported that high stressful environment, IBS family history, and decrease of exercise practicing were found to be suggestive risk factors for IBS [13].

Medical students are prone to stress due to the duration of their studies and difficult exams [11]. The high prevalence rate of IBS detected in university students, particularly medical students, could be attributed to the role of stress [14]. IBS prevalence has been seen higher in women and medical students [15]. We hypothesis that stress and sedentary life could be risk factors for IBS in medical students.

This study aims to assess the prevalence of IBS with its subtypes in undergraduate medical students using Rome III criteria. We also investigated the association of IBS and emotional disorders including stress among undergraduate medical students in Saudi Arabia.

Subjects and Methods

This analytical cross-sectional study was conducted during the months of January 2021 and February 2021 among all medical students of Saudi Arabia. Different Saudi universities including Taif university, King Saud university, Umm Al-Qura University, King Abdul Aziz university, King Saud bin Abdulaziz University for Health Sciences in Riyadh, and Princess Nourah Bint Abdul Rahman university were sites for our study.

Undergraduate Saudi medical students in the selected universities from all the years of their degree were recruited. All postgraduate, non-medical students or students from other universities were excluded. All cases were randomly collected from selected universities in Saudi Arabia.

A self-administered online questionnaire was used which was disseminated using online platforms and social media at: https://docs.google.com/forms/d/e/1FAIpQLSf490Ptg4d8BH59PDIGxijK2e54vN8KDCpjFk-M9IBzDLNDvg/viewform. The questionnaire comprised questions about age, sex, sleep duration, income per month, history of travel to tropical areas, current academic year, medical history, and presence or absence of Rome III criteria used in diagnosis of IBS. The questionnaire also covers special habits such as practicing any type of sports. We also asked about stress in daily life and other diseases related to this stress. The questionnaire consisted of twelve questions about personal information and the situations of life that were answered only either with Yes or No. This test had been widely used in clinical and epidemiological studies.]16[The validity was verified by checking an online sample. And it was reliable and simple.

The data were transferred to Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc., Chicago, IL) for analysis. Categorical variables were extracted as frequencies and percentages and continuous variables were extracted as mean and standard deviation.

Research proposal and a request letter were submitted to the Dean, College of medicine and Vice Dean Scientific research for approval before conduction of the study. Ethical approval was granted by the Research Ethics Committee at Taif University via letter number (42-170)

Consent of participations was taken in the online questionnaire at https://docs.google.com/forms/d/e/1FAIpQLSf490Ptg4d8BH59PDIGxijK2e54vN8KDCpjFk-M9IBzDLNDvg/viewform before answering the questions.

Results

A total of 300 medical students were recruited, the majority of whom were females (63.7%). About three-quarters (72.7%) of the study participants were aged above 22 years (Table 1).

Table 1. Demographic characteristics of the study population

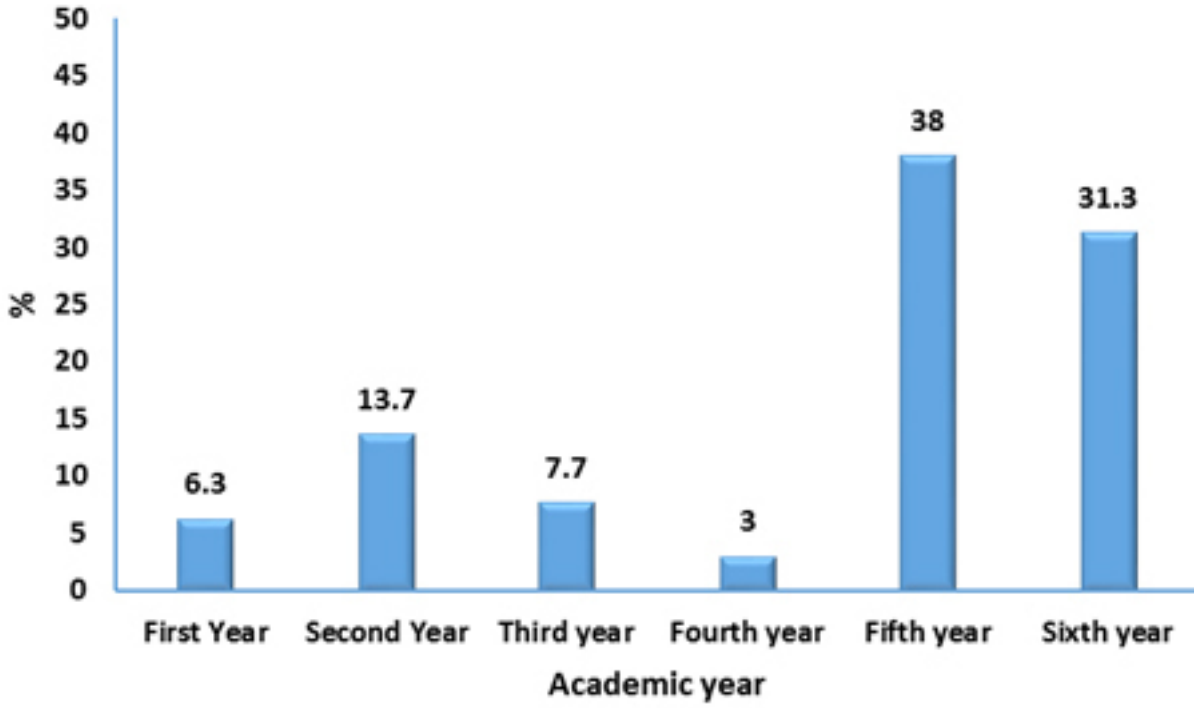
		N	%
Age	≤22 years	82	27.3
	>22 years	218	72.7
Gender	Male	109	36.3
	Female	191	63.7

Regarding distribution of universities and academic years of participants in the study population (Table 2), more than one-half (56.3%) of the study participants were from Taif University and more than two-thirds (69.3%) of the study participants were in fifth and sixth academic year with a higher percentage of fifth year than sixth year participants by (6.7%) (Figure 1).

Table 2. Distribution of universities in the study population

University	N	%
Al Baha University	2	0.7
Al Ghad International Colleges	2	0.7
Al Qassim University	8	2.7
Al-Imam Mohammad Ibn Saud Islamic University	2	0.7
Al Maarefa University	1	0.3
Fatima College of Health Sciences	1	0.3
Gulf Medical University	1	0.3
Imam Abdulrahman Bin Faisal University	11	3.7
Imam Muhammad Bin Saud Islamic University	1	0.3
Inaya Medical College	1	0.3
Jazan University	2	0.7
King Abdulaziz University	35	11.7
King Faisal University	7	2.3
King Saud Bin Abdulaziz University for Health Sciences	7	2.3
King Saud University	15	5.0
Mashad University of Medical Sciences	1	0.3
Najran university	1	0.3
Northern Border University	1	0.3
Prince Mohammad Bin Fahd University	1	0.3
Prince Sultan University	1	0.3
Princess Nora University	10	3.3
Sulaiman Al-Rajhi University	12	4.0
Tabuk University	1	0.3
Taif University	169	56.3
Umm Al Qura University	5	1.7
University Of Hail	2	0.7

Figure 1. Distribution of the academic year in the study population



Regarding lifestyle and health condition, more than one-half (56.7%) of participants were sleeping more than 6 hours and less than one-half (47.0%) practiced physical exercise with more than one-half (55.3%) of them practicing physical exercise more than once/week (Table 3).

Table 3. Sleep duration and sport habits in the study population.

		N	%
Sleep duration	≤6 hours	130	43.3
	>6 hours	170	56.7
Have a sport habit	Yes	141	47.0
If having sports habit how many times do you perform it?*	Once/week	63	44.7
	More than once/week	78	55.3

* Percentages were calculated based on the total number having a sport habit

As regards history of travel to tropical areas and psychiatric pathology in the study population, less than three-quarters (72.7%) of the study participants had travelled to tropical areas and only approximately one-tenth (10.7%) of the study participants had a history of psychiatric pathology (Figure 2).

More than one-tenth (13.7%) of study participants had diarrhea. Out of the participants having diarrhea, more than two-thirds (68.3%) of them have diarrhea more than once a week and one-half (50.0%) of them were found to have diarrhea associated with any type of food and less than two-thirds (63.4%) of them were found to have diarrhea alternating with constipation (Figure 3).

Using Rome III Criteria we identified 148 undergraduate medical students diagnosed as having IBS which in turn gives an overall IBS prevalence of 49.3% between undergraduate medical students and interns (Figure 4).

Figure 2. Travel to tropical areas and psychiatric pathology in the study population

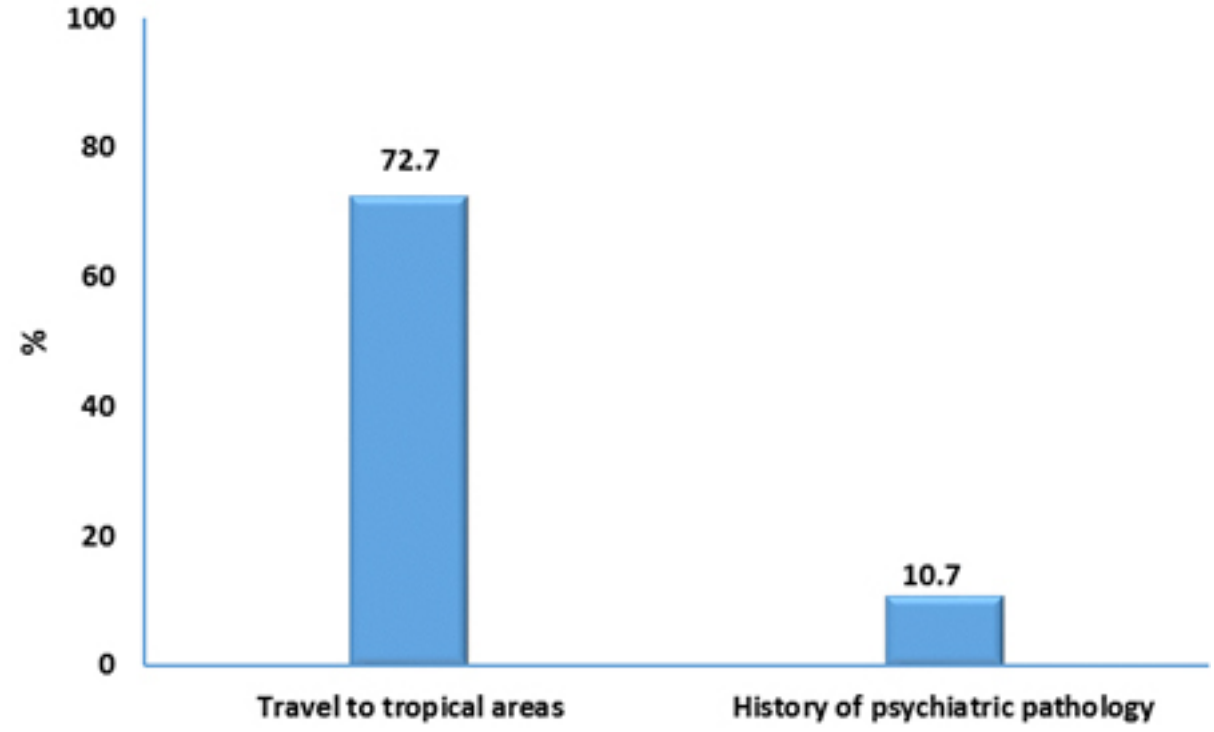


Figure 3. Diarrhea and its characteristics in the study population

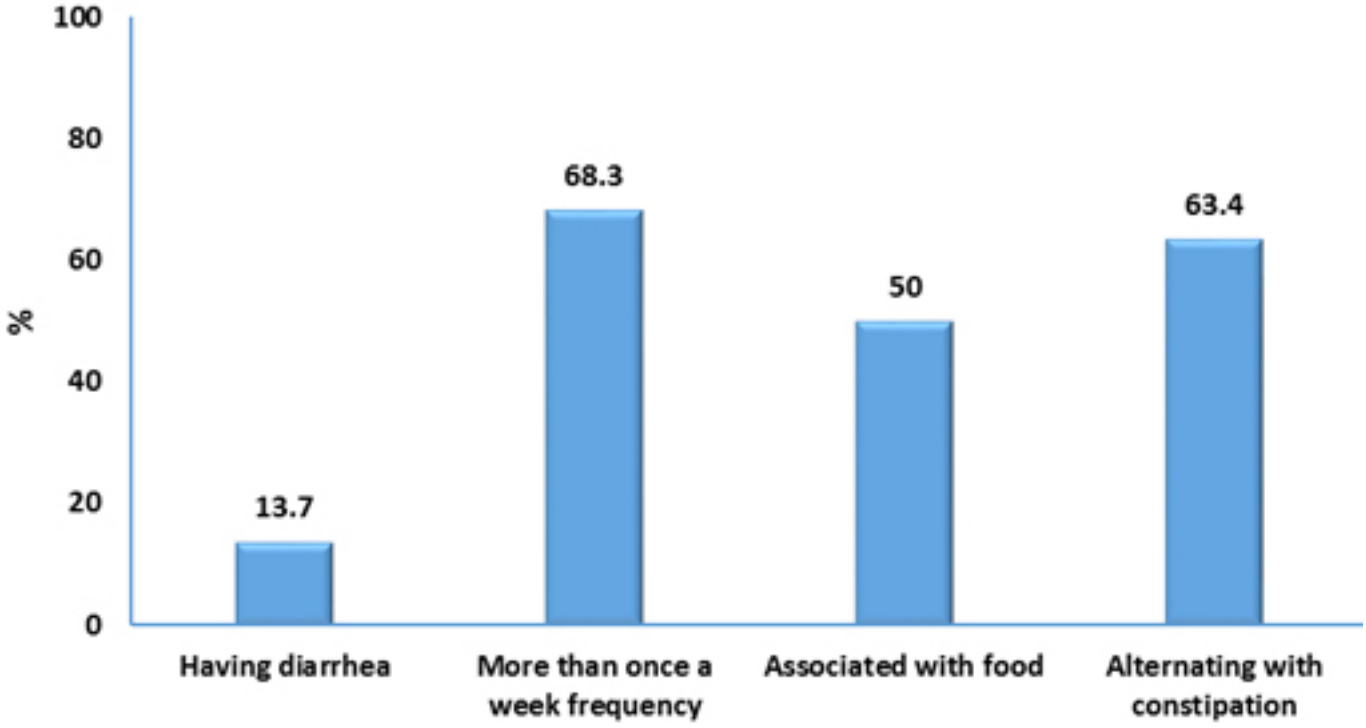
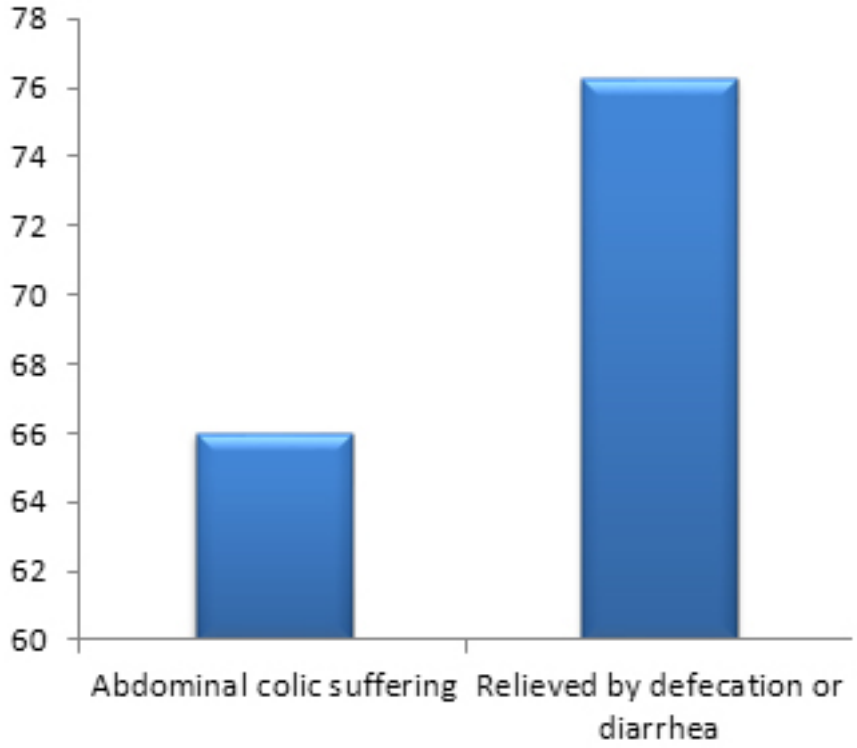


Figure 4. Abdominal colic in the study population



Discussion

IBS prevalence varied widely between different investigations. IBS prevalence was prevalent in between 15% and 24% between the populations of Western areas [17]. An international study conducted in 2003 on 41,984 persons in eight countries in Europe showed that IBS prevalence in selected population was 11.5% [18]. The current study reported a higher IBS prevalence rate of 49.3% in undergraduate medical students. The different range of IBS prevalence between the current study and the European study may be related to more than one explanation which includes sample size used, age group in the study, the different criteria used for diagnosis of IBS, environmental and demographic changes between regions and higher stressors present on the population of one study than the others.

As regard to varied types of students, a Chinese study showed that a higher risk of IBS was found in medical students than science and engineering students [15]. In a Japanese study, results found that the IBS prevalence was 35.5% between undergraduate nursing and medical students [14]. Two Pakistani studies showed similar rates among medical students: 28.3% in 2012 [19] and 34% in 2005 [20]. In a Korean study, the rate was 29.2% between undergraduate medical students [21]. In contrast, current analysis found the prevalence rate of IBS of 49.3%. This difference between the current study and other studies might be related to not only the difference in genetic, environmental factors and diagnostic criteria used, but also the enormous stress in some countries moreso than others.

A study conducted in 2003 in the United States reported that the undergraduate medical students who met the IBS criteria were only 11% [22]. A study conducted among secondary school students in Saudi Arabia showed that IBS prevalence extended between 8.9 and 9.2% based on Manning and Rome II Criteria, correspondingly [23]. The discrepancy between the last two studies and the current study may be related to a more tough stressful medical life than others which played a main risk factor in predisposition of IBS [14,24]. Longer time to achieve medical degree, exams, large numbers and irregular and too many studying hours are all examples of these stressful conditions [24].

The described connections that are verified in our study are female gender and advanced academic grade. In comparison to males, females two times more likely than males of having IBS. This finding shows similar results in wider studies which reported strong associations between female gender and IBS [14, 15,17,18,19,21,24,25].

As regards age relation and academic level, the current study reported that higher IBS prevalence was found more in older students who are in higher academic grades (fifth- and sixth-year students) than in low academic grade students. The explanation might be the relation between clinical years and increased work and stressors. Another Chinese study stated that the higher the level of undergraduate medical students, the more risk of having IBS [15]. Another study performed by Payne et al. in 2004 reported that age and IBS prevalence had no relation to each other [26]. Similar results were found in a Canadian study conducted in 2012 [25]. An Iranian systemic review reported that IBS prevalence was higher in the lower-level undergraduate medical students than higher academic levels [27].

As regards sleep changes, the current study reported that sleeping less than 6 hours per day students reported more IBS prevalence than students who sleep more than 6 hours per day. Another study conducted in Saudi Arabia by Al-Turki et al. reported that students with insomnia had more risk of developing IBS in comparison to others [28]. Another study stated that sleep disorders were more common in males who had IBS than females [23]. However, another Canadian study showed that undergraduate medical students who don't sleep at night were not associated with IBS development [25].

As regard habits, the current study stated that the prevalence of IBS was higher (26.1%) among students who didn't do any physical exercise in relation to others (23.2%). A study conducted in Saudi Arabia showed higher IBS prevalence in students who did less exercise than others [29].

Conclusion

The current study showed higher prevalence (49.3%) of IBS in undergraduate medical students in Saudi Arabia. Female gender, less exercise practicing, emotional disorders such as stress and higher academic level were the major indicators and predictors for IBS risk. More screening is needed for IBS early detection through early identifying psychological problems in medical students. Management of stress is needed for medical students to allow them to face medical field stressors without a negative impact on their, mental and physical health.

List of abbreviation:
IBS: Irritable bowel syndrome
KSA: Kingdom of Saudi Arabia

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Physicians' Perceptions and Attitudes toward Use of Electronic Medical Record Systems in Riyadh

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Abstract

Aim: This study explores the perceptions of physicians and their attitudes toward the implementation of the electronic medical record (EMR) in general hospitals in Riyadh to identify the perceived difficulties, burdens, and usefulness of implementing electronic medical records. It also aims to identify key demographic factors and training determinant predictors that may help explain physicians' perceptions of EMRs.

Methods: This cross-sectional survey was conducted in three general hospitals in Riyadh using a self-administered questionnaire. A pilot study was conducted to test the questionnaire's reliability, and random cluster sampling was used to build the sample. Responses were rated using a Likert-type scale.

Results: A total of 160 physicians filled out the questionnaire. The majority of physicians (91.3%) stated that they had heard of the EMR. Physicians rated their agreement on the usefulness of implementing the EMR positively (mean score, 3.8/5). Similar, most physicians generally agreed that the EMR could enhance their productivity (mean score, 3.6/5), prevent documentation error (mean score, 3.8/5), improve the quality of services (mean score, 3.8/5), improve the ease of finding patient records (mean score, 4.1/5), improve communication (mean score, 3.8/5), and save their patients' time (mean score, 3.5/5). However, physicians perceived lack of technical support and reliability of the information from other hospitals as potential burdens. Pearson's correlation test showed that greater belief in the effectiveness of the EMR was significantly associated with greater belief in its usefulness ($r = 0.81$, $p<0.01$). Likewise, greater physician perception of expected technical support was significantly associated with greater physician perception of effectiveness ($r = 0.61$, $p<0.01$).

Conclusion: There is a necessity for formal educational programs to improve physicians' overall attitude toward the EMR.

Key words: Electronic medical record, Medical records, Riyadh City, Saudi Arabia

Introduction

The healthcare industry faces several challenges in achieving its primary goal: the delivery of healthcare. On the other hand, there is a continuous improvement process and innovation to overcome such challenges. One of these innovations is the Electronic Medical Record (EMR), which simply uses information and communication technologies in a healthcare organization to facilitate rapid access to data and information for decision-making and problem-solving processes, either at the patient or organizational level. The Healthcare Information and Management Systems Society (HIMSS) defines EMR as "an application environment that consists of the clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized provider order entry, pharmacy, and clinical documentation applications. This environment supports the individual patient's electronic medical record across inpatient and outpatient environments, and is used by healthcare practitioners to document, monitor, and manage healthcare delivery within a healthcare organization" (1).

Many studies that have explored the effect of implementing the EMR in healthcare organizations have reported positive effects on the quality of healthcare, patient safety, and efficiency of healthcare services(2–9). However, despite positive effects resulting from the successful implementation of the EMR, it is estimated that the failure of its implementation in healthcare facilities ranges from 50–80%. This high failure rate demonstrates that technology alone is not enough to ensure successful and effective use of the EMR(10).

Like any innovation, there is a human–innovation interaction factor that affects the innovation diffusion process(11). Investigators found many barriers to adopting the EMR, one of which is the human factor, particularly physicians, due to their central role in healthcare delivery(12). In his book "Diffusion of Innovations," Rogers defined the innovation-decision process as "the process through which an individual or other decision-making unit passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision"(11). A systematic literature review that used Rogers's theory of innovation diffusion to identify a knowledge-based classification of critical factors for adopting electronic records by physicians identified six critical adoption factors: user attitude toward information systems, workflow impact, interoperability, technical support, communication among users, and expert support (13).

Several studies on implementing the EMR have been conducted in the Kingdom of Saudi Arabia. Many of these studies showed that the most prevalent barriers that delayed or hindered the adoption and the successful implementation of the EMR were "human barriers," including negative beliefs, behaviors, and attitudes of healthcare professionals toward such systems(14,15).

In this study, we aimed to explore the perceptions of physicians and their attitudes toward the EMR. The secondary objective of this study was to identify correlations between physicians' demographic and training-related predictors that may help explain their overall perceptions of the usefulness of implementing an EMR.

Materials and Methods

This cross-sectional survey was conducted in three general hospitals in Riyadh: Al-Yamamah Hospital, Al-Iman Hospital, and Al-Imam Abdulrahman Al-Faisal Hospital. These hospitals were randomly chosen from a total of six general hospitals reporting to the General Directorate of Health Affairs in Riyadh. Random cluster selection was used to select the target group, which included physicians working in these hospitals.

Survey Tool

Primary data were collected by a self-administered questionnaire that was divided into two parts. The first part was used to collect demographic data and the second listed 27 statements that were assessed on a Likert scale. These items were selected considering critical factors that affected physicians' adoption of the EMR, including user attitude toward information systems, workflow impact, interoperability, technical support, communication among users, and expert support(13). A pilot study was conducted to test the questionnaire's internal consistency by using Cronbach's alpha. The Cronbach's alpha was 0.82, which is acceptable(16).

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (IBM, SPSS Inc., Armonk, New York, version 21) and MS Excel. Means and standard deviations were used to describe continuous variables, whereas frequencies and percentages were used to describe categorical and binary variables. Associations between continuous variables, such as physicians' perceived usefulness, barriers, difficulties, and burden from the EMR, were measured using Pearson's correlation as a bivariate effect size statistic. Additionally, one-way ANOVA and t-tests were used to explore the main effects of demographic variables and other factors that were relevant to EMR use. Cronbach's alpha test of reliability was used to test the internal consistency of the questionnaire.

Factor analysis (FA) and principal component analysis (PCA) were used to examine the factorial validity of the full questionnaire. Four main concepts were developed: "EMR usefulness," "EMR expected effectiveness," "expected technical support," and "perceived burden and difficulty." Summative analysis and recode features in SPSS were used to compute the means and standard deviations for each of the indicators that comprised the main perceptive concepts of the study. The average scores for the main concepts (domains) and their sub-concepts were computed using the total score divided by the number of indicators that comprised each sub-concept for every participant. Means and standard deviations were computed for these

main domain perceptions accordingly. Finally, multiple regression was used to determine the individual and joint relationships between physicians' characteristics when these independent variables were set as variates against the physicians' perception of usefulness and their perceived difficulties of EMR use. The alpha level was set to 0.05.

Exploratory factor analysis was used with the maximum likelihood method to identify the smallest but most meaningful, simple, and interpretable concepts from the 27-item questionnaire.

Ethical Considerations

The Riyadh General Directorate of Health Affairs granted approval to conduct this study. Additionally, consent was obtained from every participant after providing full information about the aims of the study. The participants were informed that participation in the study was entirely voluntary, and they were assured of the confidentiality and anonymity of any information shared.

Results

Out of the 450 questionnaires sent to physicians, only 160 complete records were returned, representing an overall response rate of 35.5%. Male respondents were strongly represented in the sample (68.8%). The respondents' ages ranged between 20–50 years, with most aged 31–40 years (40.6%). Their clinical roles varied, with resident physicians representing nearly half of the sample (48.1%). Only 40.6% of respondents were Saudi physicians, and most hailed from Al-Yamamah Hospital (46.3%). The majority of physicians (91.3%) stated that they had heard of the EMR (Table 1).

Table 1. Physician demographics and work characteristics

Variables	Frequency	Percentage
Gender		
Male	110	68.8
Female	50	31.2
Age		
20–30 years	47	29.4
31–40 years	65	40.6
41–50 years	33	20.6
>50 years	15	9.4
Role/Position		
Resident	77	48.1
Specialist	55	34.4
Consultant	28	17.5
Nationality		
Saudi	65	40.6
Non-Saudi	95	59.4
Hospital		
Al-Yamamah Hospital	74	46.3
Al-Iman Hospital	37	23.1
Al-Imam Abdulrahman Al-Faisal Hospital	49	30.6
Ever heard about the electronic medical record?		
Yes	146	91.3
No	14	8.8

Of the 146 physicians who responded to questions about previous exposure to the EMR, 46.3% said they had knowledge of the EMR from their daily hospital practice, followed by 16.3% who reported studying the EMR in college. The distribution of other responses is displayed in Table 2.

Table 2. Physicians' previous sources of information on the electronic health records (N = 146)

Participants' Responses	Frequency	Percentage
During my study in college	26	16.3
I attended a course about it	8	5.0
Through media (TV, newspapers, social media)	13	8.1
From my friends	12	7.5
Websites search	7	4.4
In my daily practice in hospital	74	46.3
In a conference	4	2.5
Other	2	1.3

EMR Usefulness

The mean rating of the physicians' perception of the usefulness of implementing the EMR was 3.8 out of five (Table 3). Furthermore, the physicians rated their expectation of the EMR to enhance their productivity positively (mean score, 3.6/5). However, 6.9% strongly disagreed, 10% disagreed, and 22.5% were neutral. The physicians generally agreed with the ease of documenting patient information using the EMR (mean score, 3.8/5). Most respondents either agreed (38.1%) or strongly agreed (30.6%) that documentation could be made easier with the EMR. When physicians were asked to rate error prevention when using electronic records, their overall rating was 3.8 out of five points. Most respondents either agreed (38.8%) or strongly agreed (31.3%) that medical errors could be prevented by implementing the EMR. The physicians generally agreed that EMR implementation improved quality of services (mean score, 3.8/5). The majority either agreed (40.6%) or strongly agreed (34.4%).

The respondents also rated their agreement with the improved ease of finding patient records using the EMR favorably (mean score, 4.1/5). Most respondents agreed (35.6%) or strongly agreed (41.9%) that the EMR could expedite access to patients' medical records. Moreover, the physicians rated their agreement with the time-saving capacity of the EMR favorably (mean score, 3.6/5), with 34.3% agreeing and 26.9% strongly agreeing that the EMR could potentially save time.

The respondents rated their agreement with the ability of the EMR to improve communication (mean score, 3.8/5). The majority either agreed (39.4%) or strongly agreed (30.6%). The respondents also rated their agreement with the ability of the EMR to expedite workflow (mean score, 3.7/5), with most either agreeing (43.1%) or strongly agreeing (25%).

Finally, the respondents rated their agreement with the potential of the EMR to save their patients' time (mean score, 3.7/5). The majority either agreed (35.8%) or strongly agreed (28.8%) that the EMR could potentially save their patients' time.

Table 3. Descriptive statistics for physicians' perceptions on the usefulness of the electronic health record

Item#		Mean (SD)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Electronic Health Record Usefulness	3.8 (1.0)					
5	Using electronic medical record will increase my productivity	3.6 (1.2)	11 (6.9%)	16 (10%)	36 (22.5%)	54 (33.8%)	43 (26.9%)
6	Using electronic medical record will be easier for documentation	3.8 (1.2)	9 (5.6%)	21 (13.1%)	19 (11.9%)	61 (38.1%)	49(30.6%)
4	Using electronic medical record will reduce medical errors	3.8 (1.1)	3 (1.9%)	31 (19.4%)	14 (8.8%)	62 (38.8%)	50 (31.3%)
3	Using electronic medical record will improve the quality of care	3.8 (1.3)	23 (14.4%)	6 (3.8%)	11 (6.9%)	65 (40.6%)	55 (34.4%)
7	Using electronic medical record will be easier to find patient information	4.1 (1.1)	8 (5%)	9 (5.6%)	17 (10.6%)	57 (35.6%)	67 (41.9%)
8	Using electronic medical record will save me time	3.6 (1.3)	11 (6.9%)	29 (18.1%)	22 (13.8%)	55 (34.3%)	43 (26.9%)
12	Using electronic medical record will make communication with the team easier	3.8 (1.1)	8 (5%)	16 (10%)	22 (13.8%)	63 (39.4%)	49 (30.6%)
13	Using electronic medical record will make for smoother workflow	3.7 (1.1)	11 (6.9%)	12 (7.5%)	28 (17.5%)	69 (43.1%)	40 (25%)
10	Using electronic medical record will save patient time	3.7 (1.2)	9 (5.6%)	21 (13.1%)	26 (16.3%)	57 (35.8%)	46 (28.8%)

Expected Effectiveness of EMR Interoperability

The physicians' mean rating of the expected effectiveness (interoperability) of the EMR for hospital operations, processing, distance consulting, and enhanced patient outcomes was 3.7 out of five (Table 4). The physicians rated their agreement with the duplicate record and documentation capacity of the EMR favorably (mean score, 3.9), with most agreeing that the EMR could prevent duplicate records.

Other components that the physicians rated favorably included the ability of the EMR to help them with remote consultations, prevent duplicate and unnecessary investigations, enhance referral system efficiency, improve patient access to health care, and improve patient outcomes.

Table 4. Descriptive statistics for physicians' perceptions on the effectiveness of the electronic health record

Item#		Mean (SD)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Effectiveness of the electronic medical record	3.7 (0.9)					
29	Interoperability: will prevent the duplication of prescriptions	3.9 (1.1)	13 (8.1%)	9 (5.6%)	16 (10%)	72 (45%)	50 (31.3%)
27	Interoperability: can help to perform remote consultation	3.7 (1.2)	13 (8.1%)	10 (6.3%)	32 (20%)	67 (41.9%)	38 (23.8%)
25	*Interoperability: will not repeat unnecessary investigations	3.8 (1.1)	8 (5%)	16 (10%)	23 (14.4%)	65 (40.6%)	48 (30%)
28	Interpretability: referral system will be more efficient	3.7 (1.1)	9 (5.6%)	14 (8.8%)	29 (18.1%)	67 (41.9%)	41 (25.6%)
24	Interoperability: will improve patients' access to healthcare	3.6 (1.3)	19 (11.9%)	14 (8.7%)	23 (14.4%)	64 (40%)	40 (25%)
16	Using electronic medical record will improve patient outcomes	3.7 (1.2)	11 (6.9%)	13 (8.1%)	33 (20.6%)	59 (36.9%)	44 (27.6%)
19	Technical problems will disrupt our work	3.6 (1.2)	10 (6.3%)	16 (10%)	41 (25.6%)	50 (31.2%)	43 (26.9%)

EMR-Related Difficulty and Expected Technical Support

The physicians rated their agreement with the notion that EMR would improve technical support (mean score, 3.1/5). Although they favorably rated their agreement with the adequacy of training on the EMR (mean score, 3.1/5), 8.1% strongly disagreed and 26.9% disagreed that the training would be enough (Table 5). Overall, 27.5% agreed and 16.9% strongly agreed that training would be satisfactory.

The physicians were undecided about whether technical support would be available 24 hours a day (mean agreement rating of 3.0/5). Overall, 20% strongly disagreed, 17.5% disagreed, and 23.1% were undecided. They rated their agreement on the timeliness of problem-solving for the EMR as 3.1 out of five. In most cases, physicians either agreed (20%) or strongly agreed (14.4%).

Similarly, the physicians favorably rated their agreement with the expected clarity of the instruction guidelines that would be provided by the information technology personnel about EMR (mean score, 3.3/5). In most cases, 34.3% agreed and 12% strongly agreed that the information technology team would provide clear guidelines.

Item#	Technical Support	Mean (SD)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Technical support: training for use the system will be						
18	enough	3.2 (1.2)	13 (8.1%)	43 (26.9%)	33 (20.6%)	44 (27.5%)	27 (16.9%)
17	Technical support will be available 24-hours	3.0 (1.4)	32 (20%)	28 (17.5%)	37 (23.1%)	33 (20.6%)	30 (18.8%)
20	Technical problems will be solved quickly	3.1 (1.1)	12 (7.5%)	43 (26.9%)	50 (31.3%)	32 (20%)	23 (14.4%)
23	There will be clear guidelines to use the system	3.3 (1.1)	11 (6.9%)	27 (16.9%)	43 (26.9%)	55 (34.3%)	24 (12%)
	Burden/Difficulty	**2.8 (0.8)**					
22	*Using computer is not my job	2.7 (1.1)	23 (14.4%)	60 (37.5%)	32 (20%)	38 (23.8%)	7 (4.4%)
21	*Technical support: Nobody will help me to use the system	2.9 (1.2)	14 (8.8%)	55 (34.5%)	42 26.3%)	30 (18.8%)	19 (11.9%)
26	*I will not trust patient information from other hospitals	2.9 (1.2)	19 (11.9%)	47 (29.4%)	43 (26.9%)	36 (22.5%)	15 (9.4%)
15	Using electronic medical record will not add value to my medical practice	2.6 (1.2)	22 (13.8%)	68 (42.5%)	32 (20%)	23 (14.4%)	15 (9.4%)

Table 5. Descriptive statistics for the physicians' perceived expected technical support and difficulty of using the electronic health record

Perceived Burden and Difficulty

The physicians rated their agreement with the expected burdens and consequences of EMR technical support as 2.8 out of five. In general, the physicians disagreed with the fact that using a computer was not their part of their job.

Moreover, the physicians rated their agreement that no one would help them use EMRs. The mean rating was 2.9 out of 5 , with 18.8% agreeing and 11.9% strongly agreeing that nobody would help them use the system.

Similarly, the physicians were uncertain about whether they could trust EMR information from other hospitals. The mean rating was 2.9 out of five, with 18.8% agreeing and 11.9% strongly agreeing that they could trust data from other hospitals.

Associations Between the Physicians' Perceptions of the EMR

Pearson's r test showed that a greater belief in the effectiveness of the EMR was significantly associated with a greater belief in its usefulness ($r = 0.81$, $p<0.01$). Physicians who perceived greater expected technical support were significantly more likely to perceive the usefulness of the EMR ($r = 0.63$, $p<0.01$). Likewise, greater physician perception of expected technical support was significantly associated with greater physician perception of effectiveness ($r = 0.61$, $p<0.01$). There was also a weak but significant negative association between expected difficulties with using the EMR and its effectiveness. Physicians who perceived greater difficulty were significantly more likely to perceive the EMR as less effective ($r = -0.22$, $p<0.01$).

The Difference between Physicians' regarding their perception of the EMR

To determine whether the physicians perceived greater or lesser difficulty with using the EMR than their perceptions of its usefulness and efficiency, we used a paired-sample t-test. The means and standard deviations of these main concepts are as follows: perceived usefulness, 3.8 (1.0); perceived effectiveness, 3.7 (0.9); perceived expected technical support, 3.1 (1.0); and perceived burden/difficulty, 2.8 (0.8).

The paired sample t-test showed that the physicians perceived significantly greater usefulness from using the EMR (mean, 3.8; SD, 1) than its difficulty (mean, 2.8; SD, 0.8; $p<0.001$) (Table 6). Likewise, the physicians reported greater trust in the effectiveness of the EMR (mean, 3.7; SD, 0.9) than they perceived difficulties associated with using such electronic interfaces (mean, 2.8; SD, 0.8). The t-test showed that the difference between effectiveness and difficulty was statistically significant ($p<0.001$). Additionally, the physicians' perceptions of technical support (mean, 3.1; SD, 1) significantly exceeded their perceptions of difficulty (mean, 2.8; SD, 0.8; $p<0.001$).

Table 6. Paired samples test comparing physicians' perceived usefulness, effectiveness, and expected support versus perceived difficulty and burden from the electronic health record

	Mean Difference	95% Confidence Interval		*p*
		Lower	Upper	
Usefulness vs. burden/difficulty	.98325	.79728	1.16921	< 0.001
Effectiveness vs. burden/difficulty	.93862	.76708	1.11015	< 0.001
Expected technical support vs. burden/difficulty	.37813	.18805	.56820	< 0.001

Pearson's correlation test showed that greater belief in the effectiveness of the EMR was significantly associated with greater belief in its usefulness ($r = 0.81$, $p<0.01$). Likewise, greater physician perception of expected technical support was significantly associated with greater physician perception of effectiveness ($r = 0.61$, $p<0.01$), as shown in Table (7).

Table 7. Correlations between Physicians perceptions of the E-HR's: Usefulness, effectiveness, expected technical support and difficulty

	Usefulness	Effectiveness	Expected technical support
E-HR Effectiveness	0.81**		
Expected technical support	0.63**	0.61**	
Expected burden/difficulty	0.11	-0.22**	0.12

** Correlation is significant at the 0.01 level (2-tailed).

Further analysis showed that younger physicians were significantly more likely to perceive the EMR as useful than older physicians when everything else was accounted for in the model (p = 0.003). Likewise, consultant physicians were significantly more likely to perceive the EMR as useful than residents (reference group, p = 0.051), but consultants were similar to specialists regarding their belief in the usefulness of EMRs (p = 0.347 when everything else was kept constant). Of note, physician gender, academic level, nationality, and previous training were not significantly associated with the perception of EMR usefulness (Table 8).

Table 8. Multivariate linear regression model explaining variations in physicians' overall perception of the usefulness of electronic health records

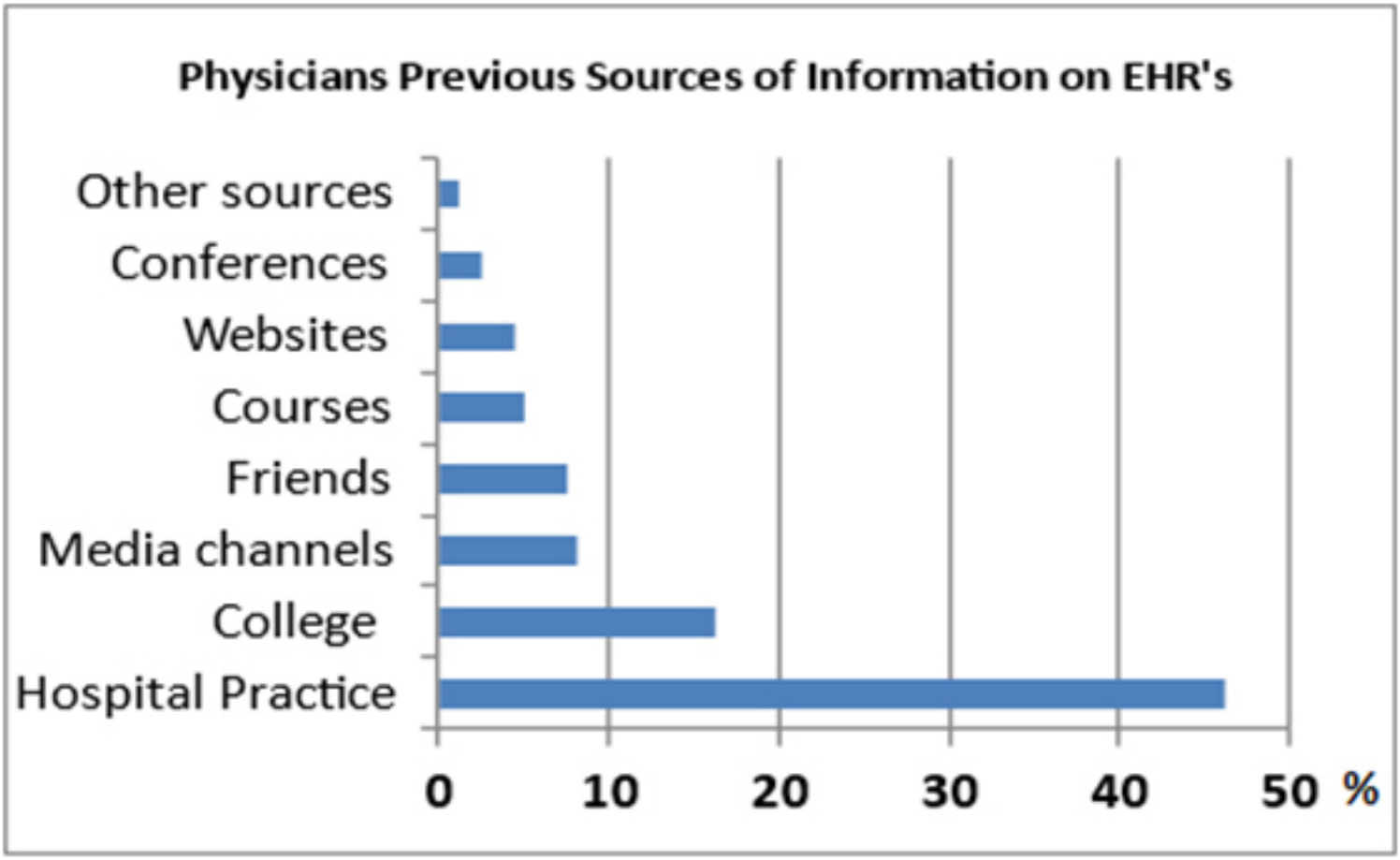
Variables	B	Standard Error	Standardized Beta	t-value	p-value
(Constant)	3.000	0.275		10.899	0.000
Age	-0.267	0.089	-0.332	-3.010	0.003
Sex: Male	0.066	0.107	0.041	0.620	0.536
Job: Specialist	0.137	0.145	0.087	0.944	0.347
Job: Consultant	0.419	0.213	0.213	1.969	0.051
Nationality: Non-Saudi	0.038	0.107	0.025	0.356	0.722
Yammama Hospital	1.002	0.120	0.669	8.387	0.000
Eman Hospital	0.702	0.139	0.396	5.062	0.000
Previous EHR training: Yes	0.201	0.184	0.076	1.094	0.276

Abbreviation: EHR, electronic health record.

We found a statistically significant difference between physicians' sources of information and their perceived usefulness of the EMR (p = 0.005). Alternatively, the Welch adjusted ANOVA F-test showed statistically significant differences between physicians' previous sources of information regarding the EMR and their perceived usefulness of the EMR (p<0.001; Figure 1). A Games-Howell adjusted post-hoc pairwise comparison showed that physicians who reported having received information on the EMR during college training had a significantly higher perception of EMR usefulness than those who either learned from media channels (p = 0.006) or from practicing elsewhere (p<0.001).

Those who reported learning from formal channels, such as courses and conferences, were significantly more likely to perceive the EMR as useful than those who learned from media channels such as newspapers, TV, and social media (p = 0.043). Additionally, those who learned from practicing elsewhere were significantly more likely to perceive the EMR as not very useful than those who learned from formal training courses and conferences (p = 0.019).

Figure 1. Physicians' perception of electronic medical record and their source of knowledge of the electronic medical record



Discussion

A great proportion of the physicians in this study perceived EMRs to be useful and effective in terms of interoperability, and they expected greater technical support and trust in the EMR than those who perceived it negatively. Of note, the participants had either a negative attitude or were undecided about technical support. According to the innovation diffusion process, this is an area for educational and training interventions to ensure positive attitudes and, therefore, lower the risk of failure in adopting the EMR (11). Previous studies conducted in Saudi Arabia found that while physicians and other healthcare professionals were excited to use the EMR, there were concerns about the underutilization of many core functions of the system(17,18).

Our study adds to prior work by studying the predictors that may explain physicians' overall perceptions of the EMR, including barriers that precluded them from adopting the EMR and using it to document patient information.

We found that physicians generally agreed that the EMR facilitated the documentation of patient information, with most agreeing that they would trust information from other hospitals. Additionally, the physicians surveyed believed in the potential of the EMR to decrease patient waiting times and delays. However, we did not determine whether physicians used the EMR at the end of each encounter or during an encounter with their patients. Previous research suggested that EMR use during clinic visits was associated with worse patient experiences (19). Indeed, a more recent report found that about 49% of primary care physicians and 36% of specialists reported that EMR use worsened the physician–patient interaction (20). Given that close to one-fifth of the physicians in the current survey did not believe that EMR use saved patients' time, it would be worth measuring the negative impact of EMRs on physician–patient interactions.

Prior work indicated that restricted access to technical support and system limitations were perceived barriers to EMR adoption (12). This underscores the need to provide technical support and EHR training to physicians. In fact, we found that physicians who perceived that they would need more technical support were significantly more likely to perceive the usefulness of the EMR. Similarly, physician perception of needing more technical support was significantly associated with a higher perception of the effectiveness of the EMR. Furthermore, we found that learning from educational channels, like courses and conferences, significantly increased perceived usefulness more than when physicians learned from media channels or from practicing elsewhere.

Multivariate linear regression model showed that younger physicians were significantly more likely to perceive greater usefulness of the EMR than older physicians. Our findings are consistent with those of other authors who reported that older physicians were less likely to use the EMR compared to younger physicians (21). Such findings suggest the need to consider individual characteristics such as age when developing strategies for EMR implementation.

Our results are also in line with those of other authors who found that a greater proportion of physician consultants used the EMR compared to residents and specialists (22–24). While there is no clear explanation for our observation, one study conducted in the United States suggested that federal initiatives, which specifically targeted certain subgroups of physicians, may contribute to higher use rates among these subgroups (22). We believe that if residents and specialists are not fully using the EHR of their health institutions, the potential for them to share information to improve health care is compromised. Future studies in our context should investigate why residents may not perceive value in using the EHR and how their perceptions of the EHR can be improved.

Our study has strengths and limitations. The main strength of this study is that the principal component analysis of questionnaire responses showed constructive validity, i.e., the four main concepts logically related to the theoretical construct of the questionnaire. Moreover, Cronbach's alpha is > 0.82, showing acceptable reliability(16). However, our study has limitations that should be discussed. First, it has all the limitations inherent to cross-sectional surveys. Second, the response rate was 35.5%, which is relatively low but acceptable as it is close to the average response rate for similar studies (average response rate = 35.7% and SD = 18.8) (21).

Conclusion

Overall, physicians have a positive attitude toward most critical factors that can affect the adoption of the EMR. Additionally, no formal education on the EMR was offered to most physicians. There is a significant relation between physicians' source of information about the EMR and their perception of this technology, with greater perception associated with formal training. We recommend that the Ministry of Health offer an EMR education program targeting physicians to encourage physicians to use EMRs and, consequently, reduce the risk of adoption failure due to physicians' attitudes.

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Job Related Burnout among Emergency Physicians and Nurses in Dammam City, Saudi Arabia

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Abstract

Background: Burnout has been related with physical assault especially among health care experts and unit staff who are more in danger of encountering distressing occasions.

Objectives: To assess prevalence of burnout among Emergency Department (ED) staff in Dammam City, Saudi Arabia, and to assess the potential associated factors.

Methods: A cross-sectional study was conducted in EDs in 3 public hospitals in Dammam during the period from April to July 2019.

Results: Most participants suffered from high level burnout for depersonalization and low personal achievement. Burnout was found among 76% of them. Male gender, being married or divorced, poor relationships with colleagues, suffering from psychiatric disorders and having less rest days were significantly associated with higher levels of burnout among the study subjects.

Conclusions: Most physicians and nurses working at emergency hospitals in Dammam City, Saudi Arabia, had burnout disorder, especially high compassion fatigue and low personal achievement.

Key words: Burnout, Emergency rooms, Physicians, Nurses, work execution, conflict

Background

Burnout is "a disorder of compassion weariness, depersonalization, and decreased individual achievement that can happen among people who work among groups and help others" and it alludes to a contrary outcome of chronic and incessant work pressure (1). Burnout has been related with physical ambushing especially among health care experts and unit staff who are more in danger of encountering distressing occasions (2). Patient's pain and passing, uncooperative conduct of the patient, irrational requests, problematic patients, trouble with organization and absence of passionate help from colleagues and other staff members were viewed as potential stressors (3, 4).

For example, in Dammam, there are around a million people and contrasted with the quantity of emergency rooms for only three hospitals i.e., King Fahad University Hospital; Maternity and Children Hospital; and Dammam Center Hospital (5). The congestion of ED has different impacts as putting the patient in danger and poor outcomes, diminished doctor's profitability, expanded dissatisfaction among medicinal staff, and causing burnout (6).

A cross-sectional study n was held in the emergency medical hospital of University of Tanta, Egypt in 2015, and shows that age, recurrence of presentation to brutality and cruelty at work, long experience, work load, supervision and work exercises were huge indicators of burnout disorder 66% (7). In different cross-sectional studies dependent on a survey directed in a college in Niš in 2016, focusing on ED doctors and medical caretakers, argues that the personal factors in adapting to work pressure altogether diminish the burnout disorder (8). The presentation of savagery in the workplace is related with burnout in ED staff 64% (9). Diminished requests and increment of labourers' autonomy over their activities lessens the burnout disorder (10). Burnout disorder influences the execution of work adversely (11).

Also, a cross-sectional review study demonstrated that feeble logic because of business related pressure can influence the presentation of burnout adversely (12). Multilevel relapse examination study showed that the atmosphere and lack of cooperation among collaborators are considered hazard factors of burnout disorder (13).

This study aimed at assessing of the prevalence of burnout among ED staff in Dammam and assessing the potential associated factors.

Methods

Study design and sample:
A cross-sectional study was conducted in Emergency Departments in governmental hospitals in Saudi Arabia including Qatif central hospital in Dammam, and Dammam central hospital and Maternity and children in Dammam from April to July 2019. These hospitals are the main providers of emergency and trauma service in Dammam, Saudi Arabia (KSA).

Study population and sample size:
The targeted population included all ED physicians and nursing staff in Dammam City, Saudi Arabia. The inclusion criteria were all doctors and nurses of ED staff in the governmental hospitals who have been working for more than one year. Those who had experience of less than one year in the ED, trainees, physicians and nurses who are working in administration or those who work in ED in private hospitals were excluded.

Sampling:
All Doctors and nurses working in the ED in the targeted hospitals were approached with a questionnaire sheet to cover the calculated required minimum sample size which is 104. The total number of ED physicians and nurses in the targeted hospitals is 150. The sample size was calculated by the Epi-Info Software, based on 95% level of significance, assuming that the prevalence of stress and burnout among ED physicians and nurses is 64.1% with accepted margin error 5%.

Study tools and data collection:
The questionnaire was developed after reviewing relevant literature by searching several medical databases, e.g., Science Direct, Scopus, PubMed. The questionnaire was reviewed and validated by three experts then the data were collected. Data were collected by visiting the hospitals 5 days per week until all staff were covered, by using a self-administered questionnaire after obtaining the acceptance from the administration to distribute the questionnaire to all ED doctors and nurses. The questionnaires were completed and returned to data collectors in the same session. This questionnaire covered the sociodemographic characteristics (age (in years), gender (male and female), marital state (married, single, divorced, widowed), occupation (nurse, doctors), and job details (workload per shift [how many patients seen by each doctor/nurse], number of shifts per month, number of off-days between shifts (1, 2 or 3), years of experience, professional responsibilities (residents, specialist or consultant for physicians) and (head nurse or nurse for nurses), previous exposure to workplace violence (physical or verbal) and job satisfaction (relation with colleagues [excellent, very good, good, or poor], relation with supervisor (excellent, very good, good, or poor) and bullying from colleagues or supervisors (yes, no).

Burnout was measured through the Maslach Burnout Inventory (MBI). The MBI measures burnout using 22 items grouped in three scales: emotional exhaustion (9 items), depersonalization (5 items) and reduced personal accomplishment (8 items). Emotional exhaustion measures feelings of being emotionally exhausted; depersonalization measures the development of negative attitudes toward the recipients; and personal accomplishment measures feelings of successful achievement. Participants were asked to answer the MBI items based on how often they experience these feelings on a 7-point Likert scale ranging from 0 (never) to daily (6) with possible sum scores of burnout, ranging from 0 to 132.

Ethical approval:
The ethical committee of faculty of medicine and the 3 included hospitals approved the study and the questionnaire sheet. A written informed consent was provided from the participants included in the study.

Statistical analysis:
The data processing was done using the Statistical Package for Social Sciences (SPSS, version 22).

Results

Demographics of the studied subjects:
Table (1) shows distribution of the studied group regarding basic characteristics. Dc hospital was 55 (52.9%) and Dm hospital was 49 (47.1%). Males were 58 (55.8%) and females were 46 (44.2%). Regarding nationality, Saudi was higher with 76 (73.1%) and non-Saudi was 28 (26.9%). Married cases were higher with 76 (73.1%) followed by single cases with 22 (21.2%). Regarding professional levels, resident (physician) was higher with 50 (48.1%) followed by diploma and specialist (nurse) with the same ratio 19 (18.3%). According to occupation, physician was higher with 67 (64.4%) followed by nurse with 34 (32.7%) and head nurse with 3 (2.9%). Number of off days between shifts was 1 in 51 (49%) cases while it was 2 and above in 53 (51%) cases. Regarding exposure to work related violence, verbal was higher with 70 (67.3%). Cases have been subjected to bullying, harassment in the last 12 months while the same number of cases have not with 52 (50%). Relations with supervisor were good in 38 (36.5%) cases, very good in 33 (317%) cases, excellent in 25 (24%) cases and poor in 8 (7.7%) cases. Relations with colleagues was excellent in51 (49%) cases, very good in 35 (33.7%) cases, good inb 16 (15.4%) and poor in 2 (1.9%) cases. Regarding income per month, from 10000 SR and 20000 SR was in 61 (58.7%) cases, up to 10000 SR was in 19 (18.3%) cases, from 20000 SR and 30000 SR was in 10 (9.6%) cases, from 30000 SR and 40000 SR and above 40000 SR was 7 (6.7%). Cases diagnosed with any psychiatric disorder were 15 (14.4%) and cases who were not diagnosed were 89 (85.6%).

Disorders among participants:
Table (2) shows the distribution of participants regarding their psychiatric disorders. Regarding emotional exhaustion, low level of burnout was found among 45 (43.3%) cases, followed by high level of burnout with 33 (31.7%) and moderate burnout were 26 cases (25%). Depersonalization was high in 55 (52.9%) cases, moderate in 31 (29.8%) cases and low in 18 cases (17.3%). Personal achievement was high in 54 (51.9%), low in 29 (27.9%) and moderate in 21 cases (20.2%). Burnout cases were higher (79, 76%), while non-burnout cases were 25 (24%).

Distribution of the studied group regarding burnout is shown in Figure 1.

Table (3) shows relation between incidence of burnout and different studied variables. A total of 42 participants in Dammam Central Hospital had burnout (53.2%), compared with 37 participants in Dammam Maternity and Children's Hospital (46.8%). Age of healthcare workers (HCW) without burnout ranged from 25-54 with mean value 31.84-6.216 and age with burnout ranged from 24-50 with mean value 32.78-5.952. Family size of HCW without burnout ranged from 0-8 with mean value 4.08-1.869 and family size with burnout ranged from 0-12 with mean value 3.50-2.069. Years of work experience without burnout ranged from 1-25 with mean value 6.48-5.009 and with burnout ranged from 1-22 with mean value 7.06-5.429. There was no statistically significant difference between incidence of burnout and demographic data ($P > 0.05$). Numbers of shifts per month in the last 6 months without burnout ranged from 17-26 with mean value 20.24-2.728 and family size with burnout ranged from 2-28 with mean value 18.67-4.760. Numbers of patients seen per shift by HCW without burnout ranged from 5-210 with mean value 57.36-62.909 and family size with burnout ranged from 1-300 with mean value 57.29-54.930. There was a statistically significant difference regarding numbers of patients seen per shift in relation to burnout ($P < 0.05$). There was a statistically significant difference regarding diagnosed with any psychiatric disorder in relation to burnout ($P < 0.05$).

Logistic regression analysis:
Entering type of job, sex, marital status, relation with colleagues and days of rest between shifts as potential associated risk factors for burnout among HCW, the only statistically significant independent factors were, being married in reference to single Odds ratio (OR), 95% CI: 5.58 [1.5, 20.7] and 1 day rest in reference to 2 or more OR, 95% CI=4.16 [1.14, 15.1].

Table 1: Demographics' and work characteristics of included subjects

	No.	%
Hospital		
• Dammam central hospital	55	52.9
• Dammam Maternity and Children hospital	49	47.1
Sex		
• Male	58	55.8
• Female	46	44.2
Nationality		
• Saudi	76	73.1
• Non-Saudi	28	26.9
Marital status		
• Married	76	73.1
• Single	22	21.2
• Divorced	6	5.8
Professional level		
• Diploma (nurse)	19	18.3
• Specialist (nurse)	19	18.3
• Resident (physician)	50	48.1
• Specialist (physician)	11	10.6
• Consultant (physician)	5	4.8
Occupation		
• Physician	67	64.4
• Head nurse	3	2.9
• Nurse	34	32.7
Numbers of off days between shifts		
• 1	51	49.0
• ≥2	53	51.0
Exposure to work related violence		
• Verbal	70	67.3
• Verbal and physical	15	14.4
• Nil	19	18.3
You have been subjected to bullying, harassment in the last year		
• Yes	52	50.0
• No	52	50.0
Relations with supervisor		
• Excellent	25	24.0
• Very good	33	31.7
• Good	38	36.5
• Poor	8	7.7
Relations with colleagues		
• Excellent	51	49.0
• Very good	35	33.7
• Good	16	15.4
• Poor	2	1.9
Income per month		
• Up to 10000 SR	19	18.3
• >10000 – 20000 SR	61	58.7
• >20000-30000 SR	10	9.6
• >30000-40000	7	6.7
• >40000 SR	7	6.7
Diagnosed with any psychiatric disorder		
• Yes	15	14.4
• No	89	85.6

Table 2: Distribution of the participants according to their burnout

	No.	%
Emotional exhaustion		
• Low level burnout	45	43.3
• Moderate burnout	26	25.0
• High level burnout	33	31.7
Depersonalization		
• Low level burnout	18	17.3
• Moderate burnout	31	29.8
• High level burnout	55	52.9
Personal achievement		
• Low level burnout	29	27.9
• Moderate burnout	21	20.2
• High level burnout	54	51.9
Burnout		
• Absent	25	24.0
• Present	79	76.0

Figure 1: Distribution of the studied group regarding burnout

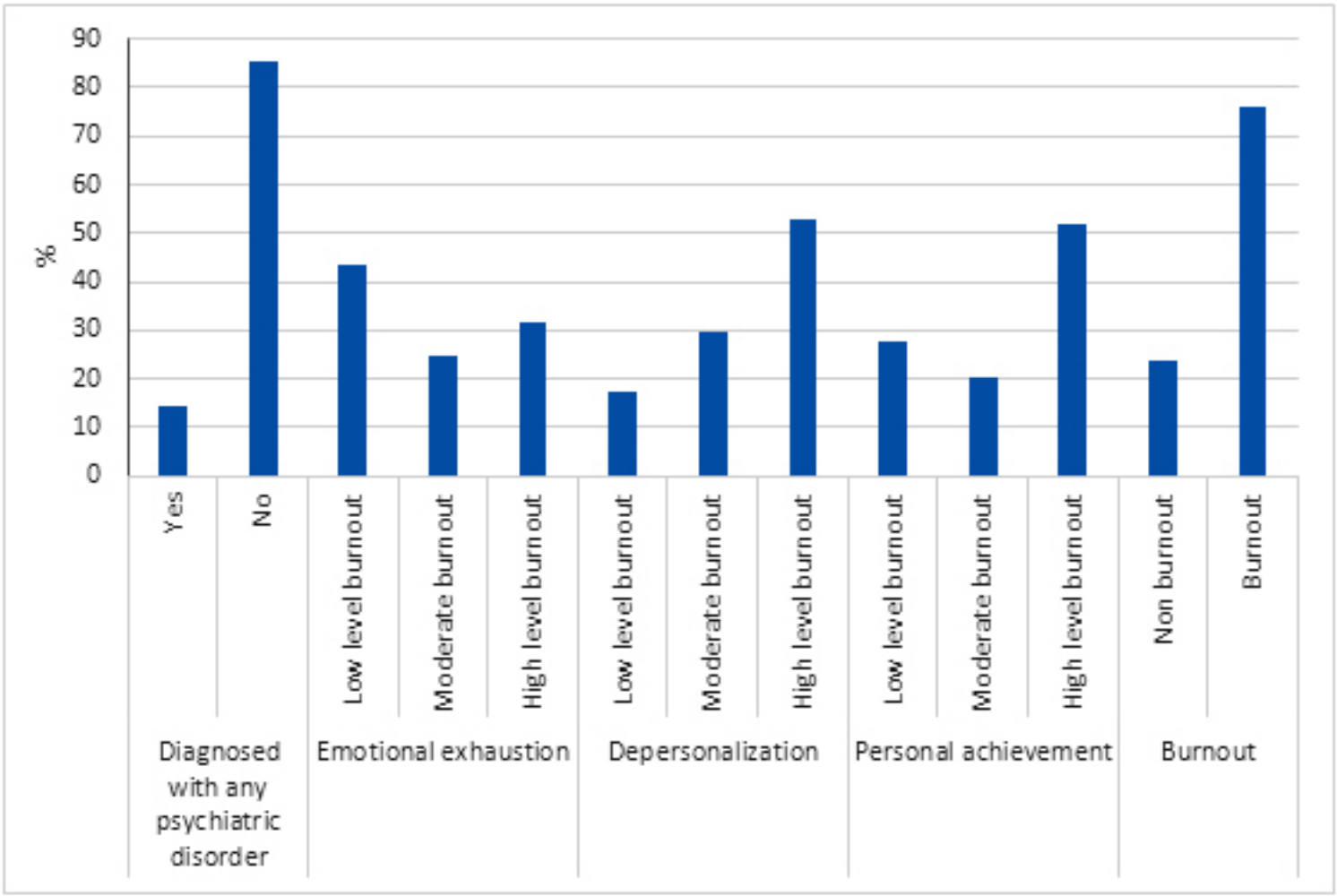

Table 3: Relation between incidence of burnout and potential associated factors

	Burnout				Test statistic P-value
	Absent		Present		
	No.	%	No.	%	
Hospital					0.010
• Dammam central hospital	13	23.6	42	76.4	0.550
• Dammam Maternity & Children hospital	12	24.5	37	75.5	
Sex					3.318
• Male	10	17.2	48	82.8	0.049*
• Female	15	32.6	31	67.4	
Nationality					0.431
• Saudi	17	22.4	59	77.6	0.339
• Non-Saudi	8	28.6	20	71.4	
Marital status					8.541
• Married	13	17.1	63	82.9	0.036*
• Single	10	45.5	12	54.5	
• Divorced	2	33.3	4	67.7	
Professional level					
• Diploma (nurse)	4	21.1	15	78.9	
• Specialist (nurse)	4	21.1	15	78.9	0.867
• Resident (physician)	14	28.0	36	72.0	0.929
• Specialist (physician)	2	18.2	9	81.8	
• Consultant (physician)	1	20.0	4	80.0	
Occupation					
• Physician	16	23.9	51	76.1	4.111
• Head nurse	0	0.0	3	100.0	0.250
• Nurse	9	26.5	25	73.5	
Numbers of off days between shifts					1.076
• 1	10	19.6	41	80.4	0.210
• ≥2	15	28.3	38	71.7	
Exposure to work related violence					
• Verbal	21	30.0	49	70.0	4.549
• Verbal and physical	1	6.7	14	93.3	0.103
• Nil	3	15.8	16	84.2	
Subjected to bullying, harassment in the last year					2.580
• Yes	9	17.3	43	82.7	0.084
• No	16	30.8	36	69.2	
Relations with supervisor					
• Excellent	7	28.0	18	72.0	4.550
• Very good	6	18.2	27	81.8	0.208
• Good	12	31.6	26	68.4	
• Poor	0	0.0	8	100.0	

Table 3: Relation between incidence of burnout and potential associated factors (contiued)

Relations with colleagues					
• Excellent	18	35.3	33	64.7	7.855
• Very good	6	17.1	29	82.9	0.049*
• Good	1	6.3	15	93.8	
• Poor	0	0.0	2	100.0	
Income per month					
• Up to 10000 SR	4	21.1	15	78.9	
• >10000 – 20000 SR	13	21.3	48	78.7	4.710
• >20000-30000 SR	2	20.0	8	80.0	0.318
• >30000-40000	4	57.1	3	42.9	
• >40000 SR	2	28.6	5	71.4	
Diagnosed with any psychiatric disorder					
• Yes	0	0.0	15	100.0	5.547
• No	25	28.1	64	71.9	0.011*

Figure 2: Distribution of participants regarding their burnout level and their relations with colleagues

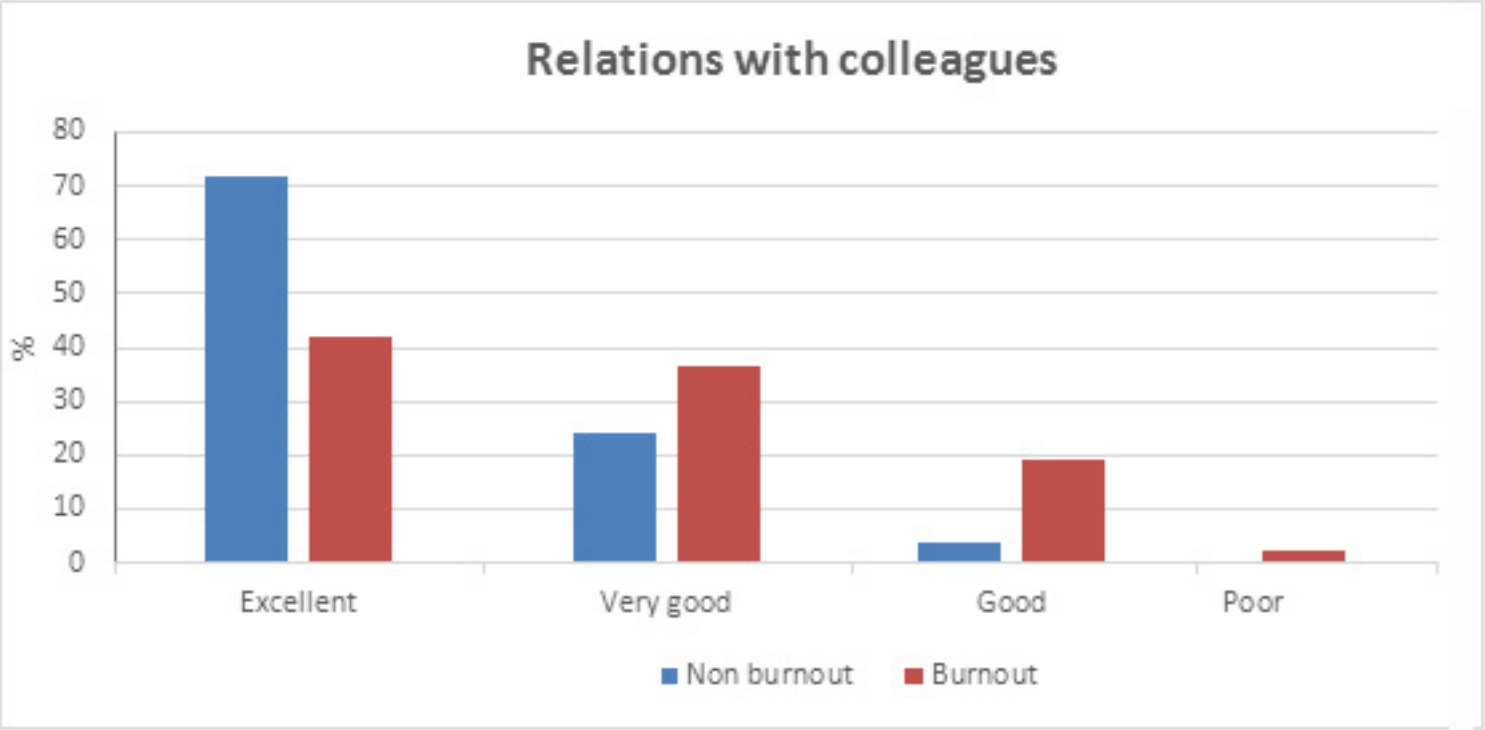

Table 4: Multiple logistic regression analysis of different independent risk factors associated with burnout

	B	S.E.	Wald	df	Sig.	OR	95% CI for OR	
							Lower	Upper
Single			7.148	2	.028			
Married	1.720	.669	6.615	1	.010	5.583	1.506	20.704
Divorced	-.407-	1.129	.130	1	.718	.665	.073	6.082
1 day rest in reference to 2 or more	1.426	.657	4.708	1	.030	4.163	1.148	15.101
Female gender	-.815-	.687	1.406	1	.236	.443	.115	1.702
Shifts/month	-.132-	.073	3.231	1	.072	.877	.759	1.012
Doctors in reference to nurses	-.733-	.692	1.121	1	.290	.481	.124	1.865
Poor relations with colleagues	1.878	1.111	2.855	1	.091	6.540	.741	57.748
Constant	3.899	1.791	4.736	1	.030	49.339		

Discussion

Occupation-related burnout is acknowledged as a difficult issue influencing a few groups of individuals related with the medical services industry where they experience the negative effects, diminishing their activity, and quality of life (14). Remembering this, it is imperative to unmistakably distinguish hierarchical stressors that are identified with employment burnout so as to support and encourage methodologies coordinated as a counteractive action and prevention (15).

Most of our participants suffered from low level burnout for emotional exhaustion, high level burnout for depersonalization and low personal achievement, thus the overall burnout between the study members was found among 76% of them. Higher results were found in a recent study concluding the contrasting burnout among various experts working under ED and showed a general frightening figure of 75.6% high compassion depletion, 84.4% high depersonalization, and 56.8% respondents had low personal achievement (16). Another study showed that Doctors expressed higher compassion and subjective burdenss when contrasted with medical nurses. The two groups had high tangible requests and duties at work, regardless of the low level of their self-rule. The importance of work, duty to the work environment, and instability at work were high for the two groups thus increasing the burnout level (8).

In disagreement with our study, a study in India showed that enthusiasm depletion and burnout level were typically low; the respondents scored a general moderate degree of depersonalization and moderate to low personal achievement. The sceptical and lack of concern disposition might be reflected by the steady interaction with a high volume of patients just as managing hazardous conditions more often than not. ED likewise experience the negative effects of extensive carelessness from the emergency clinic executives as for framework and workplace arrangement. With expanding consciousness of people in general and their developing requests for crisis social insurance, the staff in ED constantly move toward becoming demotivated towards work, prompting a feeling of diminished individual achievement (14).

The male gender, being married or divorced, poor relationships with colleagues, suffering from psychiatric disorders and having less rest days were significantly associated with higher levels of burnout among the study subjects. In the same respect, a study showed that male sex, having history of smoking and admission of medications for rest issue, were altogether connected with higher danger of burnout among emergency staff (17). However, different investigations revealed that females were at higher danger of burnout contrasted with males in ER divisions (18, 19).

Other studies announced in their survey that both work related issues and non-business related components such as age, sex, and lifestyle are related with burnout (20). Howlett and others inferred that task-situated adapting was related to diminished danger of burnout, while feeling focused adapting was related to expanded risk and negative effects of burnout (21). Also, other factors related with burnout among female emergency crisis nursing staff were absence of learning and aspiration for expert advancement (22). Another study found that more youthful (≤25 years), female, non-Saudi, low experienced, working more hours, and accessible if the need arises crisis doctors working at Makkah, Riyadh, and Jeddah Saudi urban communities were bound to express high compassion weariness contrasted with others (23). In Turkey (2016), age, sexual orientation, and monetary prosperity were all noteworthy indicators for burnout among emergency crisis staff (16).

Conclusions

An large number of doctors and medical nurses working at crisis branches of emergency hospitals in Dammam had burnout disorder, especially high compassion fatigue and low personal achievement.

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Sleep Patterns and Academic Performance among Medicine and Pharm D students in Almaarefa University 2018-2019

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Abstract

Background: Sleep is an important necessity in the human life. The majority of grown-ups require seven and a half to nine hours of sleep every night to work at their full capacity. Sleep deprivation is a common finding in students' academic life.

Objectives: To assess the relation between sleep pattern and academic performance among Al-maarefa University medical and pharmacy students in Riyadh.

Methods: An observational, descriptive, cross-sectional study. Among 162 Medical and Pharm D students. In Almaarefa University, Riyadh. It was done by a questionnaire. Data was analyzed using (SPSS).

Results: Among the included students, Findings regarding the relation between gender and depth of sleep was statistically insignificant, showed that deep sleep is 43% among males and 28% among females was considered statistically significant. Regarding shared or separated rooms, and factors. 66% used separated room. For females the shared rooms amounted to 38% while it was 19% in males. Regarding major, approximately 66% of students reported using separate rooms. For medicine students the separate rooms amounted to 71% while it was 57% among pharmacy students was also statically significant

Conclusion: Sleep pattern and GPA had no relation. However, male students had deeper sleep than females. The percentage of female students in a shared room was higher than males. Finally, medical students had a higher percentage in sharing a room than pharmacy students. Most of the respondents are majoring in medicine, as well as females were triple the number of males, this may have affected the results.

Key words: sleep, performance, University, student, Saudi Arabia

Introduction

Sleep is an important necessity in the human life(1). It is fundamental for reestablishing mental and physical wellbeing and improving the quality of life. While resting, the mind catches up with regulating a wide assortment of biological needs that keep the body running in perfect condition. This sleep and wake cycle is driven by the circadian rhythm and is affected by a huge number of things including: our daily physical activity, our routines of school and work, the food we eat, the environment we live in and so many more. The majority of adultsrequire along the lines of seven and a half to nine hours of sleep throughout every night to work at their full capacity (3). Lack of sleep and adverse effects linked with sleep issues have been overlooked and poorly understood. As a matter of fact, lack of sleep has been one of the most common issues of our society today. And those who suffer the most due to lack of sleep are the students, due to their academic stressful lifestyle. An examination with a healthy representative group demonstrated that drowsiness may considerably, and substantially affect general wellbeing and life quality (3). The sleep wake cycle of medical science students is characterized by lack of sleep, prolonged onset of sleep, and events of snoozing amid the day. Medical science students are subjected to a huge amount of responsibilities because of academic demands (4). Components identified with poor sleep include caffeine utilization, school related tension, depression, and biological factors (5). A few examinations demonstrated that students' overall work was influenced by students' bedtime and the time they woke up and not the amount of time spent in bed (6).

The bad academic performance related with lack of sleep is a particularly important issue worldwide(7). A practice especially predominant among medical students who feel obliged to undertake excessive workloads and overloaded timetables is to replace sleep with studying(2). However, sacrificing sleep might be fruitless for medical students as it blocks their learning temporarily, and affects life-long wellbeing and the potential to work as therapeutic practitioners(2).

The most remarkably affected area is the prefrontal cortex, which performs higher brain tasks including language, working memory, coherent thinking, imagination, and individuality(8). An evaluation showed that one night of reduced sleep span was followed by diminished memory encoding, which prompted less retention of knowledge, an impact proposing the hippocampus was influenced(8).

In 2017 Cvejic conducted a study in Australia exploring the complex relationship between sleep, autonomic activity, wellbeing and performance in medical students. The aim of this study was to evaluate the impact of sleep-related factors on psychological wellbeing, cognitive task performance and academic standing in medical students. The sample size was 59 undergraduate medical students. The findings stated that poor sleep quality in the month preceding assessment correlated with psychological distress ($p<0.001$) and reduced nocturnal heart rate variability ($p=0.007$). Psychological distress also correlated with reduced nocturnal heart rate variability ($p=0.031$) and less refreshing sleep during the monitoring week ($p<0.001$), but not with sleep timing parameters. A greater increase in heart rate variability during the transition from awake to sleep significantly predicted better spontaneous cognitive performance ($p=0.021$). Better academic standing was predicted by consistently short, less refreshing sleep (all $p<0.001$), along with earlier bedtimes ($p=0.004$) and greater psychological wellbeing ($p=0.009$). It concluded that unrefreshing, short-duration sleep and psychological distress are prevalent in medical students during university training and were associated with reduced nocturnal parasympathetic autonomic activity. Achieving higher academic grades was associated with high psychological wellbeing despite consistently short, unrefreshing sleep (2).

Research conducted by Wang in 2016 in China, aimed to examine Chinese adolescents' sleep patterns and school performance in the context of a high-stress academic challenge, on 481 students, The result showed that 21% of the students had bedtimes after 12:00 am, 78% had sleep latency longer than 30 minutes, 15% had wake time earlier than 6:00 am, and the vast majority (94%) had sleep duration less than 8 hours. After adjusting for selected confounders such as academic stress, prolonged sleep latency was associated with poorer self-reported academic performance ($p = 0.01$), and late bedtime was associated with higher College Entrance Exam (CEE) score. Finally the findings demonstrate that late bedtime, prolonged sleep latency, early wake time, and insufficient sleep are very common in Chinese adolescents preparing for the CEE. Furthermore, prolonged sleep latency is associated with poor academic performance and later bedtime is associated with high CEE scores, whereas no significant association is noted between other variables of sleep patterns and either academic performance or the CEE score (9).

In USA, 2016 Beebe made a study about impact of Multi-Night Experimentally Induced Short Sleep on Adolescent Performance in a Simulated Classroom. The aim of the study was to investigate whether a realistic "dose" of shortened sleep, relative to a well-rested state, causes a decline in adolescents' learning and an increase in inattentive and sleepy behaviors in a simulated classroom setting. The research was carried out on 87 students. The results showed that simulated Classroom Performance (Primary Outcomes), adolescents scored modestly but significantly higher on video quizzes following healthy sleep compared to short sleep, $z = 2.18$, $p = 0.029$. Whereas those who scored at or below the median following healthy sleep averaged little change in score (mean rise of 0.2 points). In conclusion, these findings suggest that previously-reported correlations between sleep duration and academic performance reflect true cause-effect relationships (10).

The aim of the study by Cates, 2015 in USA was to determine the quality of sleep among pharmacy students in the didactic portion of the curriculum at one school of pharmacy. The research was carried out on 253 students.

The results showed that students in the lower GPA category had higher scores on 2 of 7 components of the PSQI (Pittsburgh Sleep Quality Index, a self-rated instrument that measures sleep habits for a month) and on the global score. Poor sleep quality, indicated by a global PSQI score of greater than 5 was reported by 55% of students. The rate of poor sleeping was 75% among students in the lower GPA category compared to 45.5% of students in the intermediate GPA category and 56.2% of students in the higher GPA category (p=0.003). In conclusion, poor sleep quality was pervasive among surveyed pharmacy students in the didactic portion of the pharmacy school curriculum, especially among those with lower GPAs (11).

A study was conducted by Westrick in USA in 2015. He was studying the relationship between sleep duration and academic performance among student pharmacists. Among 364 student pharmacists >54.7% reported 6 hours of sleep or less at night during weekdays, and >58.1% took naps during the day. The majority (81.7%) reported feeling exhausted when waking up almost every day; there was significant associations between the final grade and sleep duration the night prior to an examination and between semester GPA (p=0.006). The purpose was to identify sleep patterns and frequency of daytime sleepiness and to assess the association between sleep duration and academic performance among student pharmacists (8).

In Portugal, 2014 Duarte made a study about sleep-wake patterns and their influence on school performance. The aim of the study was to characterize sleep-wake patterns and their influence on academic performance for a sample of Portuguese adolescents. The research was carried out on 2094 students. The findings showed that students with high academic achievement have better quality of sleep (67.7%) with statistical significance (P = 0.000). Poor academic achievement is observed between those who have poor sleep quality, also with statistical significance. Since the correlation between morningness/eveningness and school achievement is (r=- 0219), a percentage of 73.05% can be attributed to the effect of morningness/ eveningness on school performance, In conclusion, excessive daytime sleepiness affects most adolescents, observing that older ones and those attending the 11th grade had greater daytime sleepiness (12).

In 2013 in Ethiopia, Lemma assessed the association of sleep quality with academic performance among 2,173 university students (471 females and 1,672 males). Multiple linear regression showed that poor sleep quality was significantly associated with poor academic performance (P=0.002): a unit increase in sleep quality score was associated with 0.012 points reduction in mean CGPA. However, there was no statistically significant association between sleep duration and CGPA. Being male was associated with 0.27 point increase in mean CGPA compared to female (P<0.001); an increase in year of study at the university from second year to third year and from second year to fourth year was associated with 0.62 and 0.19 point increase in CGPA, respectively. The reduction in mean CGPA was progressively higher as students missed more classes. In conclusion, the study findings show association between sleep problems and poor academic performance among university students (13).

In Croatia 2013, Valic conducted a study. The aim was to evaluate sleep habits of dental students and the relationship between sleep habits and academic performance. The participants were 447 dental students. The result showed that high-performing students reported to have the usual amount of sleep the night before an exam, more often than low-performing students (38.8% vs. 21.7%, respectively). Accordingly, low-performing students reported a small amount of sleep more often than high-performing students the night before an examination (39.3% vs. 24%, respectively). Low-performing students reported to stay awake during the night due to computer or TV usage more often than high-performing students (66% vs. 45%; P = 0.001). The percentage of students who reported insomnia symptoms was significantly higher in the low-performing students group compared with the high-performing students group (10.4% vs. 3.1%). There were significant differences in the gender distribution of the two groups, as low-performing students were more often male compared with high-performing students (40.2% vs. 15.5%). Therefore Self-reported academic performance of dental students in Croatia is associated with timing of sleep and wakefulness, rather than with total sleep duration (6).

Gaultney (2010) in USA, conducted a study to examine the prevalence of risk for sleep disorders among college students by gender and age, and their associations with GPA among 1,845 college students. The results showed that about (27%) were at risk for at least one sleep disorder. Students who have sleep disorders or are at risk for at least one disorder had a GPA below 2.00/4.00. Those who reported no sleep disorder had a higher GPA (M = 2.82, SD = .88) than those who reported at least one sleep disorder (M = 2.65, SD = .99). To conclude, many college students are at risk of sleep disorders, and those at risk may also be at risk of academic failure (14).

In 2009 Zailinawati conducted a study of daytime sleepiness and sleep quality among Malaysian medical students. The Sample size of the study was 799 medical students. It was found that these students reported sleeping between 1-11 hours per day (mean 6.6, SD=1.3), only 51.2% slept seven hours or more per night. A minority of the respondents (3.9%) used sleep medication in the past one month. 16.1% of the respondents reported fairly bad to very bad sleep quality. The median General Health Questionnaire (GHQ-12) score was 2 (range 0-12), 41.8% of respondents had psychological distress (GHQ >3). (65.4%) reported moderate to high chance of dozing during the afternoon lecture. The median Epworth Sleepiness Score was 9.0 (range 0-24). Excessive daytime sleepiness (ESS >11) occurred in 35.5% of students. This is statistically significantly more in Phase 2 students when compared to Phase 1 students. In conclusion, daytime sleepiness is highly prevalent in the medical school in this study (15).

In USA (2009), Eliasson published a study that aimed to investigate the relative importance of total sleep time compared to the timing of sleep and wakefulness for academic performance. The study was based on 170 students. It showed that high performers had earlier bed times and earlier wake times compared to poor performers. Students with good academic performance were more likely to take naps regularly than students with poor academic performance (p =0.07). In conclusion, timing of sleep and wakefulness correlated more closely with academic performance than total sleep time and other relevant factors (16).

Yang, 2005 in China, did a study about status and influencing factors on sleep quality in some medical college students. Among 120 medical students, nineteen percent of the medical college students showed poor quality of sleep and the difference between genders was not statistically significant (P > 0.05). Statistically significant (P < 0.05) difference was seen among different levels and correlation was found between sleep quality and depression or anxiety (P < 0.0001); irregular work/rest (P < 0.0001), stress (P < 0.0002). Factors influencing on the quality of sleep in medical college students included: depression, anxiety, irregular work/rest and stress (17).

In 2004, a study lead by Howell in Canada was done for the purpose of examining associations between measures of sleep propensity, sleep quality and academic performance. The sample size was 414 students. The main findings for this study were the following: for students carrying a full course load, GPA was lower among those having poor sleep quality (M= 2.64, SD=O.61, n=92) than among those having a good quality of sleep (M = 2.86, SD = 0.62, n = 113; t,,, = 2.52, p < 0.02), whereas for students carrying a partial course load, there was no difference among students having poor sleep quality and those having good quality of sleep. In the prediction of GPA, a main effect for course load also emerged such that students carrying a full course load had higher GPAs than those carrying a partial course load (p < 0.01). In conclusion, in students carrying a full course load, GPA was lower among those having poor sleep quality than among those having a good quality of sleep, whereas for students carrying a partial course load, there was no difference among students having poor sleep quality and those having good quality of sleep. Unlike the effects that emerged for sleep quality scores, sleep propensity did not interact with course load to predict GPA (18).

In 2015, Mirghani published an article about the association between good sleep quality and better academic performance among medical students in Sudan. The aim of this study was to assess the relationship between sleep quality and academic performance among Sudanese medical students. The sample was 165 medical students. A significant difference (p < 0.001) between the excellent and average groups was found for overall sleep quality. The mean sleeping hours were (7 ± 1.9) and (6.3 ± 1.9) for the excellent and pass groups respectively (p < 0.05). A significant difference (p < 0.001) between the excellent and average groups was found for weekday and weekend bedtime, weekend wake-up time, and weekend wake-up delay. Besides, snoring was present in 9.2 % of the excellent group versus 28 % in the pass group (p < 0.005). A well-built relationship was perceptible between good sleep quality and high academic performance (7).

In 2016 Elagra conducted a study in Saudi Arabia regarding the association between sleep quality and academic performance among dental students. The aim was to investigate the sleep patterns of dental students from different academic levels and to determine the effect of sleep patterns on the academic performance of students. The sample size was 546 undergraduate female students. About 64.8% students described their sleep as good or very good whereas the remaining described their sleep as bad or very bad. The mean number of sleep hours at night for all students was 5.85 ± 1.853. The students who slept 8 hours or more at night were (21.1%). There was no significant difference between the proportion of students who slept ≥8 hours in the nonclinical group with those in the clinical group. In general, GPA had a significant negative weak correlation with Pittsburgh Sleep Quality Index (PSQI) scores. It can be concluded that dental students tend to have poor sleep quality, which is unknown to them. Poor sleep quality was associated with lower academic performance, especially in clinical years (19).

Alsaqqaf, 2016 in KSA, conducted a study to determine sleep habits and sleep quality in medical students during their clinical years using validated measures; and to investigate associations with academic performance and psychological stress. The research was carried out on a sample of 320. The findings were the students acquired on average, 5.8 hours of sleep each night, with an average bedtime at 01:53. Approximately 8% reported acquiring sleep during the day, and not during night time. Poor sleep quality was present in 30%, excessive daytime sleepiness (EDS) in 40%, and insomnia symptoms in 33% of students. Multivariable regression models revealed significant associations between stress, poor sleep quality, and EDS. Poorer academic performance and stress were associated with symptoms of insomnia. In conclusion, sleep deprivation, poor sleep quality, and EDS are common among clinical year's medical students. High levels of stress and the pressure of maintaining grade point averages may be influencing their quality of sleep (20).

A study by Bahammam, 2015 in KSA, was designed to assess sleep patterns among male medical students at different academic levels. Among 129 medical students, total sleep time at night + nap of the whole group was 5.9 +/- 1.6 hours. Twenty-nine students were defined to have excessive daytime sleepiness, 83.3% of students reported napping during the daytime more than twice per week. Analysis of the sleep pattern of male medical students revealed that this group is sleep deprived, which in turn may affect their academic performance (21).

In 2012 a study was conducted in the Kingdom of Saudi Arabia by Abdulghani. The aim was to examine the prevalence of sleep disorders among medical students and investigate any relationship between sleep disorder

and academic performance. The sample size was 491 students. Findings on the Epworth Sleepiness Scale (ESS) score demonstrated that 36.6% of participants were considered to have abnormal sleep habits, with a statistically significant increase in female students (p= 0.000). Sleeping between 6–10h per day was associated with normal ESS scores (p=0.019) as well as the academic grades 3.75. Abnormal ESS scores were associated with lower academic achievement (p=0.002). In conclusion a high prevalence of sleep disorder information of daytime sleepiness (DTS) was found in this study on three groups of medical students. It showed that female students have more sleep disorder than male students. Analysis of the relationship between sleep disorders and academic achievement shows a significant relationship with (DTS) and academic grades (4).

BaHammam executed a study to assess the relationship between sleep habits and sleep duration with academic performance in medical students at 2012 in Saudi Arabia, with a sample size of 410 students (males: 67%). The final analysis included 115 students; (28%) had “excellent” performance, and 295 students (72%) had “average” performance. The “average” group had a higher Epworth Sleepiness Scale score and a higher percentage of students who felt sleepy during class. In contrast, the “excellent” group had an earlier bedtime and increased total sleep time during weekdays. To conclude, decreased nocturnal sleep time, late bedtimes during weekdays and weekends and increased daytime sleepiness are negatively associated with academic performance in medical students(22).

Study design:

The study is an observational, descriptive, cross-sectional design.

Study area and population:

This study was conducted in Almaarefa University for Science and Technology (UM) in Diriyah, which was established by Dr. Zaid Alzamil in 2009. It consists of various colleges including medicine; pharmacy (Pharm D.), applied sciences, Nursing, Respiratory Care, Emergency Medical Services, Computer Science, Information Systems and industrial engineering. Diriyah is a city in Saudi Arabia located on the north-western outskirts of the Saudi capital, Riyadh. Diriyah was the original home of the Saudi royal family; it served as the capital of the Emirate of Diriyah under the first Saudi dynasty from 1744 to 1818. The population of the study was Medical and Pharm D students excluding preparatory year students.

Sample size and technique:

The data had been collected from 162 students who were selected by non-probability quota sampling technique.

Data collection tool:

A questionnaire specially designed for this study was used. It was constructed in two sections; the first is for personal information, the second is about sleep patterns and factors affecting sleep quality.

Data collection method:

The questionnaire was distributed after checking the validity and reliability by pilot study. A link for it was sent via Almaarefa university student email.

Data analysis:

The data was cleared, coded, and entered using SPSS. Suitable statistical tests were used for data analysis and the results were presented in tables and graphs as percentages.

Ethical consideration:

Permission was taken before the participants opened the questionnaire link. Data was used for research purposes only. Privacy and confidentiality was maintained.

Table 1: Personal Information

	Frequency	Percent
Medicine	99	61%
Pharma	63	39%
Total	162	100%

Level

	Frequency	Percent
4	9	6%
5	16	10%
6	15	9%
7	43	27%
8	12	7%
9	33	20%
10	9	6%
11	12	7%
12	3	2%
13	10	6%
Total	162	100%

Age group

	Frequency	Percent
19-21	53	33%
22-24	79	49%
25 and above	30	19%
Total	162	100%

Gender

	Frequency	Percent
Female	125	77%
Male	37	23%
Total	162	100%

Marital status

	Frequency	Percent
Single	156	96%
Married	6	4%
Total	162	!00%

Results

Table 2 shows the relation between sleep pattern and GPA. In this table, duration hours and GPA are discussed. According to the results it shows that 80% of the people who sleep less than 6 hours showed an increase in GPA. As the amount of sleep increased the percentage decreased, for example only 77% of the population who slept 6-8 hours had an increase in GPA. So sleep seems to be inversely proportional to GPA. This difference between duration hours and GPA was statistically insignificant. As for bedtime and GPA, the results demonstrated that the earlier the students slept, the lower their GPA was. 33% of the students who slept earlier than 09:00 PM had a decrease in their GPA, whereas only 19% of the students who slept from 09:00PM-12:00AM had a decrease in their GPA. And even more, only 16% of the students who slept after 12:00AM had a decrease in their GPA. So the earlier the students sleep, the worse their GPA. Yet this difference between bedtime and GPA was statistically insignificant. In the same table, Sleep environment (rooms) and GPA are explored, and it seems that 80% of the students who sleep in shared rooms have increased GPAs, while it was 77% percent among those who sleep in separate rooms. This difference between sleep environment (rooms) and GPA was statistically insignificant. Speaking of sleep environment and GPA, 78% showed an increase in GPA. 18% of students who tended to sleep in a quiet room and 10% of those who tended to sleep in a noisy room showed a decrease in GPA. This difference was statistically not significant. Regarding the correlation between the depth of sleep and GPA, 78% showed an increase in GPA. 27% accounted for people getting deep sleep, while it was 57% for normal depth and 16% for light sleep. This difference between deep, normal and light sleep in contrast with increased GPA was statistically not significant.

Table 2: Sleep Pattern and GPA

Duration hours and GPA

	Decreased	Steady	Increased	Total
<6 hours	14 (18%)	2 (3%)	63 (79%)	79 (49%)
6 – 8 hours	12 (16%)	5 (7%)	56 (77%)	73 (45%)
>8 hours	3 (30%)	0	7 (70%)	10 (6%)
Total	29 (18%)	7 (4%)	126 (79%)	162

Bedtime and GPA

	Decreased	Steady	Increased	Total
< 9 o'clock	1 (33%)	0	2 (67%)	3 (2%)
9-12 o'clock	16 (19%)	6 (7%)	61 (73%)	83 (51%)
> 12 o'clock	12 (16%)	1 (1%)	63 (83%)	76 (47%)
Total	29 (18%)	7 (4%)	126 (79%)	162

Sleep Environment (rooms) and GPA

	Decreased	Steady	Increased	Total
Separate	20 (19%)	5 (4%)	82 (77%)	107 (66%)
Shared	9 (16%)	2 (4%)	44 (80%)	55 (34%)
Total	29 (18%)	7 (4%)	126 (79%)	162

Sleeping Environment and GPA

	Decreased	Steady	Increased	Total
Quite	28 (18%)	7 (5%)	117 (77%)	152 (94%)
Noisy	1 (10%)	0	9 (90%)	10 (6%)
Total	29 (18%)	7 (4%)	126 (79%)	162

Depth of sleep and GPA

	Decreased	Steady	Increased	Total
Deep	7 (16%)	2 (5%)	34 (79%)	43 (27%)
Normal	20 (21%)	4 (4%)	72 (75%)	96 (59%)
Light	2 (9%)	1 (4%)	20 (87%)	23 (14%)
Total	29 (18%)	7 (4%)	126 (79%)	162

Table 3 shows the relation between sleep duration and factors. Regarding major and duration of sleep, only a slight difference was observed between both groups. The percentages related to sleeping less than 8 hours were 94% for medicine students and 94% for pharmacy students. As for sleeping less than 6 hours, percentages were 60% and 40% for medicine and pharmacy students respectively. However, these differences among both groups had no significance. 95% of both male and female students claimed they are single. 48% of single students sleep less than 6 hours. On the other hand, 67% of married students do. The relation between marital status and duration of sleep was of no significant value, as shown in Table 3. As for the relation between gender and duration of sleep, Hours of sleep were classified into three categories: Less than 6 hours of sleep, 6-8 hours and more than 8 hours of sleep. The majority of respondents reported obtaining less than 6 hours of sleep (49%). Females represent 81% while males were 19%. Few respondents (6%) sleep more than 8 hours; females represent 80%. In relation to duration and level of study, levels are classified into: Pre-clinical (4-7) and Clinical (8-13). The majority (52%) of pre-clinical respondents obtain less than 6 hours of sleep while only 8% sleep more than 8 hours. Approximately half (51%) of respondents from clinical levels sleep 6-8 hours whereas 46% sleep less than 6 hours.

Table 3: Sleep Duration and Factors

Major and Duration

	<6 hours	6 – 8 hours	>8 hours	Total
Medicine	47 (48%)	46 (46%)	6 (6%)	99 (61%)
Pharmacy	32 (51%)	27 (43%)	4 (6%)	63 (39%)
Total	79 (49%)	73 (45%)	10 (6%)	162

Marital status and Duration

	<6 hours	6 – 8 hours	>8 hours	Total
Single	75 (48%)	71 (46%)	10 (6%)	156 (96%)
Married	4 (67%)	2 (33%)	0	6 (4%)
Total	79 (49%)	73 (45%)	10 (6%)	162

Gender and Duration

	<6 hours	6 – 8 hours	>8 hours	Total
Male	15 (41%)	20 (54%)	2 (5%)	37 (23%)
Female	64 (51%)	53 (42%)	8 (7%)	125 (77%)
Total	79 (49%)	73 (45%)	10 (6%)	162

Duration and Level of study

	<6 hours	6 – 8 hours	>8 hours	Total
4	5 (56%)	2 (22%)	2 (22%)	9 (6%)
5	10 (63%)	6 (37%)	0	16 (10%)
6	5 (33%)	8 (53%)	2 (13%)	15 (9%)
7	23 (54%)	17 (40%)	3 (6%)	43 (27%)
8	7 (58%)	4 (33%)	1 (9%)	12 (7%)
9	15 (45%)	18 (55%)	0	33 (20%)
10	2 (22%)	7 (78%)	0	9 (6%)
11	6 (50%)	6 (50%)	0	12 (7%)
12	1 (33%)	1 (33%)	1 (33%)	3 (2%)
13	5 (50%)	4 (40%)	1 (10%)	10 (6%)
Total	79 (49%)	73 (45%)	10 (6%)	162

Table 4 shows the relation between sleep interruption and factors. 20% of total number of students have never experienced interrupted sleep, 36% rarely experienced interrupted sleep, 31% usually experienced interrupted sleep, and 12% claimed that they always suffered from interrupted sleep. 33% of females tended to have interrupted sleep rarely. It was 49% in males. This difference between genders was statistically not significant. For married students 50% tended to have rarely interrupted sleep, while single students were 36%. This difference between marital status and interrupted sleep was also statistically not significant. Regarding major and interrupted sleep, there was no statistical significant difference in sleep pattern; about 60% of medicine students have continuous sleep, whereas it is 50% among pharmacy students. This is clearly shown in Table 4.

Table 4: Sleep Quality and Factors

Gender and interrupted sleep

	Never	Rarely	Usually	Always	Total
Male	24 (19%)	41 (33%)	42 (34%)	18 (14%)	125 (77%)
Female	9 (24%)	18 (49%)	8 (22%)	2 (5%)	37 (23%)
Total	33 (20%)	59 (36%)	50 (31%)	20 (12%)	162

Marital status and interrupted sleep

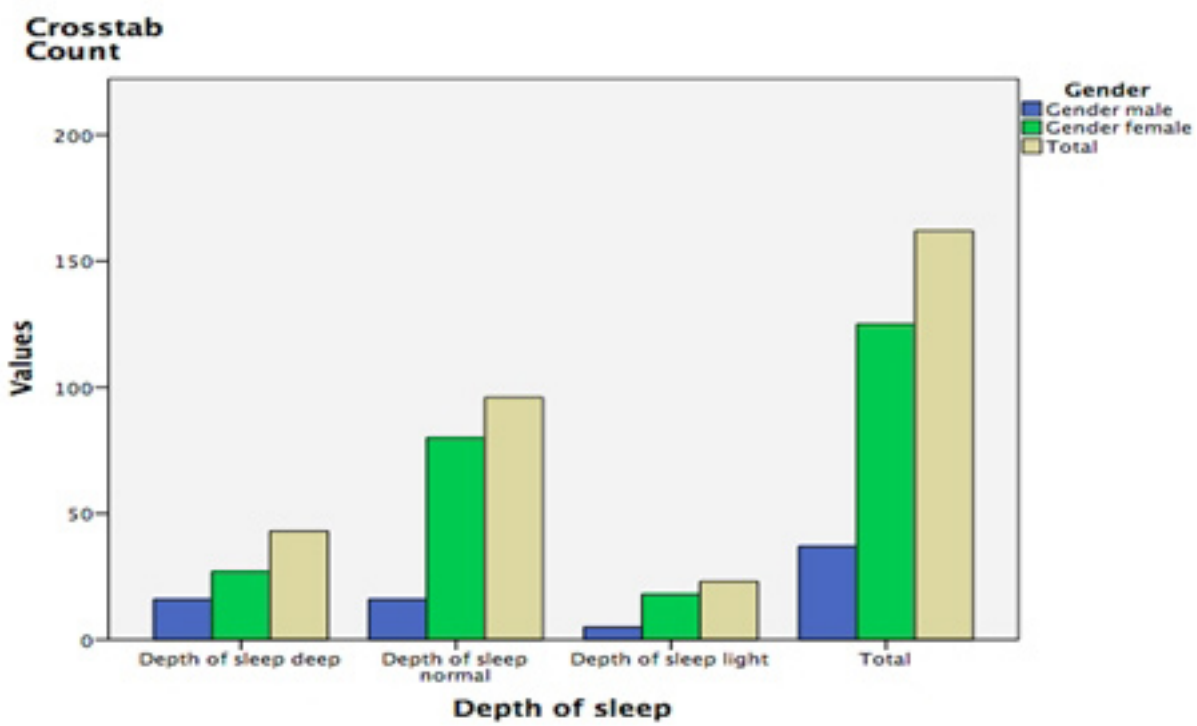
	Never	Rarely	Usually	Always	Total
Single	33 (21%)	56 (36%)	48 (31%)	19 (12%)	156 (96%)
Married	0	3 (50%)	2 (33%)	1 (17%)	6 (4%)
Total	33 (20%)	59 (36%)	50 (31%)	20 (12%)	162

Major and interrupted sleep

	Never	Rarely	Usually	Always	Total
Medicine	19 (19%)	41 (41%)	25 (25%)	14 (14%)	99 (61%)
Pharmacy	14 (22%)	18 (29%)	25 (40%)	6 (9%)	63 (39%)
Total	33 (20%)	59 (36%)	50 (31%)	20 (12%)	162

Table 5 shows the relation between sleep depth and factors. Findings regarding the relation between gender and depth of sleep, showed that deep sleep is 43% among males and 28% among females. This difference was considered statistically significant (p= 0.0088). The relation between major and depth of sleep shows that 26% in medicine and 27% in pharmacy have deep sleep. For medicine students, the students who had normal sleep depth amounted to 55%, while among pharmacy students it was 65%. Students of medicine who reported they have light sleep were 18%, on the other hand pharmacy was only 8%. This difference between major and depth of sleep was statistically insignificant. The finding showed that 27% of single students have deep sleep while 17% of married students do. For single students the normal sleep amounted to 59% while 67% of married students had normal sleep. 14% of single students used to experience light sleep while it was 17% for married students. This difference between marital status and depth of sleep was statistically insignificant.

Table 5: Sleep Quality and factors



Depth of sleep and gender

	Deep	Normal	Light	Total
Male	16 (43%)	16 (43%)	5 (14%)	37 (23%)
Female	27 (22%)	80 (64%)	18 (14%)	125 (77%)
Total	43 (27%)	96 (59%)	23 (14%)	162

P-value = 0.0088 significant

Depth of sleep and major

	Deep	Normal	Light	Total
Medicine	26 (26%)	55 (55%)	18 (18%)	99 (61%)
Pharmacy	17 (27%)	41 (65%)	5 (8%)	63 (39%)
Total	43 (27%)	96 (59%)	23 (14%)	162

Depth of sleep and marital status

	Deep	Normal	Light	Total
Single	42 (27%)	92 (59%)	22 (14%)	156 (96%)
Married	1 (17%)	4 (67%)	1 (16%)	6 (4%)
Total	3 (27%)	96 (59%)	23 (14%)	162

Table 6 shows the relation between bed time and factors. Only 2% of female students tended to sleep before 09:00 PM, while no male students claimed to sleep before the same time. Students who sleep between 09:00 PM to 12:00 AM were 51% of both male and female students. 46% of females claimed to sleep after 12:00 AM, while male students were 49%. This difference between bedtime and gender was statistically insignificant. In relation to bedtime and major, (56%) of students majoring in medicine sleep between 09:00 PM to 12:00 AM, while (44%) of students majoring in pharmacy sleep between 09:00 PM to 12:00 AM. Students who reported they sleep after 12:00 AM were mostly those majoring in pharmacy (56%), and (41%) of medicine students sleep after 12:00 AM. Only (3%) of medicine students sleep before 09:00 PM while no pharmacy students reported they sleep before 09:00 PM. The result was not significant. According to bedtime in regards to marital status, the majority of those who are single (51%) and of those who are married (67%) sleep between 09:00 PM and 12:00 AM As for the people who noted that they sleep after 12:00 AM, (47%) were single and (33%) were married. On the other hand, only (2%) of singles sleep before nine PM while none of those who are married noted that they sleep before 09:00 PM. The result was not statistically significant.

Table 6.

Bedtime and gender

	<9 o'clock	9-12 o'clock	>12 o'clock	Total
Male	0	19 (51%)	18 (49%)	37 (23%)
Female	3 (2%)	64 (51%)	58 (47%)	125 (77%)
Total	3 (2%)	83 (51%)	76 (47%)	162

Bedtime and major

	<9 o'clock	9-12 o'clock	>12 o'clock	Total
Medicine	3 (33%)	55 (55%)	41 (41%)	99 (61%)
Pharmacy	0	28 (44%)	35 (56%)	63 (39%)
Total	3 (2%)	83 (51%)	76 (47%)	162

Bedtime and Marital status

	<9 o'clock	9-12 o'clock	>12 o'clock	Total
Singe	3 (2%)	79 (51%)	74 (47%)	156 (96%)
Married	0	4 (67%)	2 (33%)	6 (4%)
Total	3 (2%)	83 (51%)	76 (47%)	162

Table 7 shows the relation between sleeping environment and factors. In sleep pattern regarding quiet or noisy environment, 94% tended to sleep in a quiet environment. For females, those who claimed to sleep in a noisy environment were 5%, while it was 11% in males. This difference between genders was statistically not significant, as shown in Table 7. Medicine students who slept in a noisy environment were 6%, as well as pharmacy students (6%). However statistically it is not significant. For single students, those who tended to sleep in a noisy environment were 6%, while for married students it was 0%. This difference was also statistically of no significance. As can be seen in Table 7, sleeping environment was not a significant predictor of level of study.

Table 7:

Sleeping Environment and gender

	Quiet	Noisy	Total
Male	33 (89%)	4 (11%)	37 (23%)
Female	119 (95%)	6 (5%)	125 (77%)
Total	152 (94%)	10 (6%)	162

Sleeping Environment and major

	Quiet	Noisy	Total
Medicine	93 (94%)	6 (6%)	99 (61%)
Pharmacy	59 (94%)	4 (6%)	63 (39%)
Total	152 (94%)	10 (6%)	162

Sleeping Environment and marital status

	Quiet	Noisy	Total
Single	146 (94%)	10 (6%)	156 (96%)
Married	6 (100%)	0	6 (4%)
Total	152 (94%)	10 (6%)	162

Sleeping Environment and level of study

	Quiet	Noisy	Total
4	8 (89%)	1 (11%)	9 (6%)
5	15 (94%)	1 (6%)	16 (10%)
6	14 (93%)	1 (7%)	15 (9%)
7	41 (95%)	2 (5%)	43 (27%)
8	12 (100%)	0	12 (7%)
9	30 (91%)	3 (9%)	33 (20%)
10	8 (89%)	1 (11%)	9 (6%)
11	11 (92%)	1 (8%)	12 (7%)
12	3 (100%)	0	3 (2%)
13	10 (100%)	0	10 (6%)
Total	152 (94%)	10 (6%)	162

Table 8 shows the relation between sleep pattern, regarding shared or separated rooms, and factors. 66% used a separated room. For females the shared rooms amounted to 38% while it was 19% in males. This difference between gender was statistically significant (p=0.0279). Regarding major, approximately 66% of students reported using separate rooms. For medicine students the separate rooms amounted to 71% while it was 57% among pharmacy students. This finding was also statistically significant (p=0.0562). As seen in Table 8 65% of single students tended to be sleeping in separate rooms while 83% of married students did. This was statistically not significant. When all the variables previously shown to be related to sleeping room were entered into the model simultaneously the only variables that remained significant

Table 8:

Sleeping Room and gender

	Separate	Shared	Total
Male	30 (81%)	7 (19%)	37 (23%)
Female	77 (62%)	48 (38%)	125 (77%)
Total	107 (66%)	55 (34%)	162

P-value = 0.0279 significant

Sleeping Room and marital status

	Separate	Shared	Total
Single	102 (65%)	54 (35%)	156 (96%)
Married	5 (83%)	1 (17%)	6 (4%)
Total	107 (66%)	55 (34%)	162

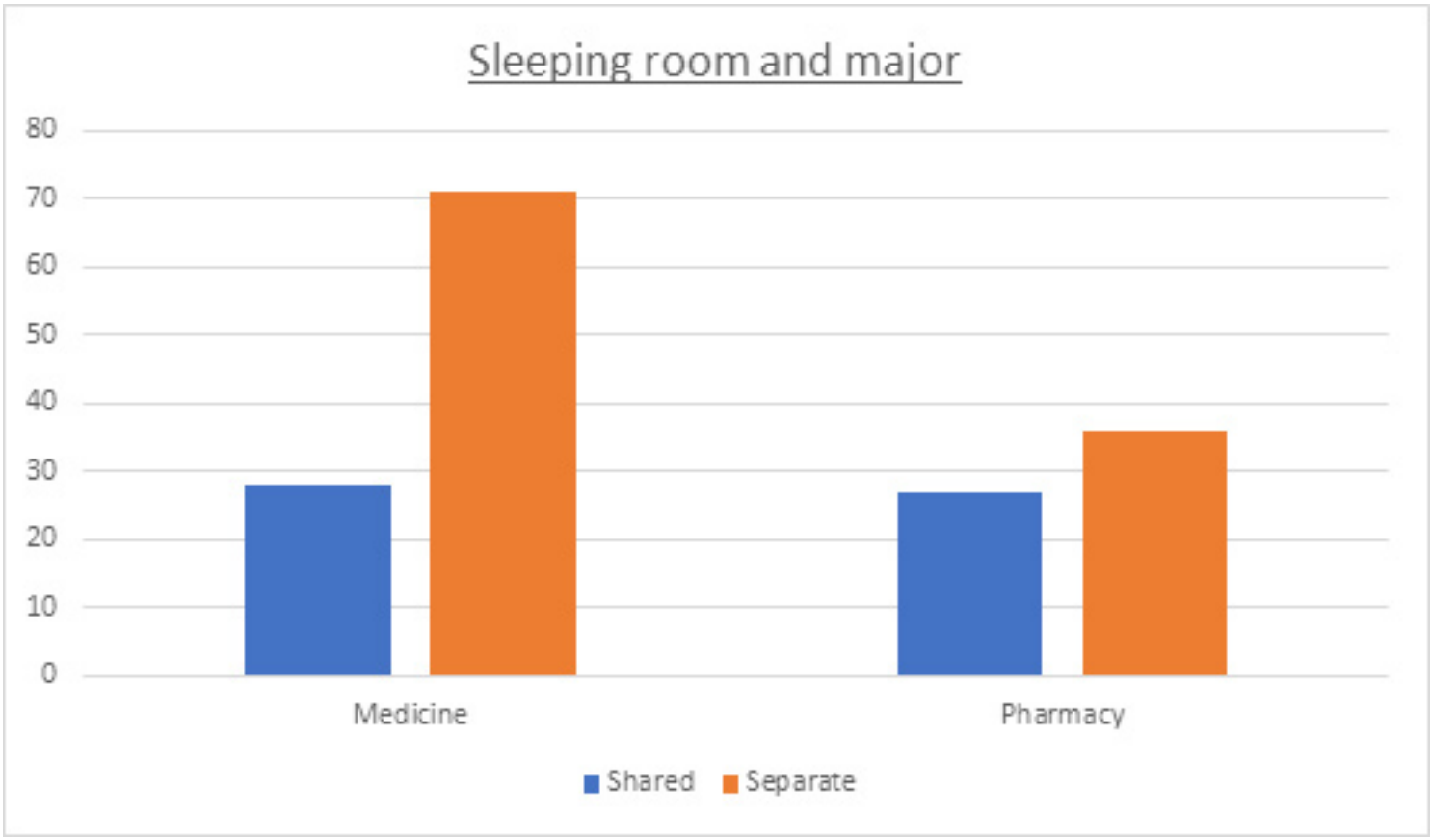
Sleeping Room and major

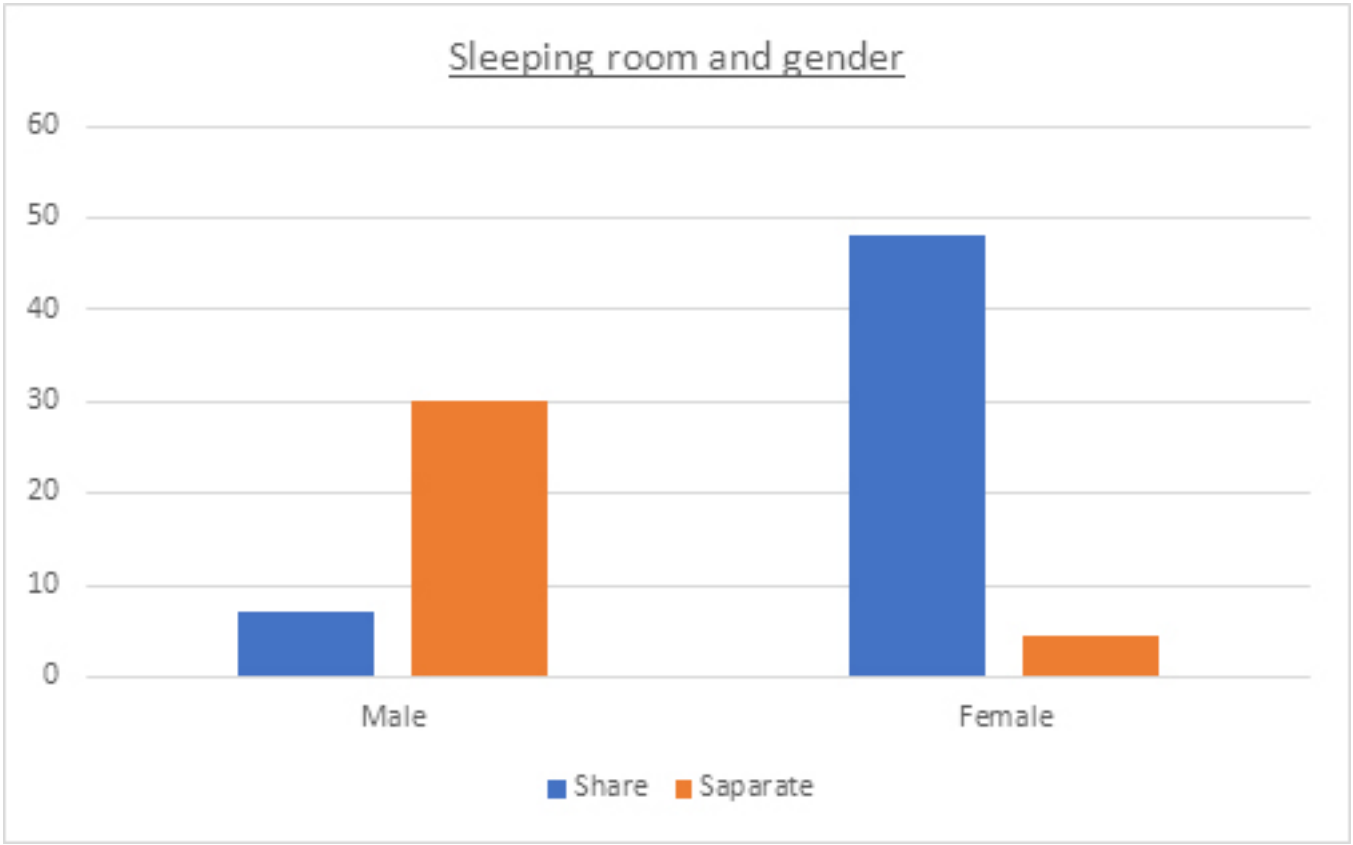
	Separate	Shared	Total
Medicine	71 (71%)	28 (28%)	99 (61%)
Pharmacy	36 (57%)	27 (43%)	63 (39%)
Total	107 (66%)	55 (34%)	162

P-value = 0.0562 significant

Sleeping Room and study level

	Separate	Shared	Total
4	3 (33%)	6 (67%)	9 (6%)
5	10 (63%)	6 (37%)	16 (10%)
6	12 (80%)	3 (20%)	15 (9%)
7	32 (74%)	11 (26%)	43 (27%)
8	7 (58%)	5 (42%)	12 (7%)
9	23 (70%)	10 (30%)	33 (20%)
10	6 (67%)	3 (33%)	9 (6%)
11	7 (58%)	5 (42%)	12 (7%)
12	0	3 (100%)	3 (2%)
13	7 (70%)	3 (30%)	10 (6%)
Total	107 (66%)	55 (34%)	162


Sleeping room and major
80
70
60
50
40
30
20
10
0
Medicine
Pharmacy
Shared
Separate


Sleeping room and gender
60
50
40
30
20
10
0
Male
Female
Share
Saparate

Discussion

Each table is discussed thoroughly in a separate paragraph starting from table 2, where sleep duration and GPA being inversely related was a surprising finding, as most people would expect that the more a person sleeps, the better their performance. In a study in the USA in 2015(11), a study in 2016 by Beebe(10), a study conducted by Westerick(8) in USA, and Bahammam at 2012 in Saudi Arabia(21) the opposite was found, but as the p value was insignificant, just like the study in 2013 in Ethiopia (13), the reason may be due to individual variability, because some people perform better with more hours of sleep, while others feel less stressed by sleeping less and saving time for studying. This difference between bedtime and GPA was statistically insignificant. The conclusion that bedtime and GPA have a reciprocal relation was unexpected, as most would think that sleeping earlier would increase the GPA and not decrease, but since the P value is insignificant we cannot confirm that the later you sleep the better your GPA. A study in Saudi Arabia by Bahammam in 2012(22) states the opposite, while a study by Wang in 2016 in China(9) states that the later the bedtime the higher the GPA. However, this behavior is considered unhealthy in the long run. The no association finding between sleep environment and GPA was unpredicted, but the explanation could be that to each their preference. It depends on what the individual is used to. The finding that there is not much difference between quiet and noisy room and decreased GPA was unexpected. This finding might be due to the students getting used to sleep in noisy rooms for a long time. Therefore, students can remain accustomed to their sleeping pattern. There is no association between sleep depth and GPA, this was unexpected. This could be because each person has different sleep pattern since childhood. Further studies on this matter should be conducted.

The majority of students in this study slept less than 8 hours per day, which is considered less than the recommended duration for adequate sleep. The same results were found in a study conducted by Westrick in USA 2015, where more than 54.7% of student pharmacists reported 6 hours of sleep or less (8). However, this finding was expected among medicine and pharmacy students; it may be attributed to their heavy study loads, continuous exams and sometimes practical training in hospitals being at times in the early morning then at other times late at night, which may confuse their sleep cycle hence affect their duration of sleep. This exact behavior shouldn't be maintained as sleep duration should be sufficient to allow normal functioning of body and mind. As for the marital status of students where 94.9% were single, it indicates that marriage among medicine and pharmacy students is not a common choice during studying years. This could be as a result of the busy life style which doesn't suit the burdensome house responsibilities and duties that usually come along with marriage. Thus this reasonable behavior should be sustained. According to the study females sleep less than males, which was expected. This might be because females tend to have more responsibilities and put more effort in their studying. More hours of sleep should be obtained for optimum health and well-being. The findings showed no significant association between duration of sleep and level of study, which wasn't expected. Further studies should be conducted.

The finding that males rarely have interrupted sleep in comparison to females was expected. This could be because females are more stressed about the following day tasks and more susceptible to hormonal fluctuations. This is not a recommended behavior and it is better to be changed. There was no correlation between major and interrupted sleep; this could be because each person has their own sleep pattern without major being an influential factor, and there is no problem if this behavior is sustained.

The findings that males have deeper sleep more than females was excepted. This may be due to the biological phases of a woman's life and the hormonal shifts that accompany them, making women more likely to experience disruptions during their sleep. The findings also showed that there is no association between depth of sleep and major, as well as the relation between depth of sleep and marital status.

Findings showed that the majority of the students sleep between 09:00 PM to 12:00 AM. It could be because of the responsibilities the students have. Students who sleep before 09:00 PM were merely 2% of females while no male noted that they sleep before 09:00 PM. This could be because they have to focus on their studies.

The findings showed no significant association between major and bedtime. This was expected and could be because each student has a different way in managing their time regardless of their major. A greater percentage of respondents reported they sleep between 09:00 PM to 12:00 AM, in order to attain a balanced lifestyle. This manner should be promoted. The findings that the majority of the respondents who sleep between 09:00 PM to 12:00 AM were married, was expected. This may be because people who are single are mostly young and focused on their academics only, so they risk a couple of hours of night time sleep in order to get more studying done, while married people have a lot more responsibilities and they need as much energy as they can during the day. The habit of sleeping between 09:00 PM to 12:00 AM should be sustained as it is optimal for the maintenance of the circadian rhythm and sleep-wake cycle. Sleeping during the night helps in improving mental health and development as well as immunity. People should achieve optimal sleep in order to maintain a healthy lifestyle.

According to the study, females tended to sleep in a noisier environment more than males, and that was expected. It might be because females tend to sleep in a shared room more than males. This is recommended for the researchers to focus on this subject and to know the reasons behind that. There was also no association between noisy environment and major. This may be

because each student has his own environment whether they are a medical or pharmacy student, so major is not an influential factor to this point.

The finding that single students living in noisy environments are more than married students was expected. This could be because single students have a higher chance of living with a large number of roommates rather than the married ones. However it is subjective to each individual and depends on one's pattern of living usually since childhood. No correlation was found between students regarding the sleeping environment and level of study.

As for the finding regarding sleeping room gender, there were statistically significant differences between male and female students. Females used shared rooms more than males which was expected. This could be because females like to be close and their privacy matters bringing them more together.

The finding that medical students used separated rooms more than pharmacy students could be because medical students needed to focus more. Based on findings, it was surprising that married students used separate rooms higher than single students, which might be because many students living in student house are from outside Riyadh. A significant correlation was not found between sleeping room and marital status. There was no significant relation between sleeping room and study level of students.

Conclusion

In this study, we aimed to assess the relation between sleep pattern and academic performance, and factors affecting sleep pattern. We found that sleep pattern and GPA had no relation, however, male students showed they have deeper sleep than females. The percentage of female students sleeping in a shared room was higher than males, and finally, medicine students had a higher percentage in sharing a room than pharm D students. The number of students who answered the questionnaire and who are majoring in medicine were almost three times more than those majoring in pharm D. Also female respondents were triple the amount of male respondents, which may have affected the results.

Recommendations

1. More hours of sleep should be obtained for optimum health and well-being.
2. The habit of sleeping early should be sustained as it is optimal for the maintenance of the circadian rhythm, sleeping during the night helps in improving mental health and development.
3. Further studies are still needed to link sleep pattern and academic performance among medical and pharmacy students

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Nutrition and puberty

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Abstract

Nutrition plays an important role in the growth, development and puberty of children. Adequate nutrition is very important for the normal development of the child during the various stages of childhood and into puberty. Unfortunately, we note the spread of fast food and the adoption of wrong methods in feeding the child, such as making them watch TV to motivate them to eat a larger amount of food etc. This has led to the spread of obesity and overweight among children. Overweight or obese children are more likely to enter puberty early. Some evidence suggests that obesity can accelerate the onset of puberty in girls and this is a major reason why girls begin puberty at an earlier age compared to past decades while overweight or obesity may delay the onset of puberty in boys. On the other hand, severe primary or secondary malnutrition also can delay the onset and progression of puberty.

The aim of our article is to shed light on the relation between nutrition and puberty and to focus on the importance of adequate nutrition to create a healthy child with a normal development.

Key words: Nutrition, children, puberty

Introduction

Nutritional status in childhood is very important because it has a profound effect on biological, physical, and psychological development of children. Nutrition can affect as much as 25% of pubertal timing variation. Over-nutrition and obesity seem to trigger pubertal onset. Neonatal shortness and thinness are associated with earlier pubertal maturation [1].

Puberty parameters are mainly, height, weight, Tanner staging and breast development.

Most girls enter puberty between ages 8 and 13 years, while boys enter puberty from age 10 to 15 years. Strong associations were found between all pubertal timing parameters on the one hand and BMI and percentage of body fat on the other hand. Increased consumption of processed, high-fat foods may be blamed for this phenomenon [2,3,4]. Some controversy exists about the effect of obesity on pubertal onset in males. An expert panel reviewing existing American pubertal data from boys in 2005 could not confirm a secular trend in male pubertal timing[5]. National Health and Nutrition Examination Survey III findings reported a mean age of 10.4 years for Caucasian boys entering Tanner stage G2 [6].

Progression of puberty has been shown to be affected by prepubertal body composition in healthy boys and girls in a longitudinal study. Higher prepubertal BMI and fat mass resulted in earlier attainment of pubertal stages. Both clearly predicted the age at peak height velocity (APHV) and puberty duration in both sexes and age at menarche in girls [7,8].

Growth in children

Proper growth is the most important factor in health assessment of children and adolescents. Growth can be presented as an increase in height and an increase in body weight. Postnatal linear growth is controlled by genetic, endocrine and nutrition factors.

Most girls enter puberty between age 8 and 13 years, while boys enter puberty from age 10 to 15 years. For pubertal development and menstrual function in girls, it is essential to achieve a certain minimum weight or percentage of body fat (PBF): the "critical weight hypothesis"(8,9). A secular trend for earlier age at menarche associated with an increase in the prevalence of overweight and obesity has been reported (10). An accelerated growth rate in overweight children accompanied by early appearance of pubertal signs may raise the concern of hormonal abnormalities such as precocious puberty.

Careful assessment of pubertal status and bone age determination are important for growth assessment in children and adolescents. For better sensitivity in the initial assessment and sequential follow-up of nutritional status, body composition evaluation could be considered in routine clinical practice (11).

Nutritional status from fetal to childhood and onset of puberty:

Nutritional imbalances during pregnancy may be implicated in the programming of the fetal metabolism, including the setting of the hypothalamic-pituitary axis(12) on the one hand, and of insulin resistance and body composition on the other hand, which could, in turn, trigger subsequent hormonal changes affecting pubertal timing(13) .To date, evidence linking prenatal nutritional imbalances to the timing of puberty is only indirect, using birth weight as a marker of the intrauterine environment. Nutritional factors during pregnancy that have been discussed in relation to an influence on birth weight range from malnourishment(14) to deficiencies in micronutrients vitamin B12, or docosahexaenoic acid intake(15). A recent study has suggested maternal vitamin D status in early pregnancy may play a role in both birth weight and subsequent growth velocity(16). With respect to the timing of puberty, a lower birth weight has been related to an earlier menarche(17,–18). The DONALD Study confirmed this association for other pubertal markers (ATO and APHV) in both boys and girls (21).

It has been suggested that the postnatal nutritional environment will, to some extent, override prenatal nutritional influences (e.g., prepubertal nutritional deprivation will result in delayed sexual maturity, irrespective of prenatal influences) (14). On the other hand, lower birth weight predisposes to rapid weight gain among those who encounter – in contrast to what they had "anticipated" in the uterus – a sufficient or even excessive nutrient supply (mismatch theory) (20). Rapid weight gain during infancy and early childhood has, in turn, repeatedly been linked to a notably earlier onset of menarche(218,–22) and other early and late pubertal markers.(23,–24) pre- and postnatal genetic/intrauterine and nutritional influences appear to interact; i.e., infants with a lower birth weight and subsequent rapid weight gain during childhood will experience the earliest puberty onset(17,–25).

Nutrition during early life might also play an important role in the timing of puberty. Direct evidence for such a link is largely confined to studies investigating the association of breastfeeding with pubertal timing. Prospective studies have not, however, found an independent association of breastfeeding with age at menarche,(26,–27) ATO, or APHV(21). In line with this is the observation from the DONALD Study that protein intake in early childhood (1–2 years) is not critical for the timing of early and late pubertal markers(28).

Prepubertal attainment of a critical body weight and/or fat mass (FM) has been thought to have a noticeable role in the start of sexual maturation whereas underfeeding and malnutrition in humans has been related to delayed pubertal onset [29,30,31,32] . In a large population-based study done in Sweden, large growth data showed that an increase of one BMI unit between ages 2 and 8 was associated with an average of 0.11 years earlier for peak height velocity. In addition children with higher changes in BMI had significantly earlier timing of pubertal onset. This suggests that over-nutrition in early childhood can result in an earlier onset of puberty in both sexes [33] . Girls with a higher percentage of body fat and BMI at age 5 and 7 had significantly earlier pubertal development at or by age 9. A strong correlation was reported between percentage body fat at age 7 and breast development at age 9 [33,34] .

Nutrition–hormone interaction during critical periods of growth plays an essential role in the control and prediction of metabolic adaptation and pubertal development later in life [19] . Rapid early weight gain leads to taller childhood stature and higher insulin-like growth factor I (IGF-I) levels, possibly through early induction of growth hormone (GH) receptor numbers, and such children are also at risk of childhood obesity [35]. In the Avon Longitudinal Study of Parents and Children, rapid infancy weight gain was associated with increased risk of obesity at 5 and 8 years, with evidence of insulin resistance, exaggerated adrenarche and reduced levels of sex hormone binding globulin (SHBG). Theoretically the increased IGF-I and adrenal androgen levels can increase aromatase activity and free sex steroid levels which consequently can early arouse the GnRH pulse generator. Besides, obese infants and children have higher leptin levels with a proven permissive factor in initiating LH pulsatility [36,37,38,12,39].

Obesity and its effect on puberty:

A three years follow-up study of 8–12-year-old pupils in China [41] demonstrated that the incidence of menarche in obese children of all age groups was higher than in the normal-weight group, while the incidence of first spermatorrhea in obese children was lower than that in normal-weight group. Another cohort in Sweden [42]

involving 1901 children defined the pubertal development by childhood pubertal height growth, in which the result suggests that onset of puberty reached for girls/boys was 3.5/2.5 monthly earlier in the overweight and obese group than the normal-weight and underweight group.

Two included cohort studies [43,53] comprising 788 girls and 776 girls respectively, all showed that girls with a higher BMI at younger age had significantly earlier menarche compared with those with lower BMI, which is consistent with St. George [49] and one case-control study [44] conducted in Korea with 144 girls, demonstrating an inverse association between body fat and age at pubertal onset in girls.

As for the number of girls with menarche, the pooled estimates showed that obesity is a risk factor for early menarche, which was in agreement with Frisch [45], who proposed that the onset of the female adolescent growth spurt and menarche require a critical weight of 47.8 kg, and that increased body fat can lead to early height spurt start age and menarche age in puberty [45,46].

Only one cohort [52] studies have evaluated the association between obesity and the timing of genitalia development in boys in our systematic review, which showed that boys with higher BMI trajectory were more likely to be later mature compared with lower BMI trajectory, which is consistent with cross-sectional studies conducted by Lee [50] and Wang [51], where boys with a higher BMI were more likely to be classified as late maturers. However, another cohort based on 1060 boys [47] reported that BMI-for-age z score at 5 years were positively associated with pubic hair development, which is consistent with the results in girls. It is hard to draw a definite conclusion that obesity led to early puberty timing in boys due to the limited number of studies with small sample size in this meta-analysis. Compared with the study of girls, there are few studies on boys; the reason may be that data can be even more difficult to interpret in boys considering that early staging of genitalia and subsequent progression through puberty (without assessment of testicular volume) is more subjective, with no easily identified event like menarche in girls [48,40].

Malnutrition

Under-nutrition, chronic diseases and pubertal growth:
Under-nutrition is the most important cause of growth retardation worldwide. Poverty in the poor countries and self-induced food restriction in the rich countries or malabsorption and chronic systemic

diseases are the main causes. Primary or secondary malnutrition leads to serious consequences including impaired growth, osteopenia, anemia, and different syndromes caused by deficiency of vitamins, minerals, essential fatty acids and amino acids, and trace elements [54,55,56,57].

Chronic primary malnutrition during childhood modulates the timing of adolescent sexual development in both sexes and is associated with later age of menarche (as well as secondary amenorrhea) [57,58,59].

Patients suffering from secondary malnutrition due to chronic diseases also have delayed onset of puberty and a reduced pubertal growth spurt. Although the etiology of abnormal puberty in these patients is multifactorial, nutritional deficiency largely contributes to their growth and pubertal delay[60,61]. Insufficient food supply due to decreased appetite, eating disorders and/or malabsorption of nutrients can be observed in these patients. Moreover, increased energy expenditure is another mechanism of hastening malnutrition in these children[62]. More specific factors due to the disease itself may be involved in growth and puberty disorders. Abnormalities of the growth hormone (GH-IGF-1) axis and gonadotrophin secretion have been described in patients with chronic renal failure, cystic fibrosis and Crohn's disease[63,64,65].

More recently, it has been shown that cytokines produced during chronic diseases such as juvenile idiopathic arthritis and CF may affect the GH-IGF-1 axis. The associated medication, namely corticosteroids, which are often given to these patients, also contribute to delayed puberty and poor pubertal growth[66,67].

Endocrine disruptor (EDs) and pubertal development: EDs accumulate in the environment in the long term and are introduced into the human body through water, air, foodstuffs, or through equipment used in the office and home. Human studies have shown that several EDs including DDT/dichlorodiphenyldichloroethylene (DDE), PCBs, polybrominated biphenyls (PBB), hexachlorobenzene, endosulfan, dioxins, heavy metals and phthalates affect puberty in humans. A significant relationship has been found between intrauterine exposure to high doses of PBB pesticides and early thelarche and pubarche in girls. In addition, an association between serum DDT/DDE concentrations and early menarche was reported in textile workers. Exposure to phthalate esters (used as plastic softeners and in some cosmetic products, shampoo, and perfumes) has been linked with early thelarche. A bisphenol A (BPA) (found in huge amounts in baby feeding bottles), has also been suggested to have estrogenic effects causing precocious puberty. Heavy metal exposure especially to lead was associated with delayed pubarche and menarche. Avoiding different methods of exposure to these EDs should be enforced to avoid abnormalities of pubertal development and reproduction[68,69,70,71].

Conclusion

In summary, nutritional condition can affect pubertal development and we will outline it in a few points:

• Increased adiposity during childhood, advances puberty in girl and delays puberty in boys.
• Nutrition during early life might also play an important role in the timing of puberty.
• Rapid growth during infancy was related to early pubertal maturation
• Higher prepubertal BMI and fat mass resulted in earlier attainment of pubertal stages.
• Malnutrition during childhood modulates the timing of adolescent sexual development in both sexes.
• Likelihood that timing of puberty (menarche) may be set in utero or early in life, even though it can be modified by changes in nutrition, body size and composition in childhood.

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Alzheimer's Dementia - A Narrative Review

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Abstract

Alzheimer's Disease (AD) was identified almost a century back and is slowly progressing as a global pandemic. This disease is one of the most common causes of Dementia. In this condition, an affected individual loses their recent memories and almost all cognitive functions, and eventually, the person becomes incapable of performing even the simplest of tasks. This paper aims to review the epidemiology, clinical features, diagnostic criteria, pathophysiology, and various treatment strategies of AD dementia.

Key words: Alzheimer's disease, Amyloids, Cognitive functions, Dementia

Introduction

Due to excessive and critical advances in medicine, life expectancy has drastically increased over the past two centuries (1). Mixed with decreased fertility rate in many developed and developing nations; this increased life expectancy led to an increase in the ageing population (2). Therefore, the geriatric population around the globe amplified, and so did the diseases affecting them. One such disease that primarily affects the elderly population is Alzheimer's disease (AD). It is a neurological disorder that causes irreversible degeneration of the brain cells. Most importantly, the frontal and temporal lobes, which are responsible for learning, communication, language, memory, etc., are abridged due to degenerative changes in the synapses and death of neurons.

AD stages itself as a progressive disease with a decline in cognitive functioning, mood, and behaviour (3). Clinically, Dementia presents an array of symptoms that are concomitant with a decline in mental function that is serious enough to diminish an individual's ability to carry out day-to-day activities (4). Though Dementia is considered an inexorable aftermath of ageing; it is not a part of healthy ageing. It occurs due to various reasons; with AD being the most common cause, followed by vascular Dementia (5).

In due course, the disease progresses to a state where emotional control, social behaviour, and motivation also dwindles. Furthermore, the need for assistance and constant supervision exponentially increases gradually, causing more stress to patients, caregivers, and the community.

Epidemiology, Prevalence and Incidence

The World Health Organization (WHO) listed AD as the seventh commonest cause of death globally and the third common cause in developed/higher-income countries (6). Furthermore, the organization has reported that over 55 million people are currently suffering from the disease, and the number is expected to increase up to 139 million in 2050 (6).

Clinical features:
AD classically exhibits diminished memory tailed by impairment in cognitive and executive functions. The classical triad of AD is impaired learning, aphasia, visuo-perceptive deficits. The disease onset is insidious and gradually progresses from mild to severe stages as years advance. The Diagnostic and Statistical Manual of Mental Disorders (DSM–5) describes and categorizes the mental disorders (MDs) to facilitate accurate diagnoses, management, and future research perspectives.
To meet the DSM-5 criteria for AD, a patient must satisfy the major or mild neurocognitive disorder criteria. The disease must be progressive with surreptitious onset resulting in impairment of one or more cognitive domains. The major neurocognitive disorder necessitates diminished cognitive function that is serious enough to impede the patient's day-to-day functioning that is not influenced by any other neurologic condition. The criteria for mild neurocognitive impairment, previously known as MCI, includes milder cognitive decline while retaining functionality (7).

Major domains of cognitive functions that are impaired in AD are as follows:

i. Amnesia:
This is short-term memory impairment, with long-term memory being spared initially. For instance, the affected individual will fail to pay bills or forget medical appointments. This might be followed by difficulty in retaining any new information.

ii. Aphasia
Aphasia is difficulty in finding/forming words and ultimately speaking them incoherently (8). As the condition progresses, the words simply become meaningless utterances, or the patients become mute.

iii. Apraxia
Apraxia denotes difficulty and complexity to carry out day-to-day activities such as dressing oneself, combing hair, and eating. It is essential to keep in mind that this condition is due to impairment of cognitive function and not because of any weakness.

iv. Agnosia
This word is used when the patient finds it difficult to recognize other known persons or objects. This difficulty is not due to visual disturbance but due to neurological instabilities. Agnosia can be exhibited as the inability to use the phone or TV remote, trouble in planning and executing activities.

BPSD (Behavioural and Psychological Symptoms of Dementia):
This may include restlessness, agitation, irritability, anxiety, depression, aggressive behaviour, and hallucination. The intensity of BPSD is expected to worsen as the stage of the disease advances. Nonetheless, it would decline in severity when apathy and global breakdown of functions sets in . It is imperative to tell apart BPSD from delirium and recognize the exact aetiology and treat them accordingly. The probable aetiologies for BPSD are hunger/thirst, pain, anxiety, depression, lack of sleep, adverse effects of certain medications, drug interactions, and infections (9).

Pathophysiology:
AD is characterized by progressive thinning out of the cerebral cortex. Significantly, the frontal and temporal lobes see extensive obliteration. This thinning is due to neuronal destruction of the medium-sized and large pyramidal neurons and the resultant loss of synaptic connections. Autopsy studies revealed multiple senile neuritic plaques and tangles and atherosclerotic changes all through the cortex(10). The aftermath of neuronal loss saw generalized ventricular and sulcal enlargement and cortical atrophy (11). Furthermore, the functions of the neurotransmitter pathway consisting of noradrenergic, dopaminergic, and serotonergic systems are profoundly marred. This resulted in the characteristic behavioural changes in the affected individuals. However, the factor that instigates the disease remains imprecise. Diagram 1 shows the pathophysiology of AD (12).

Various hypotheses associated with AD

I. Cholinergic hypothesis:
Studies on individuals of advanced age and AD have steadily suggested aberrations in the basal forebrain and rostral forebrain cholinergic pathways (13). These pathways seemed to be linked to the level of deterioration of cognitive function. As a consequence, the concept of the "cholinergic hypothesis" stemmed (14). This hypothesis states that "a loss of cholinergic function in the central nervous system contributes significantly to the cognitive decline associated with advanced age and AD" (15). Various types of research advocate that cholinergic oddities; such as variations in choline transport, the release of acetylcholine, expression of nicotinic as well as the muscarinic receptor, etc., can negatively influence the cognitive function. These abnormalities can impact the non-cognitive behavioural deviations and the accretion of lethal neuritic plaques in AD (16,17). Hence, this hypothesis is expected to continue as one of the valid approaches to develop drugs for the management of AD and other forms of Dementia.

II. Amyloid hypothesis:
In consonance with the amyloid hypothesis, Aβ amassing the forebrain is the critical factor for the pathogenesis of AD. Other contributing factors contributing to the pathophysiology, such as the accumulation of phosphorylated tau proteins, are propositioned to be a consequence of discrepancy concerning the production

and clearance of Aβ (18). the Gene for APP is positioned on chromosome 21. Practically every person with Trisomy 21 exhibits the primary signs of AD within 40 years of age. In vitro studies on mice models have shown diminished cognitive functions due to amyloid build-up in the brain cortex (16). Nonetheless, the amyloid hypothesis continues to be a contentious topic due to the lack of In vivo evidence to support the concept that particular neurotoxic genera of Aβ have toxic effects on brain function (19). Therefore, this theory has been reformed of late and given an ancillary role rather than considering it as the aetiology.

III. Tau hypothesis:
The tau hypothesis highlights that unwarranted or unusual phosphorylation of tau protein causes the alteration of normal adult tau into a paired helical filament (PHF) and results in the formation of neurofibrillary tangles (NFTs). These NFTs escort the breakdown of microtubules, and the destruction of the neuron's cytoskeleton and transport system, in turn instigating glitches in intercellular communication, ultimately piloting cell death (20). It was also proposed that serotonergic systems may play a crucial role in the molecular mechanisms of amyloid deposition and hyperphosphorylation of microtubules that result in tau neurofibrillary tangles (21).

ApoE hypothesis:
One common finding seen in both neurofibrillary plaques and tangles was the presence of apolipoprotein E (ApoE). The primary function of this protein is to prevent oxidative damage of neuronal-glial cells, preserve the integrity of the synaptic junctions, and bind to β-amyloids and APP. Amongst the four allelic forms of ApoE, E3 form has been found to have a maximum affinity towards the tau cells and thus prevents β-amyloids and APP-induced toxicity. However, in AD, the E4 form seems to increase in number; therefore, it might be incapable of counteracting the abnormal phosphorylation of tau (22). Besides, E4 fails to prevent the toxicity produced by excessive accumulation of β-amyloids and APP. Subsequently, the failed ApoE mechanism leads to atherosclerotic and ischaemic changes, as well as neurofibrillary tangle formation (23).
Nor-adrenergic receptor hypothesis:

The α2A receptor subtype is the key regulator of noradrenergic activity. This receptor subtype is the crucial regulator for the noradrenergic activity that constrains the inputs of the noradrenergic system into the cerebral cortex. This results in inhibition of response from this region of the brain. Though there is a lack of solid evidence suggesting the role of the noradrenergic components in the pathophysiology of AD, recent research opines that the α2A receptors of the noradrenergic system are an unusual but novel target in AD pathogenesis (24).

Diagnostic criteria:
NINCDS-ADRDA Work Group in the year 2011 updated the previous criteria and proposed the following terminologies for classifying individuals with Dementia caused by AD (25):

1. Probable AD dementia
2. Possible AD dementia
3. Probable or possible AD dementia with evidence of the AD pathophysiological process

The first two terminologies are meant for clinical use, while the third was proposed for research purposes.

I. The core clinical criteria proposed for describing Probable AD dementia must have the previously mentioned findings. Additionally, the patient must show the insidious onset of disease and progressive deterioration of cognitive function. The cognitive deficits should be evident either with a clear-cut amnestic presentation or non-amnestic presentation in the form of altered language perception, visuospatial and executive presentation.

II. A diagnosis of Possible AD dementia involves two other sub-classifications, i.e., AD dementia with atypical course or with an etiologically mixed presentation.
- In the atypical course, the cognitive deficits for AD dementia are the same as defined in the core clinical criteria. Still, there might be a sudden onset of cognitive impairment or non-contributory medical history, or the documentation reveals a progressive decline in cognitive function.
- The etiologically mixed presentation has evidence of (a) simultaneous cerebrovascular disease such as stroke, (b) features of Dementia with Lewy bodies, but it is not Dementia, (c) evidence for any other disease or medication that can substantially affect the cognition.

Diagnosis of Probable or possible AD dementia with evidence of the AD pathophysiological process is made after examining for biomarkers in the brain tissue in biopsy or autopsy samples. These biomarkers are categorized into two classes:
- The first class of the biomarkers includes biomarkers of brain β-amyloids such as low CSF Aβ (42) and positive PET amyloid imaging (26,27).
- The second class of biomarkers highlights neuronal degeneration or injury. The three main bio-markers included in this class are elevated CSF tau (both total and phosphorylated tau), reduced 18fluorodeoxyglucose (FDG) uptake on PET in the temporoparietal region, and disproportionate atrophy of the parietal and temporal lobe when viewed on structural Magnetic Resonance Imaging (MRI).

Assessment

i. History:
A thorough history is the backbone for a proper diagnosis. Obtaining detailed patient history allows the clinician to arrive at a clinical diagnosis; however, the definitive diagnosis can be attained only after post-mortem examination. If the patient has Dementia due to AD, then the history might reveal the insidious onset and gradual progression of the clinical signs and symptoms. It typically shows after 2-3 years of early symptoms that are identifiable in hindsight. It will also disclose the magnitude to which the patient is suffering from functional impairment.

Questions focusing on the difficulty in carrying out daily activities will abet the clinicians to comprehend the level of functional impairment.

The facets of history taking should comprise detailed past medical and psychiatric illnesses, substance abuse, present social and financial situation. This will aid in detecting the actual root cause, thus allowing tailoring the plan according to the patient's needs.

ii. Mental State Examination (MSE):
MSE is done to illustrate the signs and symptoms of AD & Dementia. Performing this examination will apprise the diagnosis and hence the management. MSE collects data regarding the details of mood, thought process, perception, and changes in behaviour. Examining the degree of insight and capacity is vital for making future decisions, be it medical management or social and financial plans.

iii. Cognitive testing:
This will aid in comprehending the extent of cognitive impairment and thereby quantifying it. Also, the areas affected are spotted and monitored. However, it is essential to account for the patient's premorbid functioning, educational level, language barrier, and acute conditions at the time of the test. Nonetheless, this testing alone is not adequate to arrive at a diagnosis.

Montreal Cognitive Assessment (MoCA) and Modified Mini-Mental state examination (MMSE) are the most commonly used cognitive tests. Hoops et al. in 2009 compared these two tests and suggested that MoCA and not MMSE has satisfactory properties to perform psychometric tests to detect mild cognitive impairment (MCI) (28).28

If time is scarce, the cognitive function can be tested by employing a memory impairment scale and a clock drawing test. More assenting test results are obtained by performing the Mini-Cog test, AD8 screening test, the four-item version of the MoCA, and the General Practitioner Assessment of Cognition (GPCOG).

iv. Physical examination:
This is done to assess the overall health of the patient. Blood pressure, pulse rate, and body temperature are monitored, followed by a thorough neurological examination. The neurological examination includes assessment of focal signs, abnormal reflexes, nerve lesions, gait disturbances. Performing this examination helps in differentiating AD dementia from Vascular Dementia and Dementia associated with Parkinson's disease.

Investigations

Complete blood picture analysis comprising total blood count, blood glucose, HbA1c, ESR, lipid profile, urea, electrolytes, vitamin B12, folic acid, and tests to assess the liver function and thyroid function should be carried out. Tests for Syphilis, HIV, Wilson's disease (Ceruloplasmin level), UTI, ECG, and EEG may be helpful (29).

Brain Imaging:
Brain imaging plays an important role in the study of AD and associated Dementia. More recently, contrast CT, structural and functional MRI, particularly 3T MRI, and positron emission tomography (PET) analysis have taken over the radio-diagnosis specialization to identify complex neurological diseases. The studies of cerebral metabolism with fluoro-deoxy-D-glucose (FDG) and amyloid tracers such as Pittsburgh Compound-B (PiB) have revealed the typical amendments that occur even at the prodromal and pre-symptomatic stages of the brains of the individuals affected with AD dementia (30). The indications for imaging are enumerated in Table 2.

Fluorodeoxyglucose- Positron Emission Tomography (FGD-PET) aids in measuring cerebral metabolic rates of glucose as a proxy for neuronal activity in AD (31). Many studies show a reduction in CMRglc early in AD (32). Amyloid PET analysis of the atypical presentation of AD dementia assists in arriving at a diagnosis and deciding the treatment plan. The following changes are seen in imaging studies of a patient with AD:
1. Atrophy of cerebral hemispheres with the corresponding ventricles showing considerable enlargement.
2. The earliest signs are noted in the medial temporal lobe and limbic lobe, such as the posterior cingulate (33). Atrophic changes are, however, noted predominantly in the entorhinal cortex, followed by the hippocampus, amygdala, and parahippocampus (34).
3. Alterations in the brain are noted in the neocortical and all the concomitant regions in a symmetrical manner. This change of the cortices is said to be associated with the spread of neurofibrillary tangles (35).
4. Hypoactivity of the hippocampal region can be noted during functional imaging.

It has to be kept in mind that not all patients will exhibit all the findings mentioned above. These changes must be clinically correlated with the history, neurological examination, laboratory investigations, and disease diagnostic criteria.

Differential diagnosis

The differential diagnosis of AD Dementia includes Huntington's disease and Parkinson's disease, Normal Pressure Hydrocephalus, pseudodementia, hypothyroidism, Vitamin B12 or folic acid deficiency, hypercalcemia, substance abuse, delirium, etc. AD dementia can be clearly distinguished from the conditions mentioned above if the diagnostic criteria and proper investigations and examinations are carried out chronologically.

Risk factors

The risk factors for AD dementia can be broadly divided into modifiable and non-modifiable factors (Diagram 2) (11):

I. Modifiable risk factors:
Head injury, type 2 diabetes mellitus, cardiovascular factors (stroke, heart disease, and hypertension), high cholesterol, obesity in midlife, depression in later life, smoking and alcohol abuse, reactive oxygen species (ROS), estrogen deficit, etc., are considered as modifiable risk factors.

II. Non- modifiable :
Family history, genetic factors, increasing age, Latino and African ethnicities, female gender, trisomy 21 are non-modifiable risk factors. The familial form (1% of AD) is due to variations in genes coding for the proteins such as presinilin1, presenilin 2, APP. Inheritance of the APOE4 gene is a risk factor for acquiring the disease.

Biomarkers

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Inspecting reliable biomarkers may benefit physicians in detecting the precise pathophysiology of AD during the pre-symptomatic stage. Biomarkers with high sensitivity and specificity enable diagnosis of the disease at the early stages. The following are the most commonly examined and predictable biomarkers for AD dementia:

APP: It has been well established that the presence of senile plaques and neurofibrillary tangles, when closely examined, revealed that they are composed of Aβ and APP. Therefore, if altered proteolytic processing of APP can be detected in AD patients, then measuring APP or its derivatives will aid as a diagnostic marker.

Aβ: APP is present in all tissues, especially present in excess in AD cases. This compound is cleaved by β-secretase to produce ectodomain (sAPP-β). The ensuing cleavage by γ-secretase further releases 38–43 Aβ peptides (36). Since it is already a fact that Aβ42 is the predominant component of the senile plaques, various researchers have suggested Aβ42, as well as other Aβ species, as an investigative tool (37).

Tau and p-tau: Neurofibrillary tangles seen in the brains of individuals affected by AD are chiefly composed of tau, a microtubule-associated protein. Since increased levels of CSF tau is present in other neurodegenerative disorders such as stroke and cortico-basal degeneration, researchers have instigated to specifically probe the phosphorylated forms of tau and consider it as diagnostic biomarkers for AD (38).

Amyloid: Five amyloid PET ligands that are verified in AD patients have yielded assuring results (39).

The ATN Biomarker Classification by the NIA-AA in 2018 is given in Table 1(40)

Isoprostanes: Emerging research and its evidence advocates that oxidative damage could be a significant component in the pathophysiology of AD. The isoprostanes, especially the F2-isoprostanes, are the end-products of the lipid peroxidation process; therefore, these by-products are profoundly inspected (41). It has been learned that these substances are increased in the frontal and temporal cortex of AD. Hence, it is thoughtful to consider this product as a biomarker.

Imaging biomarkers:
Functional MRI (fMRI) studies have disclosed aberration in brain activity of AD patients, such as decreased activation of the entorhinal cortex, supramarginal gyrus, prefrontal regions, anterior inferior temporal lobe, medial temporal lobe, hippocampal regions, and increased activation of medial parietal cortex and posterior cingulate (42).

PET enables in examining the regional cerebral metabolism by employing CMRglc using FDG-PET. Perceived alteration in the brains of the patients with AD involves decreased metabolism in temporoparietal, posterior cingulate, hippocampal complex, medial thalamic regions, and mamillary bodies (38).

Prevention

The aim of prevention should be to prevent or arrest the primary neuropathology, reduce risk factors, and enhance protective factors. Consuming nutrition-rich foods such as the Mediterranean diet, unsaturated fatty acids, lots of fruit and vegetable intake is essential. Physical activity is advised, at least at a moderate intensity. Music therapy, and audiological rehabilitation for patients with hearing loss, is suggested for those suffering from AD. Prevention of sleep deprivation and treating sleep apnea, if present, is recommended. Medication and treatment to reduce the severity of modifiable risk factors are mandated. Depression, particularly late-onset, is linked to acquiring AD within the next five years when contrasted with people with similar risk factors (42). Hence, monitoring and treating Depression in the elderly is essential.

Recent research suggests that anxiety is perhaps leveraging the amyloid in driving the expression of cognitive disorder. Hence, monitoring and treating anxiety may be beneficial.

Screening

Cognitive testing in asymptomatic people with a family history of AD or vascular risk factors is not recommended for screening purposes. However, monitoring for symptoms of cognitive impairment in older adults and those who are at risk for developing AD is advisable. If a cognitive concern arises, a validated cognitive assessment should be carried out as a part of the complete examination/workup.

Managaement

Management of AD incorporates both psychosocial and psycho-educational interventions. Patients with mild or moderate AD would benefit from exercise and group cognitive stimulation. Psychosocial and psycho-educational interventions are also crucial for caregivers. They should include problem-focused and emotion-focused coping

strategies, education, counselling, information regarding services, enhancing carer skills, problem-solving, and strategy development.

Medications

Medications such as Acetylcholinesterase inhibitors, Donepezil, rivastigmine, galantamine, N-methyl-D-aspartate (NMDA) receptor antagonist, memantine and memantine XR formulation, and a combination of Donepezil and memantine are currently available for the medical management of AD dementia (Table 3).

A study by Xu H et al. in 2021 suggested that the global improvement of AD based on CIBIC score was 27% when ACE inhibitors were prescribed. In contrast, the score was 16% in placebo (44). 1 in 4 patients who receive medications for AD dementia get a clinically notable benefit. However, the value of cognitive and functional improvement varies considerably among individuals with AD, but nearly all trials for ACE inhibitors in MCI did not show statistically significant benefit.

The follow-up of the patients must include a multidimensional approach; wherein all domains must be evaluated at least annually. The visits can be scheduled every six months at most, except if new concerns arise or if there is a plan of starting new medications. Patients with BPSD require more frequent monitoring. Since this disease puts a lot of pressure and stress on the caregivers, they should be evaluated regularly for burnout. Zarit Burden Interview scale may be beneficial for that purpose.

De-prescribing Anti Dementia Drugs:
Firstly, it is crucial to consider the patient's wish (if the patient is currently able to make decisions) and any advanced directives and Substitute Decision Making (SDM). De-prescribing should be gradual, and medications should be reinstated if the patient shows any clinical signs of decline in cognitive function or if the neuropsychiatric symptoms improved while cognition and functionality declined. The circumstances that require de-prescribing the medications are explained in Table 4.

BPSD

In clinical settings, neuropsychiatric symptoms can present often and might be difficult to understand initially. It is vital to understand the causes of BPSD and try to reverse them before deciding to medicate. Management of BPSD largely depends on the cause, patient profile, and the presenting symptom. Management options include non-pharmacological methods, ECT, and medications like SSRIs, Trazodone, Gabapentin, and Antipsychotics. Agitation is usually noted quickly as it poses risk to patients and staff, but other symptoms can go unnoticed for a while. When managing BPSD, it is important to start by non-pharmacological measures as it has shown better outcomes in research (Table 5). After we have tried to reverse possible causes and if non-pharmacological measures bear no fruit, we might consider medications as we aim to increase the quality of life. Antipsychotics should be avoided initially, due to the black box warning by the FDA and because it can lead to a series of side effects (45).

Antipsychotics may be used in selected cases where the fast intervention is required due to inefficacy of alternative therapies, and there is risk of deterioration in a patient having severe symptoms. Monitoring closely for the side effects is vital in practice, especially because the geriatric population is more vulnerable to medication side effects in general, and the brains affected by dementia can be extra sensitive to antipsychotics. Davies et al in 2018 developed a sequential algorithm for managing agitation and aggression associated with AD and mixed type of dementia (Diagram 3) (45). It is important to keep in mind that some symptoms are less likely to respond to medications like wandering, hoarding, repetitive activity, vocalizations, undressing, inappropriate voiding, eating inedible objects. Hence, the use of medications might not change the outcome and only add the burden of side effects and drug interaction (46). Deprescribing antipsychotics is vital and has shown promising results in recent studies. It is recommended to de-prescribe after no more than eight to 12 weeks. The suggested tapering strategy in case of BPSD is elaborated in table 6 (47).

Future treatment

The forthcoming and prospective remedial measures for AD should be directed at the etiologic pathologies, mainly the neurofibrillary tangles (composed of p-tau) and senile plaques (Aβ). Research focusing on anti-amyloid, anti-tau, and attempts to alter the neural circuit are underway. The EU/US/Clinical Trials in AD Task Force in 2016 evaluated many clinical trials that focused on remedies for AD dementia to detect which drug or treatment modality is effective (41). The task force could not give any definite solution and treatment options that could completely cure the disease or remove the risk factors (48). However, the meeting in 2020 concluded that it is premature to use remote estimations for clinical trials for novel experimental medications. Nonetheless, non-invasive and multi-domain remote study approaches could be made feasible during the times of the ongoing COVID-19 pandemic (49).

Conclusion

The prevalence of AD has its graph in an increasing trend. Although AD was discovered almost a century ago, there is no permanent remedy to cease, hold back or even decelerate the advancement of this neurodegenerative disease. Although various diagnostic methods such as advanced imaging modalities and biomarker evaluation have come into play, the medical fraternity is still lacking complete knowledge about the aetiology and pathogenesis of the disease. While there is more emphasis on the treatment options that provide symptomatic relief and reduce disease progression, further research is required to detect the disease at the initial stage and provide a definite cure for the disease.

Table 1: ATN Biomarker Classification proposed by the NIA-AA in 2018

Amyloid (A) aggregates	CSF Aβ42, or Aβ42/ Aβ40 ratio Amyloid PET
Tau (T) aggregates	CSF phosphorylated tau Tau PET
Neurodegeneration (N)	CSF total tau Anatomic MRI FDG PET

Table 2: Enumerating the indications for imaging

Indications for imaging:

a. The onset of cognitive impairment signs/symptoms must be within the past 2 years.
b. There must be an unexpected and unexplained decline in cognition and/or functional status in a patient already known to have Dementia.
c. Recent history of significant trauma to the head.
d. Unexplained neurological manifestations such as headache, seizures, Babinski sign, altered gait, etc
e. Patient with a history of cancer.
f. Factors that can increase the risk of intracranial bleeding are present
g. Symptoms suggestive of Normal-pressure hydrocephalus (NPH) are present
h. There is a significant presence of vascular risk factors.

Table 3: Common medications prescribed for the treatment of AD dementia

MEDICATION	
Acetylcholinesterase (ACE) inhibitors Side effects: nausea, vomiting, diarrhea, anorexia, syncope, bradycardia (can theoretically slow heart rate)	
Donepezil (in mild to severe cases of AD)	5 mg PO QAM x 4weeks, then 10 mg QAM. (The dosage may be increased to 23 mg daily in moderate to severe cases, but advised to increase after 3 months on 10 mg).
Rivastigmine (skin patch) (in mild to severe cases of AD)	4.6mg twice a day for 4 weeks, then 9.5 mg twice a day.
Galantamine (in mild to severe cases of AD)	8mg daily for 4weeks, then 16 mg daily. (The dosage may be increased to 24 mg daily after 4 weeks of being on 16mgs).
NMDA receptor antagonist	
Memantine (in moderate to severe cases of AD)	5 mg daily then increase by 5mg increments every week. (Maintenance dose is 10 mg BD (lower in renal impairment))
Memantine XR formulation Side effects: sedation, headache, constipation	7 mg daily for 1 week (The dosage may be increased by 7 mg every week, maximum dose 28 mg daily).
Combination Pill Donepezil/Memantine	Doses: 10mg/28mg Best after trial of the medication and stability is seen Titrate 10/7, 10/14, 10/21, 10/28 (mgs)

Table 4: Indications for de-prescribing AD medications

De-prescribing the medications can be attempted in the following circumstances:
- Clinically meaningful worsening of Dementia
- No clinically meaningful benefit was observed during treatment.
- An individual with severe or end-stage Dementia.
- Development of intolerable side effects (might respond to dose reduction if applicable.)
- Medication adherence is poor, or inability to assess the effectiveness of the medication.

Table 5: Non-pharmacological interventions and management of behavioural and psychological symptoms of dementia in residential care 46

Categories	Non-pharmacological intervention
Sensory Enhancement/ Relaxation	• massage and touch • individualized music • white noise • controlled multisensory stimulation (Snoezelen) • art therapy • aroma therapy
Social Contact: Real or Simulated	• individualized social contact • pet therapy • 1:1 social interaction • simulated interactions/family videos
Behaviour Therapy	• differential reinforcement • stimulus Control
Structured Activities	• recreational activities • outdoor walks • physical activities
Environmental Modifications	• wandering areas natural/enhanced • environments • reduced stimulation • light therapy
Training and Development	• staff education (e.g: CARE Program, P.I.E.C.E.S., proper communication) • staff support • training programs for family caregivers

Table 6: Deprescribing antipsychotic drugs in BPSD (47)

The following strategy is recommending while deprescribing drugs in cases of BPSD • Reduce to 75%, 50%, and 25% of the original dose on a biweekly basis before stopping • Alternatively, reduce the previous dose by approximately 50% every week down to 25% of the initial dose, then stop
Additionally, • For patients with severe baseline BPSD symptoms or longstanding use of antipsychotics, we recommend slower tapering, close monitoring for withdrawal symptoms, and establishing a clear intervention plan emphasizing the use of nonpharmacologic approaches first, in the event of increased severity or recurrence of neuropsychiatric symptoms • Furthermore, tapering might need to be individualized depending on the starting dose, available dosage forms, and how tapering is tolerated
For those prescribed antipsychotics for the treatment of insomnia, the following regimen is recommended: • If the patient has been taking an antipsychotic for a short period of time (eg, <6 wk), stop antipsychotic use immediately. • If the patient has been taking the antipsychotic for a longer period of time, consider tapering the dose first before stopping. If there are concerns on the part of either the patient or the prescriber about possible side effects of immediate discontinuation, tapering can also be considered • All patients should be counselled about nonpharmacologic approaches to sleep (so-called sleep hygiene)

Diagram 1: Pathophysiology of AD dementia

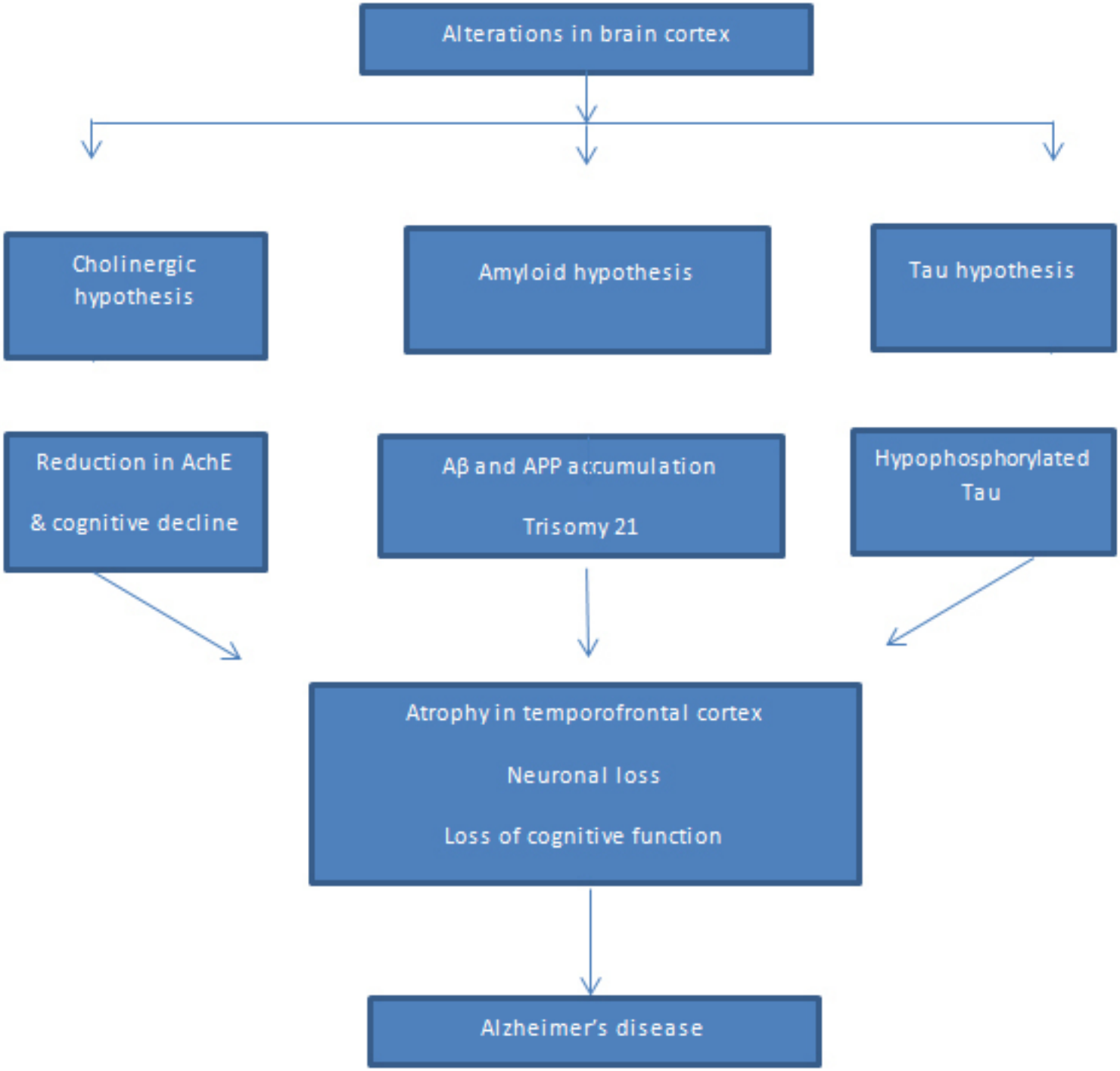


Diagram 2: Risk factors for AD dementia as proposed by Farlow MR8

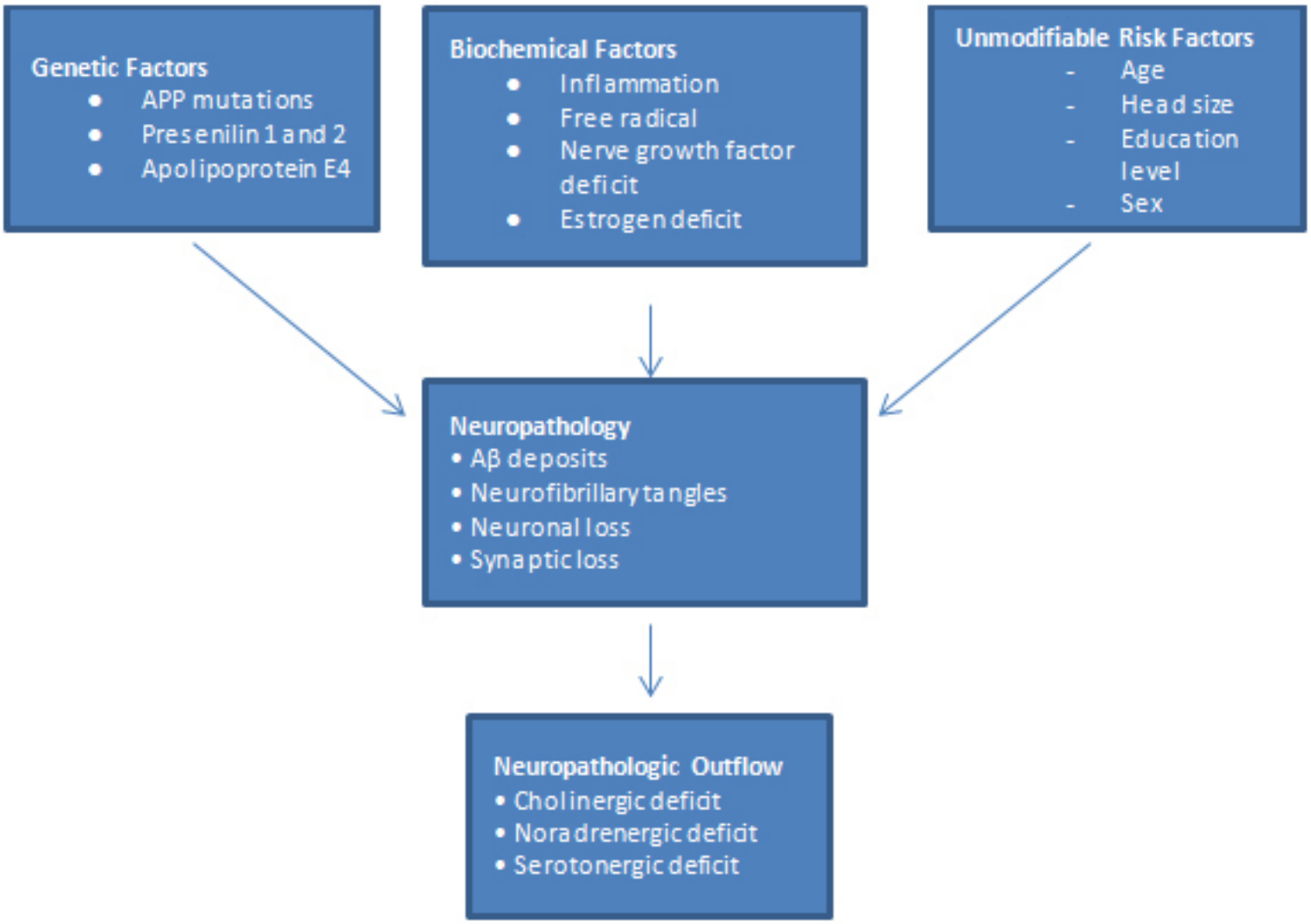
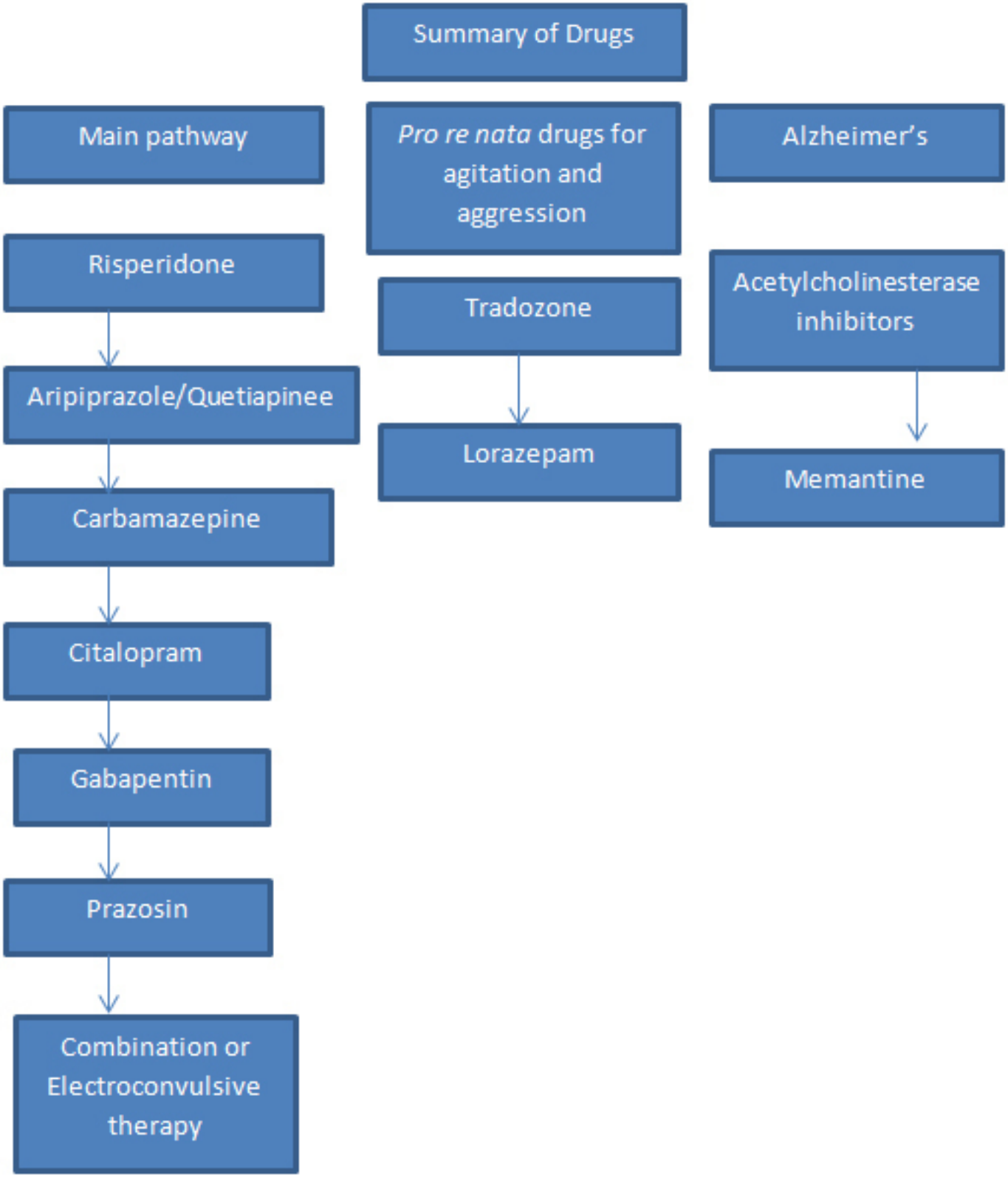


Diagram 3: Algorithm for management of agitation and aggression in AD45



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Clinical Audit Report on Adherence to Imaging Guidelines for Patients with Acute Low Back Pain in Airport Health Centre

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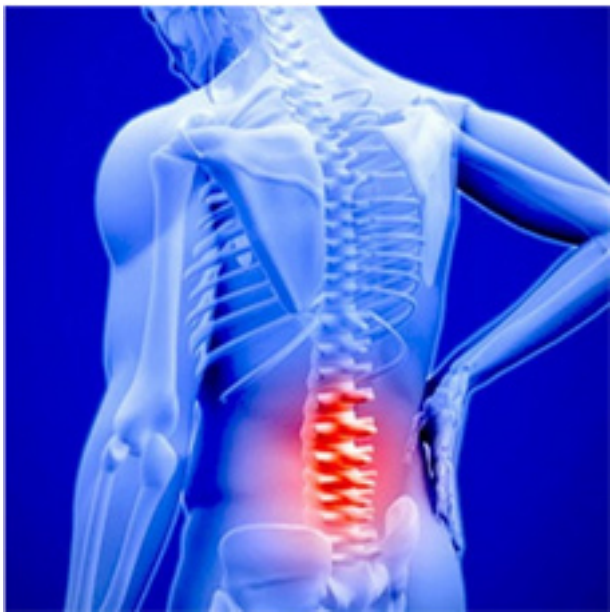
Abstract



It is estimated that up to 84 percent of adults have low back pain at some time in their lives [1,2]. The vast majority of patients seen in primary care (>85 percent) will have nonspecific low back pain, meaning that the patient has back pain in the absence of a specific underlying condition that can be reliably identified [3-4]. For most of these individuals, episodes of back pain are self-limited. Patients who continue to have back pain beyond the acute period (four weeks) have subacute back pain (lasting between 4 and 12 weeks), and some may go on to develop chronic back pain (lasting >12 weeks) [5].

Patients who don't improve on pharmacotherapy should be reassessed and must not be given imaging within 6 weeks from the onset of symptoms. However, acute low back pain will go on to develop chronic low back pain if not addressed.

It is observed from practice that most of the physicians did follow the guidelines while treating the patients with acute low back pain, although, sometimes they advised imaging within 6 weeks of symptoms.

The Audit was conducted through a retrospective review of health records of a randomly selected 66 patients with acute low back pain, seen at the Airport Health Center during the months from 1st January 2021 till 31st March 2021. Audit criteria is derived from PHCC Clinical Practice Guideline for the Management of Low Back Pain in Adults.

Audit findings of the total sample of 66 patients showed 95% compliance with the recommended practice on imaging requirement for patients with acute Low Back Pain and didn't do imaging at the first visit.

Conclusion: Audit concluded with the recommendation on achieving 100% level of compliance in practice and to sustain the practice.

Key words: clinical audit, low back pain, imaging

Abbreviations:
PHCC Primary Health Care Corporation
LBP Low Back Pain

Introduction

The clinical evaluation of low back pain includes a history and physical examination to evaluate for signs or symptoms that indicate need for immediate imaging and further evaluation. For most patients with acute LBP (<6 weeks), laboratory tests and imaging are not necessary in the initial evaluation.

Earlier use of imaging for low back pain without associated symptoms is not associated with improved outcomes but increases the use of invasive procedures and likely health care costs [9]. As examples: A 2009 systematic review and meta-analysis of six trials that compared immediate imaging (lumbosacral spine magnetic resonance imaging [MRI], computed tomography [CT], or radiography) with usual care for patients with acute and subacute low back pain, without signs or symptoms of infection or malignancy, found no differences in short-term (up to three months) or long-term (6 to 12 months) outcomes for measures of patient pain or function [10].

Additionally, imaging exams often show abnormal findings in adults without low back pain, which makes it difficult to determine which imaging findings are clinically significant. As an example, disc herniations on MRI are seen in 22 to 67 percent of asymptomatic adults and spinal stenosis in 21 percent of asymptomatic adults over age 60 [11-12].

Aim

To ensure adherence to imaging guidelines for patients with acute low back pain and suggest changes in practice if needed.

Audit Objective

• To determine if imaging is done for patients with acute low back pain within the first 6 weeks from the onset of symptoms.

Audit Standards / Criteria

Standard: No imaging examination is needed for patients 18 years and above with acute low back pain within the first 6 weeks from the onset of symptoms

Criteria	Target (%)	Measurement frequency (repeat data collection) *if needed*	Exceptions
Criteria 1: All patients with acute low back pain do not need imaging examinations within the first 6 weeks of symptom's onset	100%	Repeat data collection after 3 months of implementation of audit recommendations	• Patient with Red flag symptoms/signs • Caudia equina syndrome • Fracture • Infection • Malignancy • Acute onset of back pain resulting from trauma. • Chronic persistent low back pain

Methodology and Sample

Inclusion Criteria
Patients aged 18 years and above with diagnosis of acute low back pain within the audit period from January 1st till 31st of March seen at the Airport Health Center.

Exclusion criteria
Patients with Red flag symptoms / signs: Caudia equina syndrome, Fracture, Infection, Malignancy, Acute onset of back pain resulting from trauma and chronic persistent low back pain.

Audit Type:
Retrospective audit

1. SAMPLING
A total of 10 % (66 records) from total cases (676) of the total medical records of patients with acute low back pain seen at Airport Health Center from 1st of January till 31 of March 2021 was randomly selected. Each record was carefully reviewed for documented evidence about if the physician had placed the imaging order within six weeks from the onset of symptoms and recommended measures.

2. DATA SOURCE
Patients' records (electronic)

3. AUDIT TOOL
Quantitative analysis by using MS excel tables, proportions and percentages.

4. DATA ANALYSIS
1. Quantitative analysis was done by using MS excel comparisons, proportions and percentages.
2. Each patient's record was audited based on the audit criteria as coded into: YES= 1, No= 0 and Not applicable = NA.
3. Data was entered to a pre-formatted MS excel and MS words document template analyzed and then tables and charts were generated.

Results

Criteria 1: All patients with acute low back pain, don't need imaging examination within the first 6 weeks of symptoms onset

Figure -1: Adherence to PHCC imaging guideline for patients with acute LBP

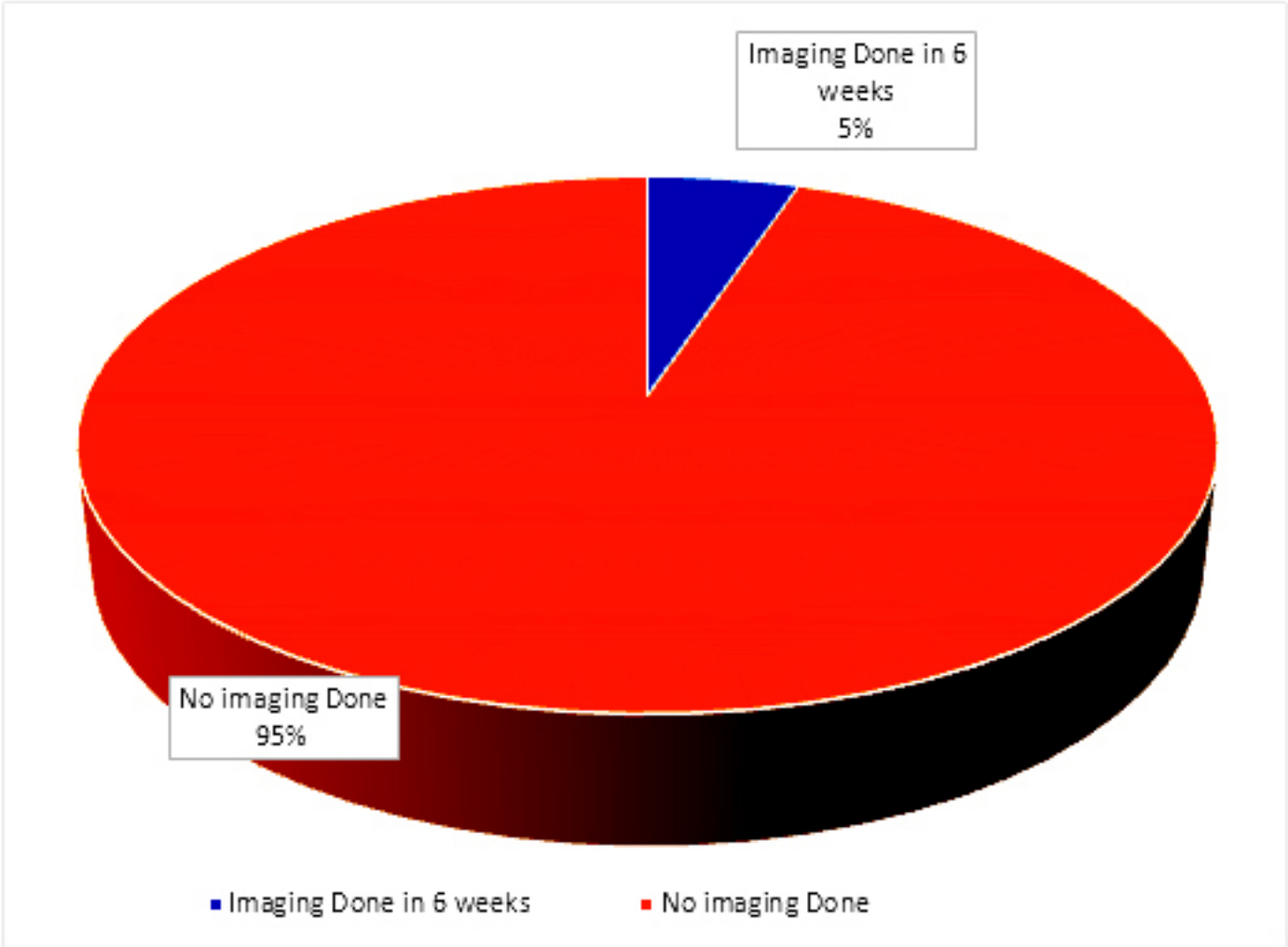


Figure 1 shows that in 95% of records imaging was not requested in the initial 6 weeks as recommended by best practice guideline, which indicate a satisfactory level of compliance among Physicians with the PHCC practice guidelines for imaging (patients with acute LBP).

Recommendations

To improve the compliance to 100% of the recommended imaging practice for patient with low back pain

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Clinical Audit Action Plan

Audit Topic	Adherence to PHCC Imaging Guidelines for Patients with Acute Low Back Pain	Audit No.	HC/CA.21-014
Health Centers	Airport health canter	Audit Dates	1st January 2021
Audit Lead	Dr. Hanan Al-shamery	Section Manager	Dr Mariam Jaber
Recommendations	Actions Required	Responsible	Initiation date
Improve the compliance level to achieve 100%	Share the audit findings through email, ppt and repeat the audit after 6 months to ensure the guideline followed 100% adherence.	Dr. Hanan Al-shamery	Oct 2021

A case of Erythroderma following Terbinafine therapy

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Abstract

Background: The onset of cutaneous lupus erythematosus may be associated with the administration of a variety of drugs. Terbinafine, an oral antifungal agent, which rarely causes cutaneous eruptions, has been implicated as the cause or exacerbation of cutaneous lupus erythematosus in several patients.

Case: A 52-year-old female patient had received oral terbinafine for onychomycosis. The patient had a family history of lupus, but no personal history. Six weeks after initiating treatment with terbinafine the patient developed cutaneous lupus which was diagnosed clinically and by histology. She developed an erythrodermic rash. Immunological studies showed elevated titres of anti-nuclear antibodies. Following discontinuation of terbinafine therapy and under the treatment of systemic and topical steroids, a slow resolution of the eruption was noted over several weeks.

Conclusions: This report, along with previous cases described, suggests the association between terbinafine therapy and the onset or exacerbation of SLE often occurring in a patient with history of systemic lupus erythematosus or SLE.

Key words: SLE, erythroderma, drug reactions

Background

Terbinafine, an oral antifungal agent, is an effective and common treatment for dermatophyte toenail onychomycosis (1). Cutaneous systemic lupus erythematosus is rare and has been listed in the British National Formulary as a 'rare or very rare' side effect. Terbinafine has been linked to being the cause or exacerbating cutaneous lupus erythematosus in several patients (2).

It is diagnosed that cutaneous systemic lupus erythematosus is drug induced when the clinical and immunological testing are similar to idiopathic lupus in a patient with no previous history so thus relating it to the drug taken (3).

The first case of drug-induced systemic lupus erythematosus was described in 1945 (4). A distinguishing feature of drug related cutaneous lupus is the symptoms progressively resolving on stopping the offending drug and a relapse on re-exposing the patient to the same drug.

Cutaneous systemic lupus erythematosus can rarely present as erythroderma which is an intense and usually widespread reddening of the skin due to inflammatory skin disease first described by Von Hebra in 1868. The erythrodermic state is of great concern because of the dysmetabolism it creates (5). It can lead to death even when handled well hence an accurate diagnosis is crucial. A detailed outline of the patient's history to elicit possible triggering events particularly drug taken is therefore pertinent and there is a need for clinicians to be aware of this.

In this case we describe a patient who developed erythroderma as a result of lupus triggered by Terbinafine therapy for toenail onychomycosis.

Case

We present a 52 year old female patient of mixed black and white ethnicity who presented to her family physician with a widespread erythematous rash. Her only medical concern was toenail onychomycosis proven on microscopy. She had been started six weeks previously on Terbinafine at a dose of 250mg once daily. She was on no other medication, had no medical history, was a non-smoker and didn't drink alcohol. She had a family history of lupus as her mother had been diagnosed with the condition 20 years previous and was established on Methotrexate.

She described an intermittent pruritic rash for two weeks that developed until most of her skin was erythematous and inflamed. She thought the itching was related to a new shampoo she had started using but it didn't seem to ease on stopping usage. In fact, the pruritus worsened until she was unable to work or sleep. On examination she had a severe red inflammation of more than 90% of her skin including swollen eyelids. Some areas of her skin were oozing and other areas were lichenified. All of the skin examined was warm to touch. Her heart rate, temperature, respiratory rate and blood pressure were within normal parameters.

She was admitted to a dermatology ward. It was clear she had erythroderma and the differential diagnoses were that it was secondary to contact dermatitis or a drug eruption pending results. Her Terbinafine was discontinued on the ward, and her fluid balance was monitored. She was started on oral prednisolone 30mg and topical Dermovate once a day, a soap substitute and wet wrap therapy. She was also prescribed oral Flucloxacillin 500mg four times a day for 7 days and Hydroxyzine 25mg at night. Improvement was progressive over days and weeks.

Her white cell count and eosinophils were raised on admission. Immunological studies showed elevated titres of anti-nuclear antibodies. Her skin biopsy showed nonspecific inflammation on histopathology. Based on her test results and history she was diagnosed with erythroderma secondary to cutaneous lupus erythematosus triggered by Terbinafine therapy.

She made complete recovery and discharge was made after six weeks on oral Hydroxychloroquine.

Discussion

It is intriguing that black people or those of African descent are affected more with SLE. Although it is not known why, they appear to be more susceptible to it. We also know that the course and severity vary and often those of African descent suffer more severe disease (6). It is relevant thus that our patient was of mixed heritage, her mother being black. This perhaps made her more susceptible. In addition, a family history of SLE is associated with a clearly raised risk of developing SLE (7).

SLE due to drug reaction is rare representing 6% to 12% of all lupus cases (8). This case is important because in the literature Procainamide and hydralazine have been shown to have the highest incidence of causing drug induced SLE and other drugs with definite association with DIL include interferon-alpha, minocycline, isoniazid, rifampin, phenytoin, penicillamine, quinidine, phenytoin, methyldopa, chlorpromazine, carbamazepine, ethosuximide, propylthiouracil, and sulfasalazine (9). However there have only been a few cases linking Terbinafine with drug induced SLE (2). Thus more cases like this and more in depth research providing more substantial links is necessary.

As in this case, the research supported a diagnosis of drug induced cutaneous SLE on clinical appearance and the resolution of symptoms with the withdrawal of the offending medications (10,11). Immunological testing should show a positive ANA autoantibody; usually a homogenous pattern is present, although the speckled pattern has been reported (9).

The backbone of treatment is understanding the link between the offending drug and the subsequent symptoms, hence discontinuing it. A positive ANA on its own does not require the cessation of the drug but the patient will require close monitoring (9).
The use of systemic steroids in more severe cases is supported in literature although caution is often advised if there is any query as to whether erythroderma was caused by psoriasis due to the risk it may cause worsening of their psoriasis (12).

As with our case above, even though the symptoms of drug induced SLE usually resolves within a few weeks of discontinuing the drug, the autoantibodies can stay positive for several months to years, and their presence alone shall be a reason for immunosuppressive therapy (9). Moreover, the positive autoantibody along with her family history and likely underlying susceptibility supports our patient continuing on Hydroxychloroquine, a disease modifying agent.

Conclusion

This case report indicates that there is an association between Terbinafine and developing cutaneous SLE particularly in susceptible patients. Previous reports have shown susceptible patients to be those with a personal history of SLE but we present a case where the susceptible patient could be someone with a significant family history. Thus this report emphasises the importance of clinicians eliciting an excellent history.

We recommend that patients with a known drug allergy that caused cutaneous SLE should be made aware that they should avoid the drug forever, and if their reaction was severe whereby they develop erythroderma, they should wear a drug alert bracelet.

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Rare presentation of lower limb weakness, a case report

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Abstract

SUMMARY

This is a 53 year old male, who was previously healthy, and who presented to a primary care physician, complaining of from chronic back pain. He was seen multiple times with the same problem, which was treated as Myalgia with pain killers only. After a proper approach and investigation he was found to have ALS Amyotrophic lateral sclerosis.

BACKGROUND:

Lower limb weakness is a common problem in the primary care setting, with a multiple differential diagnosis. It is defined as loss of muscle strength[1]. The physician should firstly isolate and be sure that the complaint of patient is weakness of the muscle , mainly by investigating other causes that may mimic and overlap with the presentation; the famous and most common cause being fatigue[2]. History and physical examination in addition to investigation will assure that the physician will reach the proper diagnosis and management plan but before that knowing the mechanisms of weakness is the corner stone in approach[3,5], which includes[3,4]:

Upper motor neurons, Lower motor neurons, Neuromuscular junction, Muscle.

In the primary care setting and because of patient flow, usually common is common, which is exactly what happened to the patient, as he visited the center multiple time because of weakness and mild pain which did not attract the attention of the treating physicians to more serious and complicated disease[6,7].

Amyotrophic lateral sclerosis (ALS), commonly called Lou Gehrig's disease, is a progressive neurodegenerative disease affecting both upper and lower motor neurons. ALS is a condition characterized by weakness, muscle wasting, fasciculations and increased reflexes[1,2]. The annual incidence rate is one to three cases per 100,000. The disease is mostly diagnosed in middle age and affects more men than women [5].

Over a period of months or years, patients with ALS develop severe, progressive muscular weakness and other symptoms caused by loss of function in both upper and lower motor neurons.

Mainly it presents with 2 major categories of symptoms: Upper motor neuron, Lower motor neuron [2].

In the patient's case it was mainly lower motor neuron symptoms without any symptoms of upper motor which makes the presentation unique and confusing with other differential diagnoses.

ALS has a bad prognosis and limited options of treatment. Respiratory failure limits survival to 2-5 years after disease onset. RILUZOLE is the only drug that can affect prognosis [1,7,8,9].

Being rare, difficult to treat and with a bad prognosis, makes us want to share this case with our colleagues as the learning opportunity in this case makes it a valuable one for a case report.

Key words: lower limb weakness, case report

Case Presentation

A 53 year old male working as a driver, was known to have recurrent chronic back pain for one year, that became progressive in the last 3 months. The pain was associated with weakness of both lower limbs and inability to walk without assistance.

He visited the health center multiple times to get a diclofenac injection which he believed helped in relieving his pain and improving the limb weakness. His condition became worse and not improving on the painkiller. He could not walk without assistance, depending on a cane for walking for a period. Weakness progressed rapidly until he became wheelchair bound. No other neurological or sensory symptoms were associated with lower limb weakness apart from the inability to hold urine. There was no fever, no weight loss, no history of trauma. Other System review was unremarkable.

His Past medical history: Patient report using pregabalin for neuropathic pain back in his country, Family history is insignificant, no similar condition in the family, no history of neurological disease , worked as a driver since 10 years in Doha, and he is a smoker of 25 packs per year, not alcoholic (last drink according to him was many years ago) and on regular diet not vegan or vegetarian

He has a major concern regarding his pain as it is preventing him from driving in the past 3 months.

Examination at presentation to health center:
Patient presented in wheelchair, he was not in pain, vitally stable and looked well, his chest was clear, with normal s1 s2 sounds.

We focused on neurological and lower/upper limb examination at that time, cranial nerve examination was unremarkable. When we examined the gait it showed that he has a picture of left foot drop. The Upper limbs showed Weakness on Right distal muscles, No proximal muscles weakness. And in Lower limbs Motor Tone was Decreased, Power 3/5 throughout Proximal muscles, 1/5 on dorsiflexion and plantar flexion. Sensory: intact to light touch and pain throughout in all limbs. Reflexes examination showed Normal Knee reflexes, Abnormal Ankle reflexes, Plantar reflex was Downward on right side and Equivocal on left side, with positive Romberg sign. And on back examination there was No tender point, negative Straight leg raise test, Intact perineum sensation.

Investigations (If relevant)
Investigation at Primary care:
-XR Lumbar spine
Plain X-ray Of The Lumbo-sacral Spine Revealed: -(report of x ray)

“Straightened lumbar lordosis.… spasm. Minimal Spondylo-degenerative changes of lumbar vertebrae showing anterior osteophytes at their opposing vertebral end plates. Minimal narrowing of L5/S1 disc space..... ?degenerative, ?variant. Intact both sacro-iliac joints.”

Investigations at secondary Hospital :
Patient was referred to ED for further evaluation and management.
MRI was done:
-MRI Spine thoracic lumbar with contrast (Verified)

“CLINICAL INDICATION: 53-year-old male patient. Examination was initially requested by neurosurgery with a clinical history of bilateral lower limb weakness and L1 Para spinal tenderness.

COMPARISON: No previous imaging available for comparison.

FINDINGS:
On screening imaging there is satisfactory alignment of the cervical spine. The vertebral body heights are well-maintained. There is degenerative disc disease at the level of C5-C6 with mild posterior osteophyte formation and mild disc bulge. There is also some degenerative disease at the level of C6-C7 with posterior disc bulge which is compressing the thecal sac.

No spinal cord lesions identified.

There is satisfactory alignment of the thoracic spine. The vertebral body heights are well contained. No fracture identified. There is small posterior disc bulge at the level of T4-T5.

There is satisfactory alignment of the lumbar spine. The vertebral body heights are well maintained. No fracture identified.

L4-L5: Mild diffuse disc bulge which is indenting the thecal sac and is abutting the traversing left L5 nerve root.

There is also mild-to-moderate bilateral foraminal narrowing. There is also bilateral facet joint effusion at this level.

L5-S1:There is diffuse disc herniation with a small central protrusion component which is abutting the right traversing S1 nerve root and abutting the left traversing S1 nerve root. There is also mild right foraminal narrowing and moderate left foraminal narrowing with abutment of the exiting left L5 nerve root.

IMPRESSION:
Multilevel degenerative disease as described above which is more significant at the level of L5-S1.”
Blood test in ER:
Myoglobin: 86 , CRP:6.4 , Urine analysis: -ve
-Vasculitis and Gammopathy Screening:
ANA, CTD, ANCA , C3 , IgE , IgA, IgM ,IgG All are -ve
-EMG and NCS (13/06/2021)

“Electrophysiologic evidence of active and generalized disorder of motor neurons and/or their axons consistent with amyotrophic lateral sclerosis.”

DIFFERENTIAL DIAGNOSIS: Sorted according to the presentation of case before the definitive diagnosis test

- Stroke
- Nerve Compression or Brain injury: neoplasm
- Guillain Barre syndrome
- Multiple Sclerosis
- Myopathy
- B12 deficiency.
- Alcoholic neuropathy.
- Infectious: HIV, Syphilis, Polio
- Spinal cord Injury
- Degenerative disc disease
- Cervical spondylosis
- Amyotrophic lateral sclerosis

Treatment and Outcome

The patient's only treatment was to solve the urine incontinence issue , started on:

- vitamin A/vitamin E
- Tolterodine: 4 mg,Oral,Daily

Started on physical therapy

Patient was diagnosed with ALS, followed and treated by Neurological department in HMC, started on above mentioned treatment and physiotherapy

Stable with regular follow up with Neurology and Respiratory

Further detail of treatment is not clear on the system and RILUZOLE treatment is not started yet.

Discussion

Lower limb weakness is not an uncommon presentation in primary care. A proper clinical systematic approach is essential to differentiate possible causes of lower limb weakness, as there is a wide possible differential diagnosis. Most important to exclude red flags for serious conditions if detected by primary care provider the patient should be immediately referred to emergency for further investigation and management.

Although ALS is a rare disease, and not presented frequently in primary care, it is a serious condition with a bad prognosis so early detection is essential.

When we approach the case at the beginning ALS was not on the top of our differential diagnosis; on the other hand, we were able to suspect a possibility of a serious underlying condition, even the patient himself was surprised and questioning why we are taking a full history and examining him.

We are not suggesting that every lower limb weakness is ALS or a similar condition. We recommend that primary care providers always keep in mind the following questions: what the lower limb weakness is, how to approach a patient with lower limb weakness and, what are the possible differential diagnoses.

Unfortunately, our patient was seen by more than one doctor in the health center and was misdiagnosed as a case of fatigue, or lower back pain as mentioned in his documents. Not only the risk of wrongly prescribed unnecessary treatments but also the risk of progression of the condition could be avoided in this case.

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Type 2 Diabetes Mellitus Control during COVID 19 Pandemic in Qatar 2020: A Retrospective Data Analysis

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Abstract

Background: Qatar is considered as one of highly prevalent countries of type 2 diabetes, with a prevalence of 17 %. Since the start of the global pandemic of COVID-19 the type of service and the access to health centers had changed during the pandemic, so we wanted to know the effect of this major change in the level of glycemic control in type 2 diabetes patients followed in the PHCC (Primary Health Care Corporation) and compare it with previous studies. Also we wanted to know the relation between level of glycemic control and number of phone consultations done for each patient and finally the prevalence of Covid 19 in type 2 diabetic patients followed in PHCC.

Methods: Cross-sectional retrospective data analysis extracted from medical records of patients with Diabetes Melittus type 2 followed at PHCC, in year 2020

Results: The data was extracted for 17,413 patients with type 2 diabetes. The mean HbA1c in our sample was 7.45±1.67% before the pandemic, and 7.34±1.61% during it (Paired t test P<0.001). The mean weight was 82.6±17.40 Kg before the pandemic, and 82.3±17.43 Kg during it (Paired t test P<0.001). Using unpaired t test and one way ANOVA, when analyzing the percentage changes in mean HbA1c among different groups of the sample, no clinical significant (P>0.05) changes in HbA1c was noticed among any group (although most of these groups showed statistical significance in which P<0.01 and this could be due to larger sample size studied). Pearson correlation analysis indicates percentage change in mean HbA1c didn't have any significant correlation with demographic and various comorbidities. A total of 8.06% (95% CI 7.66, 8.47) of the patients suffered a COVID-19 infection during the study period. Our sample patients received 45,701 consultations during the study period of which 60.60% were virtual.

Conclusion: The results showed no significant difference in level of glycemic control during the year 2020 as the mean of HbA1c had not changed; the mean was 7.45% and became 7.34%, with a prevalence of 8.06% for positive cases of Covid in the sample.

Key words: Type 2 diabetes control, COVID-19 pandemic, Qatar

Introduction

Type 2 diabetes mellitus (DM2) is a chronic disease with an increasing number of patients worldwide [1]. In 2017, DM2 was estimated to cause 6.7 million deaths, being the eighth leading cause of death worldwide [2]. The epidemic of diabetes is projected to rise from 425 million in 2017 to 629 million by the year 2045[2,3,4].

In Qatar, the prevalence of type 2 DM is estimated to be 17% and is expected to rise to 24% by 2050[5.6]. Many national programs have been established to prevent and decrease the disease prevalence and complications through early detection and prompt management. Updated National guidelines by the Ministry of Public Health are used to implement standardized high quality services among health care providers to provide the ultimate care to patients with type 2 diabetes [4]. A recent study assessing quality of care for patients with type 2 diabetes in Qatar showed that only "35% of patients attained the desired level of glycemic control (HbA1c < 7.0%), 27.7% had HbA1c between 7.0 and 7.9%, and there was poor glycemic control in a third of the patients with 20.9% of them recording HbA1c ≥ 9.0%"[7].

After the WHO announcement of COVID-19 on March 12, 2020[8] as a pandemic, the Ministry of Public Health (MoPH) and the Primary Health Care Corporation (PHCC) initiated a remote/phone consultation system to minimize the risk of possible COVID-19 infection at health care facilities while doing their routine visits and follow up in primary health care clinics. A well-designed protocol and pathway through phone consultation that allows feasible, safe and interactive patient-doctor communication was established. The main goal is to keep the continuous care quality to patients and enhance more education and self-management while monitoring basic needs, answering any new queries and providing guidance about the current situation along with medication modification when needed[9].

Due to remarkable innovations in medical field technology, and their tremendous contribution and applicability to the healthcare system, many different digital services have been studied and used. These technologies are considered as alternative means to the traditional face-to-face interaction or consultation between patients and healthcare providers. Examples are text messages, emails, applications, telephone and virtual consultation. A systematic review by Deborah et, al. (2017) showed that applying different types of technology in diabetes self-management education and support services has improved A1c. Another RCT by Yang et al. (2020) reported an effective glycemic control when implementing a mobile phone-based glucose-monitoring and feedback system while managing DM type 2 in primary care clinic settings [10,11,12].

According to the American Diabetes Association (ADA), a growing body of evidence suggests that various telemedicine modalities may be effective at reducing A1C in patients with type 2 diabetes compared with usual care or in addition to usual care [13,14,15,16].

Glycated hemoglobin (hemoglobin A1c, HbA1c, A1C, or Hb1c) is a form of hemoglobin that is measured primarily to identify the three months average plasma glucose concentration. Although it has some limitations with blood diseases, ADA and PHCC guidelines for adults with type 2 diabetics consider that HbA1c is the best available tool/marker for monitoring and should be done at least twice per year for each patient [17,18].

In this study we aimed to study the level of diabetes control among type 2 diabetes patients who were followed by telephone consultations in Primary Health Care Corporations in a six-month period from the start of the pandemic of COVID-19 in 2020.

Methods

Cross-sectional retrospective data analysis extracted from medical records of patients with Diabetes Melittus type 2 followed at PHCC.

In this study we measured the effect of the pandemic and change of type of health service done in Qatar during the year 2020, as PHCC is the main public provider of primary care for the whole population living in Qatar. A total of 27 health centers spread across Qatari are subdivided into 3 main regions North, West and Central, PHCC and cover all members of the population in Qatar. At EMR namely, the Cerner Millennium® patient administration system is used, and during the pandemic the PHCC developed a phone consultation service to avoid face to face consultation and decrease the number of visits to health centers. The patients were assigned to a family physician and he called them through the land line.

Inclusion and exclusion criteria:
Adult type 2 diabetic patients more than 18 years and less than 65 year who received virtual, face to face or both consultations with HbA1c done 3 months before and during the first 6 months of the pandemic.

We excluded the following:
If patient did not have HbA1c done before and after the pandemic period (within our time frame) 3 months before March and 3 months after September, Newly diagnosed patients during the pandemic, Patients with only one HbA1c reading in medical records before and after the pandemic to eliminate bias of lab errors and Hospital admission for any cause during the pandemic including causes related to diabetes complications as stress related admissions could affect the control and bias the final result. Also during admission patient medication may be changed, or a new one added or removed, some may be started on Insulin and mostly patients will have a follow up visit in HMC as an outpatient.

Statistical analysis:
Descriptive statistics were used to summarize and determine the sample characteristics and distribution of various considered parameters related to demographic, anthropometric, clinical and other related features of the study participants. The normally distributed data and results were reported with mean and standard deviation (SD); the remaining results were presented with median and interquartile range (IQR). Categorical data were summarized using frequencies and percentages. Mean changes in HbA1c measured between the two time points (pre-pandemic and during COVID-19 period) were analyzed using paired t test or Wilcoxon signed ranked test as appropriate. Mean changes in HbA1c between the two and more than two independent groups were analyzed using unpaired t and one-way analysis of variance (ANOVA) as appropriate. Relationship between two quantitative variables were examined using Pearson's correlation coefficients. Pictorial presentations of the key results were made using statistical graphs, histogram and Box plots. All P values presented were two-tailed, and P values <0.05 was considered as statistically significant. All Statistical analyses were done using Statistical Packages SPSS version 27.0 (Armonk, NY: IBM Corp).

Results

Descriptive data:
The data was extracted from 17,413 patient records with type 2 diabetes. 56.60% of them were males (9850) and 43.40% were females (7563) (Table 1). The mean age was 49.77 years with a standard deviation (SD) of 9.02 years (Figure 1). 38.00% of the patients were followed in the health centers of the central region, 34.80% in the western region, and 27.20% in the northern region. The most common comorbidity among the patients was dyslipidemia; present in 71.80%, followed by hypertension in 59.50%, thyroid disorders in 20.60%, asthma in 13.90%, and lastly cardiovascular diseases in 7.20%. Data showed that 66.90% of the patients were non-smokers, 18.30% were smokers, and smoking status was not documented in 14.80% of the patients. Of the sample collected, 8.06% (95% CI 7.66, 8.47) endured a COVID-19 infection; most of them were females (11.30%), almost double the number of males (5.56%).

Main results:
The mean HbA1c in our sample was 7.45% before the pandemic, and 7.34% during it. The median was 7.00% and became 6.90%. The 25th, 50th, and 75th percentiles were 6.30%, 7.00%, and 8.20% respectively before COVID-19 and during it they became 6.20%, 6.90% and 8.10% respectively (Table 2, Figure 2).

Weight also did not clinically increase through the pandemic. The mean weight was 82.67 Kg before the pandemic, and 82.33 Kg during it. The median was 80.70 Kg and became 80.00 Kg. The 25th, 50th, and 75th percentiles were 70.40 Kg, 80.70 Kg, and 92.00 Kg respectively before COVID-19 and during it they became 70.00 Kg, 80.00 Kg, and 92.00 Kg respectively. The stable weight correlates well with the stable HbA1c during this pandemic (Table 3).

Even when analyzing the change in HbA1c among different groups of the sample, no clinical significant change in HbA1c was noticeed among any group (Table 3). The mean HbA1c among males was 7.63% before the pandemic and 7.46% during it. Among females, it was 7.21% and became 7.19%. In addition, all three regions of health centers were similar in the stability of HbA1c. Patients followed in the central, northern, and western regions had a mean HbA1c of 7.45%, 7.46%, and 7.45% respectively before the pandemic and they became 7.36%, 7.35%, and 7.31% respectively.

Different comorbidities did not affect HbA1c change too. Patients with dyslipidemia, hypertension, thyroid disorders, asthma and cardiovascular diseases had mean HbA1c of 7.55%, 7.56%, 7.12%, 7.25%, and 7.7% before COVID-19 and they became 7.62%, 7.83%, 7.09%, 7.20%, and 7.56%.

Smokers had a mean HbA1c of 7.64% before COVID-19 and it became 7.48%, while non-smokers had a mean HbA1c of 7.37% that became 7.29% (Table 4).

Among patients of our sample 1,403 patients suffered a COVID-19 infection during the study period constituting 8.1% of the sample; most of them were female (855) with a percentage of 11.3%, while 548 males had COVID-19 with a percentage of 5.6% (Table 5).

Our sample patients received 45701 consultations during the study period. 60.60% of the consultations were virtual while 39.40% were face-to-face (Table 6, Fugure 3).

Table 1: Characteristics of the sample

Characteristics of the sample (n=17413)		
	Number	Percentage
Gender		
Male	9850	56.57%
Female	7563	43.43%
Region		
Central	6620	38.02%
Northern	4740	27.22%
Western	6053	34.76%
Chronic Diseases		
Dyslipidemia	12502	71.80%
Hypertension	10353	59.46%
Thyroid Disorders	3594	20.66%
Asthma	2421	13.90%
Cardiovascular Disease	1250	7.18%
Smoking Status		
Smokers	3179	18.26%
Nonsmoker	11653	66.92%
Status unknown	2581	14.82%

Figure 1

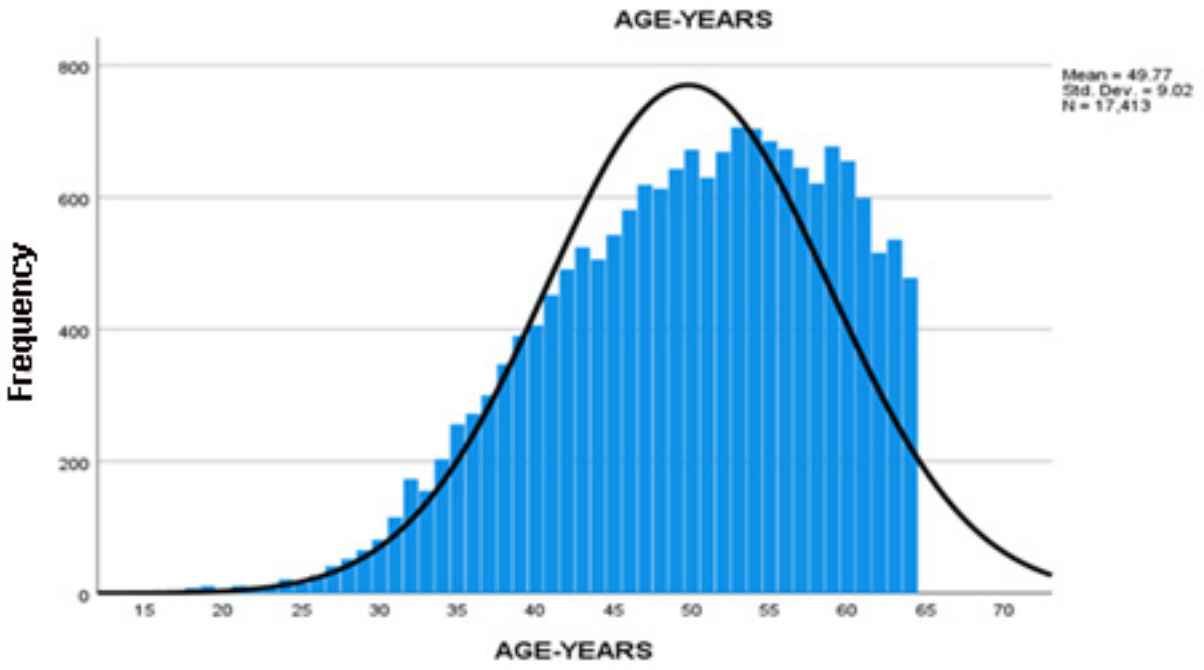


Table 2: Change in HbA1c

Table 2: Change in HbA1c					
		Last HbA1C Value (Pre-COVID-19)	Last HbA1c Value (During-COVID-19)	P-value*	% Change in HbA1C [(post-pre)/pre]*100
Mean		7.45	7.34	<0.001	-0.19
Median		7.00	6.90		0.00
Std. Deviation (SD)		1.67	1.61		15.83
Percentiles	25	6.30	6.20		-7.78
	50	7.00	6.90		0.00
	75	8.20	8.10		6.45

*Paired t test

Figure 2

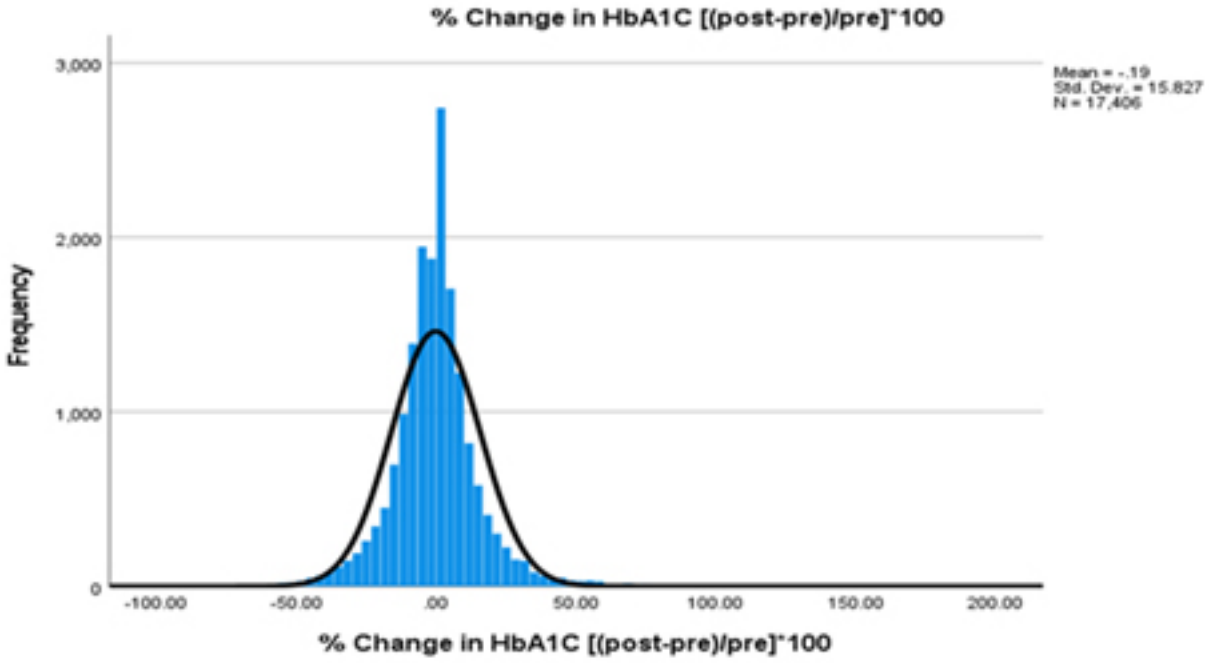


Table 3: Change in Weight (Kg)

		Last Weight (Pre-COVID-19)	Last Weight (During COVID-19)	P-value	% Change in Weight (kg) [(post-pre)/ pre]*100
Mean		**82.67**	**82.33**	**<0.001**	**-0.42**
Median		**80.70**	**80.00**		**0.00**
Std. deviation		**17.39**	**17.43**		**5.59**
Percentiles	**25**	70.40	**70.00**		**-2.59**
	50	80.70	**80.00**		**0.00**
	75	92.00	**92.00**		**1.76**

*Paired t test

Table 4: HbA1c change in each group

	Value (Pre-COVID-19)	Value (During-COVID-19)		HbA1C [(post-pre)/pre]*100
	Mean ± SD	Mean ± SD		Mean ± SD
Gender				
Male	7.63±1.70	7.46±1.61	*<0.001*	-0.68±17.03
Female	7.22±1.62	7.19±1.60	**0.023**	0.45±14.08
P-value	*<0.001*	*<0.001*		*<0.001*
Region				
Central Region	7.45±1.67	7.36±1.60	*<0.001*	0.15±16.01
Northern Region	7.46±1.71	7.35±1.65	*<0.001*	-0.26±15.85
Western Region	7.45±1.65	7.31±1.60	*<0.001*	-0.50±16.60
P-value	*0.844*	*0.225*		*0.065*
Dyslipidemia				
Yes	7.55±1.63	7.46±1.60	*<0.001*	0.06±15.61
No	7.21±1.76	7.04±1.61	*<0.001*	-0.83±16.35
P-value	*<0.001*	*<0.001*		*<0.001*
HTN				
Yes	7.56±1.63	7.48±1.60	*<0.001*	0.03±15.50
No	7.29±1.71	7.14±1.60	*<0.001*	-0.51±116.29
P-value	*<0.001*	*<0.001*		**0.029**
Thyroid Disorders				
Yes	7.12±1.54	7.09±1.54	**0.054**	0.30±14.08
No	7.54±1.70	7.41±1.63	*<0.001*	-0.32±16.25
P-value	*<0.001*	*<0.001*		**0.039**
Asthma				
Yes	7.25±1.52	7.20±1.52	**0.032**	0.11±14.00
No	7.48±1.70	7.37±1.63	*<0.001*	-0.24±16.11
P-value	*<0.001*	*<0.001*		**0.315**
Cardiovascular Disease				
Yes	7.66±1.64	7.56±1.66	**0.008**	-0.35±14.59
No	7.46±1.68	7.33±1.61	*<0.001*	-0.18 ±15.92
P-value	*<0.001*	*<0.001*		**0.713**
Smokers				
Yes	7.64±1.71	7.48±1.66	*<0.001*	-0.64±17.54
No	7.37±1.62	7.29±1.57	*<0.001*	-0.36±5.63
P-value	*<0.001*	*<0.001*		**0.031**

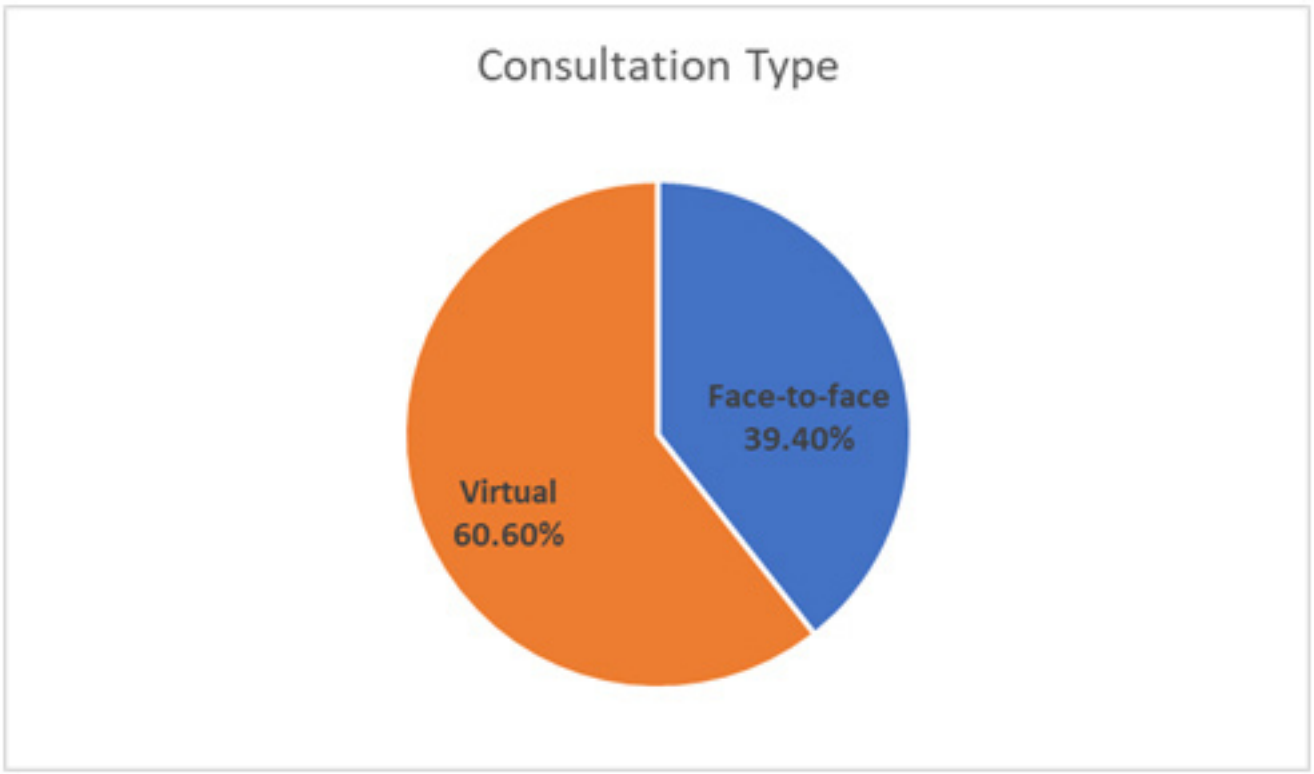
Table 5: Covid-19 Positive cases

	Positive for COVID 19	Percentage (95% Confidence interval)
Male	548/9850	5.56% (5.13, 6.03)
Female	855/7563	11.30% (10.61, 12.04)
Total	1403/17413	8.06% (7.66, 8.47)

Table 6: Type of consultation

Type	Number	Percentage
Face-to-Face	18005	39.40%
Virtual	27696	60.60%
Total	45701	100.00%

Figure 3



Discussion

Results showed that the COVID-19 pandemic did not impair the control of type 2 diabetes in Qatar. As noticed from our results, the mean HbA1C is not significantly changed, which led us to conclude that in Primary Health Care Corporation in Qatar despite the change in type of consultation and shift to a virtual consultation module we successfully managed to keep the level of glycemic controlled without change. Despite the large proportion of consultations being virtual, we managed to succeed. We expected it to be worse but fortunately it was not. We consider it a great success of the health system here in Qatar.

Compared to a previous recent study (assessing quality of care for patients with type 2 diabetes in Qatar) which showed that only "35% of patients attained the desired level of glycemic control (HbA1c < 7.0%), 27.7% had HbA1c between 7.0 and 7.9%, and there was poor glycemic control in a third of the patients with 20.9% of them recording HbA1c ≥ 9.0%" [7], our study showed better glycemic control among the patient with 50% of patients having HbA1C of 7%.

Total number of consultations was 45,701, with an average of 2.6 consultations per patient, accepted as no clear guidelines for the minimum number of consultations number for each patient'scare but we consider 2 consultations is the lowest acceptable number. As the results showed no significant changes, we did not calculate the relation between the level of glycemic control and number of phone calls called received. Another reason fr not doing that, as mentioned above, is the quality and content of phone consultation could not be assessed.

Results showed no change in weight and this surprised us as we expected the weight to increase during the pandemic, as lifestyle of patient is changed due to being less physically active due to many closures.

Also, there were no clear relation and effect of other comorbidities on the level of Glycemic control among our patients.

Our data is large enough but unfortunately it does not represent all diabetic patients in Qatar, as some of them are followed in private and secondary care facilities. Also we excluded the old aged (above 65) and below 18 for ethical considerations. In addition, patients who were admitted to hospital for any reason - including COVID-19 patients - were excluded as we consider admission as bias because during admission medications may be changed, for example a patient may be started on insulin etc.

Regarding the type of consultation, we may know the number, but we cannot judge the quality and the content of the consultation virtually, which may limit our study conclusion as we should only consider the virtual consultations that only focus on the chronic disease and its manifestations which is hard to achieve.

The prevalence of COVID-19 in Type 2 DM patients which is not possible to be calculated because the sample is not 100% representative of the accurate number of patients, but the percentage of the positive case gives us an idea about the prevalence of infection in our sample.

Conclusion

The results showed no significant difference in the level of glycemic control during the year 2020 as the mean HbA1c was 7.45% and became 7.34%. Weight also was stable; with a mean of 82.67 Kg before the pandemic and 82.33 Kg during it. The prevalence of positive cases of COVID-19 in the sample was 8.06%. Patients received around 2.6 consultation per patient during the study period, of which 60.60% were virtual.

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Prevalence of Generalized Anxiety Disorder among Medical Residents in Hamad Medical Corporation in 2020

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Abstract

Background: The mental health of healthcare professionals is essential because it affects their performance in different ways. This study aims to estimate the prevalence of generalized anxiety disorder among medical residents working in various specialties at Hamad Medical Corporation (HMC) and to determine the most common contributing factors. The study also aims to evaluate the awareness of availability of mental health services for medical residents.

Methods: A cross-sectional study that used an anonymous paper survey consisted of four sections: introductory information section, the 7-item anxiety scale, Generalized Anxiety Disorder-7 (GAD-7), the possible causes of anxiety, and the awareness of availability of mental health services.

All medical residents from all programs throughout all postgraduate year levels in HMC were invited to participate in the study. The sample size of 244 was calculated based on a population size of 666, a precision of 0.05, and a 95% confidence interval.

The data were analyzed by a biostatistician using SPSS for Windows (Version 25.0; IBM Corp., Armonk, NY, USA).

Results: Of the 244 participants, 73 (29.9 %) reported anxiety symptoms with a GAD-7 score of 10 or more; the only variable that had a statistically significant effect on anxiety was residency status, with 37.9% of overseas residents reporting anxiety compared to 21.1% of locals (p = 0.005).

The prevalence of anxiety fluctuated between postgraduate years, with 25.3% in participants of year 1, 35.9% in year 2, 34.1% in year 3, 24.3% in year 4, 23.1% in year 5, 50% (2 participants) in year 6, and 100% (1 participant) in year 7 (p = 0.397). Prevalence of anxiety was higher in non-surgical programs 32.4% than in surgical problems 23.9% (p = 0.192). There were some statistically significant differences in possible causes of anxiety between those with and without anxiety. Career planning was the most common cause among those with anxiety (82.2%) and was the fifth most common cause among those without anxiety (63.7%) (p = 0.003). The workload was the second most common cause of anxiety in participants with anxiety (79.5%) compared to 73.1% in those without anxiety (p = 0.104).

Only 31.5% of participants with anxiety were aware of mental health services provided by HMC to their staff compared to 45.0% of those without anxiety (p = 0.042). However, only 8.7% of those with anxiety and 14.3% of those without anxiety who were aware of the services would utilize them (p = 0.472). Lack of time was the most common cause of not utilizing the services among those with anxiety (61.1%) compared to 26.2% in those without anxiety. Confidentiality issues were indicated by 33.3% of participants with anxiety and 1.5% of those without anxiety.

Conclusions: This study highlights the prevalence of anxiety disorders among medical residents, and it was found to be high but relatively like the prevalence found in other studies internationally and locally. The level of anxiety was significantly higher among overseas residents in comparison to local residents. This study also detected the most common contributing factors, which were found to be career planning followed by workload. There was a significant number of residents who were not aware of the presence of mental health services within the institution; in addition, among those with anxiety who were aware of the mental health services but not utilizing them, there were two common reasons, the lack of time followed by confidentiality issues.

Key words: Generalized anxiety disorder, prevalence, medical residents, residency program, Qatar

Background

The mental health of healthcare professionals is essential because it affects their performance in different ways. Mental health impairment is usually associated with medical errors or decreased performance, and these could eventually negatively impact patients' health [1]. Numerous studies have shown that physicians are exposed to psychological distress regardless of age, gender, or seniority in the profession [1-4]. Only a few factors about physicians' workload or personalities can either attenuate or exaggerate the stress-related mood disorders (anxiety, depression, burnout), and moderate their impact on their personal or professional life [2,3]. A cross-sectional study for assessing the prevalence of anxiety and depressive symptoms and the associated risk factors among Tunisian medical residents concluded that 43.6% of residents had definite anxiety[4]. In Bahrain, a cross-sectional study was conducted in June 2014 to assess the prevalence of depression, anxiety, and stress among primary care physicians. Anxiety was noted in 37.6% of participating physicians [5]. A cross-sectional study was done in the United Arab Emirates in 2018 to assess the prevalence of depression among medical residents and showed depression percentages ranging from 6% to 22%, depending on the specialty [3]. In 2019 a cross Sectional study measuring the prevalence of depression, anxiety, and stress among postgraduate medical residents in Bangladesh, found 11.5% of the residents had depressive disorders [6]. Another cross-sectional study was done in 2019 in Nepal measuring depression, anxiety, and burnout among medical students and found depression in 31% of the residents [7]. In March 2020 a cross-sectional study under the title of ''The Prevalence of depression, anxiety, and stress among medical residents'' was conducted in Iran. According to this study results, 23% of residents had severe to extremely severe depression, and 24.9% had extremely severe anxiety [8]. A recent study conducted by Khoodoruth et al. to assess the mental health outcomes in residents working in the front and second lines of COVID-19 – using DASS-21 – questioned 127 residents in HMC and found that 41.7% of residents reported symptoms of anxiety and that it was more pronounced among junior residents [2].

In addition to measuring and recognizing mental health issues facing medical residents, it is critical to provide trainees with mental health services and to ensure that these services are being utilized appropriately. The most-reported obstacle of not utilizing mental health services by residents is the worry about confidentiality issues. A program at the University of Michigan Health System was designed to overcome many of the barriers preventing residents from utilizing health services. This program, called the House Officer Mental Health Program, began operation in 1997 and responded to the unabated concerns about the wellbeing of residents and the more recent concerns about the possible relationship of residents' difficulties to issues of patient safety [1]. Another important aspect is that residents must be aware of the mental health services their institution or program offers. In 2012 a study conducted in the United States to evaluate awareness and utilization of a new institutional policy to grant residents time off to access personal and family health care found that 89% of respondents were aware of the policy. Of those who were aware, 49.7% used the policy to access health care [9].

Methods

Study Design:
Our study is a cross-sectional study that used an anonymous paper survey consisting of four sections.

The first is an introductory information section; asking about: age, gender (male, female), nationality (Qatari, non-Qatari), marital status (single, married, divorced), chronic illnesses, type of contract (local, overseas), residency program specialty, postgraduate year level.

The second section is the 7-item anxiety scale; Generalized Anxiety Disorder-7 (GAD-7). Each item was rated from 0 (not at all) to 3 (nearly every day). A cutoff of ≥10 has good sensitivity and specificity for anxiety. We used this cutoff to determine the presence of anxiety.

The third section asks about possible causes of anxiety (workload, sleep deprivation, administrative responsibility, lack of support from an allied health professional, lack of support from seniors, family issues, financial issues, limited free time, relocation, examinations, the responsibility to patient care, and career planning).

The fourth section asks about awareness of the availability of mental health services in HMC, its utilization, and causes of not utilizing them (confidentiality, lack of time, long waiting appointments, and others).

Inclusion and Exclusion Criteria:
All medical residents from all programs throughout all postgraduate year levels in HMC were invited to participate in the study.

Inclusion criteria:
All medical residents from all residency programs and all levels who consented to participate in the survey.

Exclusion criteria:
Medical residents who are currently on annual leave or vacations.

Sample Size:
Applying Cochrane's formula for sample size calculation, a minimum sample size of 244 was calculated based on a population size of 666, a precision of 0.05, and a 95% confidence interval.

Statistical Analysis:
Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables. The dichotomous variables were expressed as numbers and percentages. Qualitative variables were compared

using the chi-square test. A non-parametric correlation was used to assess the correlation between demographic characteristics among patients with anxiety. A Chi-square test was carried out to compare the prevalence of anxiety and other variables. A P-value of <0.05 was considered statistically significant.

The data were analyzed by a biostatistician using SPSS for Windows (Version 25.0; IBM Corp., Armonk, NY, USA).

Results

Descriptive data:
The sample consisted of 244 participants (Table 1). Of all the respondents, 141 were less than 30 years old, and 101 were 30 years or older. Females were 106 while males were 137. The majority of participants (234) were non-Qatari, while only 9 were Qataris. However, 109 were already residents of Qatar compared to 132 coming from abroad. Most of the participants (130) were single, followed by married (112), while only one participant was divorced. Only 21 participants had a history of chronic illness, while 150 participants had none, and the remaining 73 participants did not answer this question.

Most of the participants (83) were in postgraduate year 1, followed by 64 in year 2, 41 in year 3, 37 in year 4, 13 in year 5, four in year 6, and one in year 7.

We categorized the medical specialties into two main categories: Surgical programs, with 71 participants and non-surgical programs with 173 participants. Surgical programs included 13 participants from obstetrics and gynecology, 12 from anesthesia, nine from general surgery, nine from orthopedics, five from plastic surgery, five from neurosurgery, four from ENT, four from urology, three from oro-maxillofacial surgery, three from ophthalmology, three from cardiothoracic surgery, and one from pediatric surgery. Non-surgical programs included 67 participants from internal medicine, 32 from pediatrics, 19 from family medicine, 17 from emergency medicine, 12 from radiology, nine from psychiatry, seven from community medicine, five from the transitional year, two from dermatology, two from pathology, and one from neurology.

Main results:
Of the 244 participants, 73 (29.9 %) reported anxiety symptoms with a GAD-7 score of 10 or more (Table 2).

The only variable that had a statistically significant effect on anxiety was residency status, with 37.9% of overseas residents reporting anxiety compared to 21.1% of locals (p = 0.005) (Figure 1). Here we report other variables with no statistically significant effect. Regarding age, 27.7% of participants less than 30 years old reported anxiety compared to 32.7% of those 30 years or older (p = 0.400). 34.9% of females and 26.3% of males had anxiety (p = 0.146). 33.3% of Qataris and 29.9 of non-Qataris had anxiety (p = 0.826). The only divorced participant reported anxiety, while 31.1% of married and 26.9% of single participants had anxiety (p = 0.205). The participants with previous medical illnesses had more anxiety (42.9%) than those free of illnesses (24.7%) (p = 0.078). Prevalence of anxiety fluctuated between post-graduate years, with 25.3% in participants of year 1, 35.9% in year 2, 34.1% in year 3, 24.3% in year 4, 23.1% in year 5, 50% (2 participants) in year 6, and 100% (1 participant) in year 7 (p = 0.397).

Prevalence of anxiety was higher in non-surgical programs (32.4%) than in surgical programs (23.9%) (p = 0.192). The only participant from neurology had anxiety, 60% of participants from transitional year had anxiety, followed by 53.8% of obstetrics and gynecology, 50% of dermatology, 41.6% of radiology, 37.5% of pediatrics, 33.3% of psychiatry, general surgery, orthopedics, and oro-maxillofacial surgery, 32.8% of internal medicine, 28.5% of community medicine, 23.5% of emergency medicine, 20% of plastic surgery, 16.6% of anesthesia, and 15.7% of family medicine. The prevalence of anxiety was 0% in the remaining programs.

There were statistically significant differences between participants with anxiety and those without anxiety regarding the difficulty in dealing with problems and their effects on doing the work, taking care of things at home, and getting along with other people. 37.0% of participants reporting anxiety found it very difficult or extremely difficult compared to 4.2% of those without anxiety. Vice versa, 4.1 % of those with anxiety did not find it difficult at all compared to 34.5% of those without anxiety. Comparable percentages of participants found it somewhat difficult; 58.9% of those with anxiety and 61.3% of those without anxiety (p = 0.001) (Table 3).

There were some statistically significant differences in possible causes of anxiety between those with and without anxiety. Career planning was the most common cause among those with anxiety (82.2%) (Figure 2) and was the fifth cause among those without anxiety (63.7%) (p = 0.003). The workload was the second most common cause of anxiety in participants with anxiety (79.5%) compared to 73.1% in those without anxiety (p = 0.104). That was followed by sleep deprivation with 76.6% in participants with anxiety and 71.3% in participants without anxiety (p = 0.611). Limited free time was the fourth cause in participants with anxiety (76.7%) and the most common in those without anxiety (78.4%) (p = 0.400). Examinations caused anxiety in 74.0% of participants with anxiety and 68.5% of those without (p = 0.665). Responsibility for patient care, lack of support from allied health professionals, administrative responsibility, and lack of support from seniors all differed statistically significantly between the two groups, causing anxiety in 64.4%, 54.8%, 53.4%, and 49.3% of participants with anxiety compared to 43.9%, 32.7%, 44.4% and 35.7% of participants without anxiety with p values of 0.007, 0.001, 0.021, and 0.004, respectively. Other factors that could cause anxiety were not common and did not differ statistically significantly, and they were: family issues, relocation, and financial issues; causing anxiety in 37.0%, 34.2%, and 16.4% of those with anxiety and 41.5%, 29.2% and 18.7% in those without anxiety, respectively (Table 4).

Only 31.5% of participants with anxiety were aware of mental health services provided by HMC to their staff compared to 45.0% of those without anxiety (p = 0.042) (Table5). However, only 8.7% of those with anxiety and 14.3% of those without anxiety who were aware of the services would utilize them (p = 0.472) (Table 6).

Causes of not using the services did not statistically significantly differ between the two groups (p = 0.083). Lack of time was the most common among those with anxiety (61.1%) compared to 26.2% in those without anxiety. Confidentiality issues were followed by 33.3% of participants with anxiety and 1.5% of those without anxiety. 32.3% of those without anxiety did not utilize them because they did not need it, followed by 29.2% who attributed their avoidance to the long waiting appointments (Table 7).

Figure 1: Anxiety according to residency

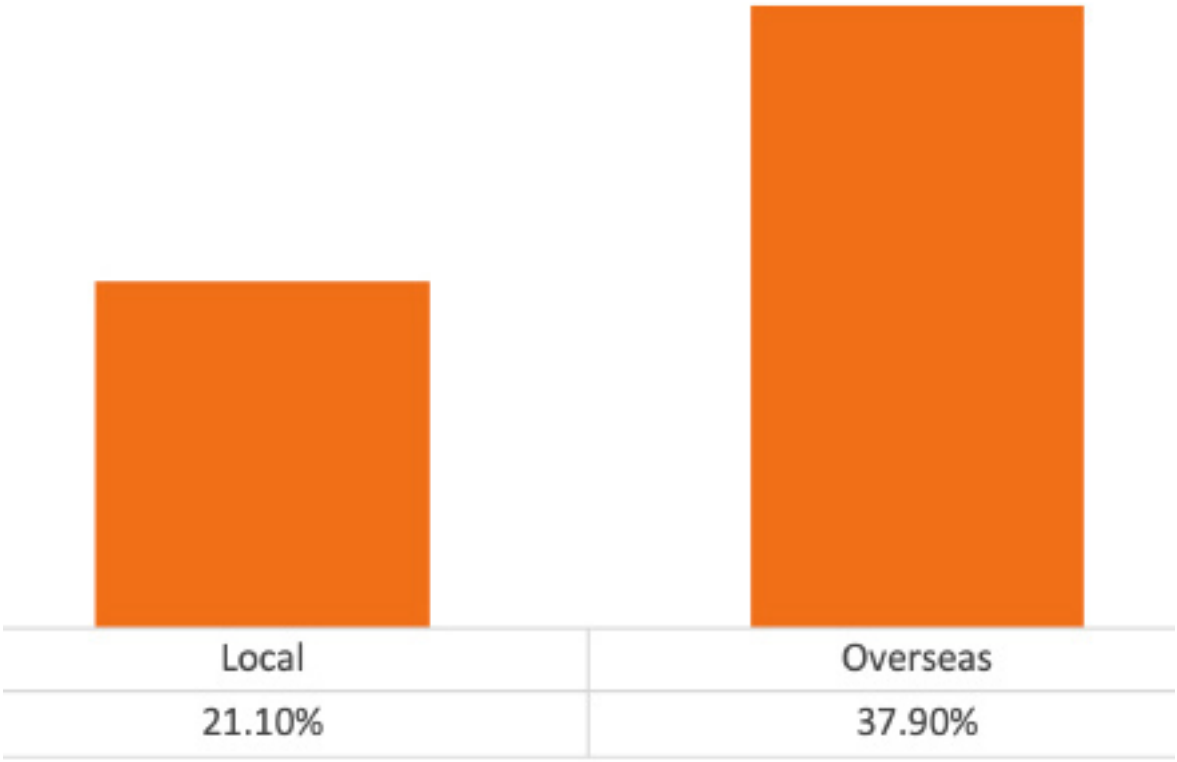

Figure 2: Causes of anxiety among residents with anxiety

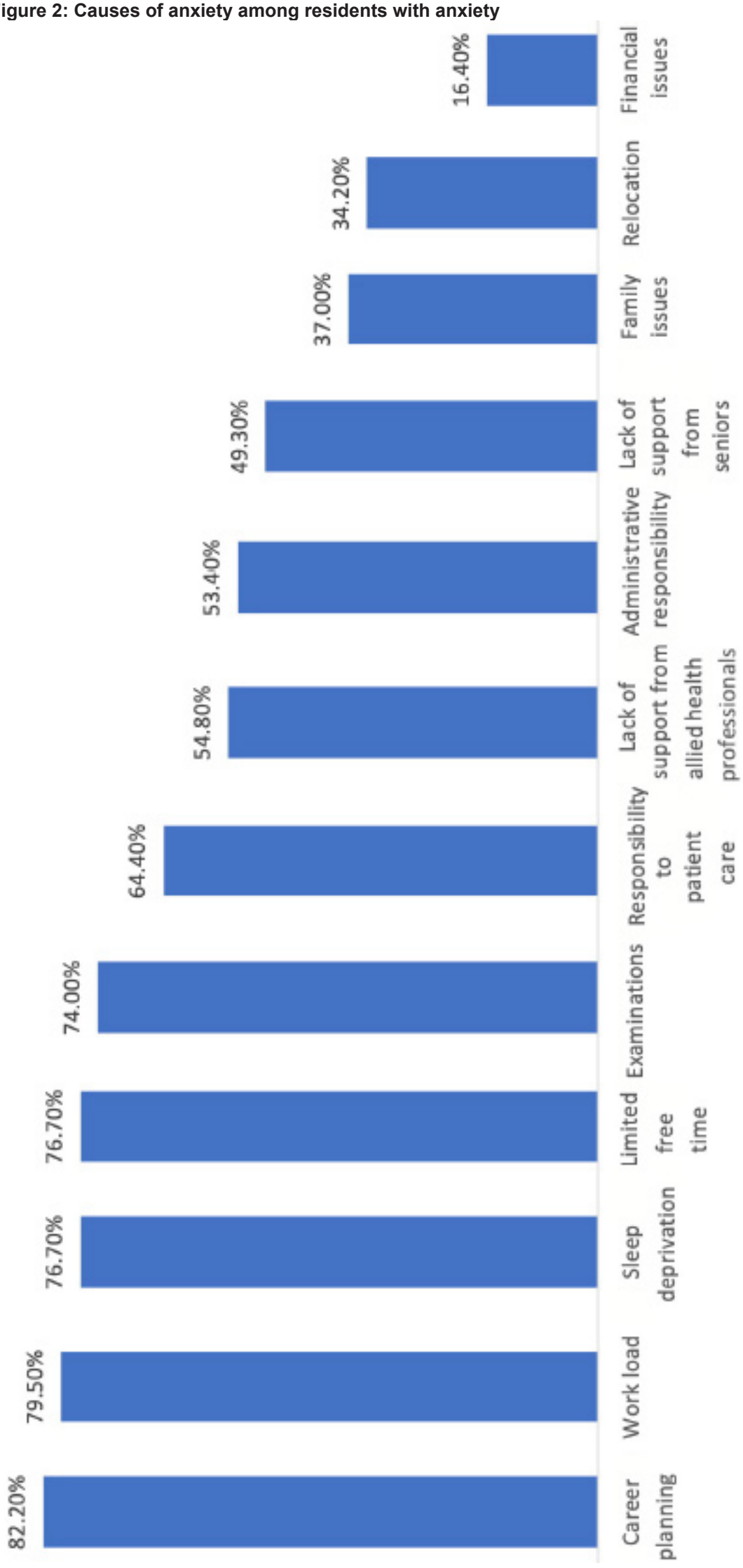

Table 1: Demographics of Sample

Variables		Frequency		Percentage	
Total		**244**		**100%**	
Age					
Less than 30		141		57.8%	
30 or more		101		41.4%	
Gender					
Female		106		43.4%	
Male		137		56.1%	
Nationality					
Non-Qatari		234		95.9%	
Qatari		9		3.7%	
Marital status					
Divorced		1		0.4%	
Married		112		45.9%	
Single		130		53.3%	
Chronic illness					
No		150		61.4%	
Yes		21		8.6%	
Residency					
Local		109		44.7%	
Overseas		132		54.1%	
PGY level					
1		83		34.0%	
2		64		26.2%	
3		41		16.8%	
4		37		15.2%	
5		13		5.3%	
6		4		1.6%	
7		1		0.4%	
Specialty					
Non-Surgical	Internal Medicine	67	173	27.5%	70.9%
	Pediatrics	32		13.1%	
	Family Medicine	19		7.8%	
	Emergency Medicine	17		7.0%	
	Radiology	12		4.9%	
	Psychiatry	9		3.7%	
	Community Medicine	7		2.9%	
	Transitional Year	5		2.0%	
	Dermatology	2		0.8%	
	Pathology	2		0.8%	
	Neurology	1		0.4%	
Surgical	Obstetrics & Gynecology	13	71	5.3%	29.1%
	Anesthesia	12		4.9%	
	General Surgery	9		3.7%	
	Orthopedics	9		3.7%	
	Plastic Surgery	5		2.0%	
	Neurosurgery	5		2.0%	
	ENT	4		1.6%	
	Urology	4		1.6%	
	Oromaxillofacial Surgery	3		1.2%	
	Ophthalmology	3		1.2%	
	Cardiothoracic Surgery	3		1.2%	
	Pediatric Surgery	1		0.4%	

Table 2: Prevalence of Generalized Anxiety Disorder

Variables		Frequency		Percentage		P Value
Total		**73**		**29.9%**		
Age						
Less than 30		39		27.7%		0.400
30 or more		33		32.7%		
Gender						
Female		37		34.9%		0.146
Male		36		26.3%		
Nationality						
Non-Qatari		70		29.9%		0.826
Qatari		3		33.3%		
Marital status						
Divorced		1		100%		0.205
Married		36		32.1%		
Single		35		26.9%		
Chronic illness						
No		37		24.7%		0.078
Yes		9		42.9%		
Residency						
Local		23		21.1%		0.005
Overseas		50		37.9%		
Post-graduate year						
1		21		25.3%		0.397
2		23		35.9%		
3		14		34.1%		
4		9		24.3%		
5		3		23.1%		
6		2		50%		
7		1		100%		
Specialty						
Non-Surgical	Internal Medicine	22	56	32.8%	32.4%	0.192
	Pediatrics	12		37.5%		
	Family Medicine	3		15.7%		
	Emergency Medicine	4		23.5%		
	Radiology	5		41.6%		
	Psychiatry	3		33.3%		
	Community Medicine	2		28.5%		
	Transitional Year	3		60%		
	Dermatology	1		50%		
	Pathology	0		0%		
	Neurology	1		100%		
Surgical	Obstetrics & Gynecology	7	17	53.8%	23.9 %	
	Anesthesia	2		16.6%		
	General Surgery	3		33.3%		
	Orthopedics	3		33.3%		
	Plastic Surgery	1		20%		
	Neurosurgery	0		0%		
	ENT	0		0%		
	Urology	0		0%		
	Oromaxillofacial Surgery	1		33.3%		
	Ophthalmology	0		0%		
	Cardiothoracic surgery	0		0%		
	Pediatric Surgery	0		0%		

Table 3: If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

	Anxiety		No Anxiety		
	Frequency	Percentage	Frequency	Percentage	P value
Very difficult and extremely difficult	27	37.0%	7	4.2%	0.001
Somewhat difficult	43	58.9%	103	61.3%	
Not difficult at all	3	4.1%	58	34.5%	

Table 4: Causes of Anxiety

	Anxiety		No Anxiety		
	Frequency	Percentage	Frequency	Percentage	P value
Career planning	60	82.2%	109	63.7%	0.003
Work load	58	79.5%	125	73.1%	0.104
Sleep deprivation	56	76.7%	122	71.3%	0.611
Limited free time	56	76.7%	134	78.4%	0.400
Examinations	54	74.0%	117	68.4%	0.665
Responsibility to patient care	47	64.4%	75	43.9%	0.007
Lack of support from allied health professionals	40	54.8%	56	32.7%	0.001
Administrative responsibility	39	53.4%	76	44.4%	0.021
Lack of support from seniors	36	49.3%	61	35.7%	0.004
Family issues	27	37.0%	71	41.5%	0.783
Relocation	25	34.2%	50	29.2%	0.646
Financial issues	12	16.4%	32	18.7%	0.932

Table 5: Does HMC provide mental health services to their staff?

	Anxiety		No Anxiety		
	Frequency	Percentage	Frequency	Percentage	P value
Yes	23	31.5%	77	45.0%	0.042
No	20	27.4%	26	15.2%	
I don't know	29	39.7%	66	38.6%	

Table 6: If yes, are you utilizing it when needed?

	Anxiety		No Anxiety		
	Frequency	Percentage	Frequency	Percentage	P value
Yes	2	8.7%	11	14.3%	0.472
No	21	91.3%	65	84.4%	

Table 7: If you are not utilizing it, why not?

	Anxiety		No Anxiety		
	Frequency	Percentage	Frequency	Percentage	P value
Lack of time	13	61.1%	17	26.2%	
Confidentiality	7	33.3%	1	1.5%	
It could be used against me by the department	1	4.8%	1	1.5%	
Long waiting appointments	1	4.8%	19	29.2%	
Stigma	1	4.8%	1	1.5%	0.083
I am not aware of it	0	0%	1	1.5%	
I do not know	0	0%	0	0%	
I do not need it	0	0%	21	32.3%	
I do not think it is useful	0	0%	2	3.1%	
I forget it	0	0%	2	3.1%	
I do not know how to reach	0	0%	1	1.5%	

Discussion

Globally, the mental health status among health care providers has become a large field of research during the last decades. Medical professionals were found to have a higher rate of mental health problems than the general population, with medical residents being the most affected group [6,7]. Work-related mental problems among medical professionals may include burnout, depression, anxiety disorders, sleep disorders, or other psychiatric disorders. Generalized anxiety disorder is characterized by excessive and persistent worrying that is hard to control, causes significant distress or impairment, and occurs on more days than not, for at least six months [10]. GAD has a considerable negative impact on daily life, which can lead to functional impairment, engagement in risky behaviors, and a notable burden to health systems [8]. GAD among health workers is less studied than depression in most Arab countries including Qatar. Therefore, more research is needed to better define the prevalence of anxiety in residents and to identify all possible causes in this population.

Our study explored the prevalence of generalized anxiety disorder and the associated risk factors among medical residents working in Hamad Medical Corporation using a cross-sectional methodology. In addition, we evaluated social-related factors, work-related factors, and career-related factors as potential risk factors increasing anxiety levels. We found a considerable prevalence of anxiety symptoms in medical residents in Qatar. Of the 244 participants, 73 (29.9%) participants met the cutoff of anxiety diagnosis. Thus, residents were more at risk than the general population. The prevalence of generalized anxiety disorders in Qatar reaches 20.4% as shown in a study conducted in 2014 [11].

In other countries, medical residents had a higher anxiety prevalence as well. In 2019, 32.6% of the 1648 Brazilian participants had anxiety [10]. In 2020, 54.4% of the 152 Iranian residents enrolled in the study had anxiety [8]. In Mexico, two studies showed a prevalence of anxiety of 44% in 2017 and 47.1% in 2020 [3,12].

Of the 73 residents with anxiety in our study, 37 (50.7%) were female and 36 (49.3%) were male. The association between gender and the prevalence of anxiety was not statistically significant (p=0.146). In comparison, in 2014, Ghuloum et al. assessed the adult Qatari general population, aged 18-65, using the WHO Composite International Diagnostic Interview (CIDI), and found that females had statistically significant more anxiety (24.9%) than males (15.9%) (p<0.01) [13].

Residents who joined residency overseas had higher anxiety percentages (37.9%) compared to those who were recruited locally (21.1%). This was the only statistically significant socio-demographic characteristic (p=0.005). This finding is understandable in Qatar as HMC recruits residents internationally, and relocating for young postgraduates is a stressful step.

When we evaluated the level of training concerning anxiety, we found that the prevalence of anxiety was higher in the 1st, 2nd, and 3rd years of residency (25.3%, 35.9%, and 34.1% respectively) compared to senior residents (p=0.397). This could be related to the adaptation to a new work environment and lifestyle change, the settlement in a new country, and the academic and work responsibilities that can be overwhelming in the first years of residency.

Similar results were also reported in a study in India, where residents in the 1st year had higher rates of anxiety than seniors (p=0.0828)[14].

Although the difference was not statistically significant, those numbers should be taken into consideration for future action plans to improve mental health among HMC residents.

COVID-19 pandemic was an additional risk factor for anxiety and other mental health disorders in healthcare providers as shown in multiple studies [15]. In Qatar, Khoodoruth et al. studied the psychological health of medical residents fighting COVID-19 pandemic using Depression, Anxiety and Stress Scale – 21 Items (DASS-21) and found high anxiety rates of 41.7%, with junior residents having higher mean DASS-21 scores. This study also showed that the mental health outcomes were significantly dependent of the seniority in residency. The juniors had poorer outcomes [2].

A higher prevalence of anxiety in our sample was observed among residents from non-surgical specialties (32.4%) compared with surgical specialties (23.9%) but these results were not statistically significant. In India, Dave et al, found similar results with anxiety being more prevalent among non-surgical residents [14]. On the other hand, in Tunisia, anxiety was more prevalent among surgical residents; probably due to different work environments and stressors (p<0.05) [12].

To better understand and attempt radical changes in the future, we tried to identify the causes and determinants of anxiety in our sample. The most common and statistically significant reported causes were career planning (82.2%), responsibility for patient care (64.4%), and lack of support from allied health professionals (54.8%) and seniors (49.3%).

Most of the studies in the literature about mental health in medical residents did not aim to identify the causes in the residents' perspective but instead listed associations between mental health problems and participants' characteristics. Afana et al, conducted a study in Qatar to identify sources of stress and burnout among HMC residents. Those stressors were classified into work-related issues, personal care, and achievement, and social issues. The most reported sources of stress were the important workload and relationships with colleagues and seniors [16].

In addition to measuring the mental health challenges that face medical residents, we need to explore the availability of mental health services for trainees and their effectiveness in reducing the anxiety level. It is essential to implement policies allowing residents to utilize these mental health services as recently, the concept of "physician wellness" has presented a considerable step in the medical culture and the Accreditation Council for Graduate Medical Education now requires that all postgraduate medical training programs make assistance services available to residents.

Hamad Medical Corporation provides all its staff including medical residents with designated mental health services through the staff medical center (SMC).

In our study, we initially asked the residents about their awareness whether mental services are provided by the institution or not and 95 residents (38.9%) answered that they are not aware of the presence of such services, in addition, 46 residents (18.9%) said that these services are not provided.

By the given number, it is noticeable that more announcements must be done by both the institution and the residency programs officials to ensure proper orientation to their residents that mental health services are available and to provide them with the tools to reach them when needed.

Out of the 100 residents (41%) who confirmed their awareness of the availability of mental health services, 86 residents confirmed that they are not utilizing these services and from the given reasons in the survey, the most common reasons were lack of time (40.5%) followed by confidentiality issues (27.4%).

These observations need to be addressed by the residency programs officials that they must ensure to provide their residents with the appropriate time to manage their mental health wellbeing, in addition, the confidentiality issue is a complex problem that must be solved on an institutional level as in the Oregon Health & Science University, USA, where a Wellness Time-Off Policy was implemented to overcome the lack of time issue for the access not only to mental health services but even to preventive healthcare [9].

Conclusion

This study highlights the prevalence of anxiety disorders among medical residents, and it was found to be high but relatively like the prevalence found in other studies internationally and locally. The level of anxiety was significantly higher among overseas residents in comparison to local residents. This study also detected the most common contributing factors which were found to be career planning followed by workload. There was a significant number of residents who are not aware of the presence of mental health services within the institution, in addition, among those with anxiety who were aware of the mental health services but not utilizing them, there were two common reasons, the lack of time followed by confidentiality issues.

List of abbreviations:

GAD: Generalized anxiety disorder
HMC: Hamad Medical Corporation
DAS: Depression, anxiety, and stress
SMC: Staff medical center

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Ethical approval
The study protocol underwent review by the Institutional Review Board (IRB) at Hamad Medical Corporation (HMC). After approval, it underwent Medical Research Council (MRC) review and was approved (MRC-01-20-068).

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Contrast-Induced Nephropathy among adults after administration of intravenous material in the Emergency department at King Abdul-Aziz university hospital

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Abstract

Background: Contrast-induced nephropathy (CIN) is known as the third most common cause of iatrogenic acute kidney injury after severe hypotension and surgery.

Objectives: to assess the risk and estimate the incidence of contrast-induced nephropathy in low-risk patients.

Methods: A retrospective study was done in King Abdul-Aziz University hospital (KAUH), Jeddah, Saudi Arabia. Data about adult patients who underwent CT was collected from electronic records of the Emergency Department. Patients were divided into two groups with and without injections of IV contrast, evenly. Data about patients' demographics, diagnosis, chronic comorbidity, nephrotoxic medication, and serum creatinine were collected.

Results: No significant difference was found in the pre-contrast serum creatinine in both groups, while eGFR was significantly higher among those receiving contrast media. Serum creatinine after 48 hours showed a significantly lower level while eGFR was significantly higher among those receiving contrast media. Before and 48 hours after the radiology, significant improvement was found between serum creatinine and eGFR levels among all patients, while the eGFR showed significant improvement among patients who received contrast media. About 26% of patients showed rising serum creatinine; of them and 10.5% of them matched the KDIGO guidelines for the diagnosis of acute kidney injury. Patients with worsening kidney function were older, diabetics and hypertensives. Age was the most independent predictor for worsening of kidney function..

Conclusion: In the current clinical setting, the administration of contrast media is not associated with an increased incidence of acute kidney injury.

Key words: Nephropathy, Contrast, Emergency, Induced, Risk

List of abbreviations
CIN Contrast–induced nephropathy
ED Emergency Department
IV Intravenous
eGFR Glomerular Filtration Rate
AKI Acute Kidney Injury
DM Diabetes Mellitus
HTN Hypertension
CHD Chronic Kidney Disease

Introduction

After severe hypotension and surgery, CIN is the third most common cause of iatrogenic acute renal damage (1). It is defined as an increase in creatinine level of 0.3 mg/dl or more within 48 hours or 50% above baseline within 7 days after injection of iodinated material used to enhance the vision of critical organs and structures in imaging using X-ray technology (2). As a result, it's been linked to an elevated likelihood of negative consequences. Stroke, dialysis commencement, renal failure, myocardial infarction, and mortality are among the conditions (3).

Contrast-induced nephropathy accounted for 14% of the study's findings, which were conducted in the emergency department (ED) (3). The precise pathophysiology that leads to CIN is unknown (4). Ischemic damage and direct toxic action, on the other hand, are proposed as contributing factors (4).

The highly concentrated contrast will cause the fluid viscosity therapy to increase, lowering the flow rate of tubular epithelial cells and vascular endothelium and increasing the contact time between contrast and tubular epithelial cells, resulting in the generation of radical oxygen species and cell damage (4). Furthermore, the iodine concentration in contrast material is classed as high or low osmolality, which may contribute to an increased risk of harmful effects (5).

Intravenous (IV) contrast material is used in computed tomography (CT) scans to improve tissue quality and visibility, which helps to improve diagnostic accuracy, particularly in vascular diseases. The majority of CT scans performed without contrast enhancement, on the other hand, are based on clinical indications (6).

Risk factors for contrast-induced nephropathy (CIN) include patients with a history of elevated serum creatinine levels as a result of diabetic nephropathy, who are at a higher risk (7). Even though the serum creatinine is in the normal range, the presence of diabetes mellitus is considered dangerous (7). There are also other factors that are specific to the individuals, such as drug-induced nephrotoxicity, heart disease, and being over 70 years old (7).

Amin et al. presented a study from 2000 to 2008 in 2012 that explains the incidence of AKI in patients with acute myocardial infarction who received IV contrast. Despite an increase in the average age of patients from 66.5 to 68.6 years and an increase in the prevalence of AKI risk factors, the incidence of AKI has decreased from 26.6 percent in 2000 to 19.7 percent in 2008. This finding, on the other hand, could indicate adequate pre-contrast assessment (8).

McDonald (2014) conducted a retrospective analysis to compare contrast with non-contrast groups, however the results were unable to replicate relationships between intravenous contrast material delivery and AKI, even in a patient with comorbidities (6).

In 2016 the previous retrospective study of Heller between May 2005 to May 2010 was done in the emergency department to compare between two groups of adult population undergoing computerized tomography scan (CT) with one receiving IV contrast and the other not. The primary goal of this study was to determine the outcomes, which are either dialysis or death as well as the incidence of CIN after using IV contrast media and to compare with the similar group receiving CTs without contrast. The result was there was no significant difference between those two groups (9).

According to recent evidence, around 80 million doses of intravenous contrast media are utilised each year. 3.10, the physician emphasises is the critical importance of confirming the danger of intravenous contrast injection in patients getting contrast-enhanced CT scans in the emergency department (ED). This study aimed to find out the risk and estimate the incidence of contrast-induced nephropathy in low-risk patients.

Subjects and Methods

This was a retrospective cohort approach done in King Abdul-Aziz University hospital (KAUH), Jeddah, Saudi Arabia. This study took place to allow effective comparison between contrast and a non-contrast group of patients who underwent computed tomography scans.

The adult patients who underwent CT were 489 and all data were identified and reviewed from the electronic hospital records system, on emergency department between Feb 2017 and Dec 2017. Of these, 289 cases were excluded due to insufficient serum creatinine data, and the remaining 200 patients were divided into two groups with and without injections of IV contrast evenly.
The study is based on a data collection sheet which involves: adult age patients >18 years, gender, nationality, diagnosis, chronic comorbidity, nephrotoxic medication, serum creatinine measured 8 hours before CT and an after CT measurement 48-72 hours later and whether contrast was used or not. Excluded were patients without established creatinine level either before or following contrast media injection, pregnant patients, and those with a history of kidney transplantation, or ongoing or previous renal dialysis. The research ethical committee at KAUH approved this study.

Ethical Approval: The present study was approved by the research ethics committee of King Abdulaziz University, Jeddah, Saudi Arabia (approval number 595-21, Date : 21 Dec 2021)

Data analysis: Data were analyzed statistically using (SPSS) version 26. To test the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test ($\chi 2$) was used. Quantitative data was expressed as mean and standard deviation (Mean ± SD), and non-parametric variables were tested using the Mann-Whitney and Kruskal Wallis tests. Binary logistic regression analysis was done to assess the predictors for worsening of kidney function and a p-value of 0.05 was considered statistically significant.

Results

The baseline demographic and biochemical characteristics for all patients are listed in Table 1. There was no significant difference between the two groups as regards age but the patients who received contrast media were younger. On the other hand, there were no significant differences between the two groups as regards Diabetes Mellitus, HTN, and CHF with (p=0.61, 0.53, and 1) respectively.

Among patients overall, 61% were on more than one medication with potential nephrotoxicity,

15.5% of patients on a single medication, and 23.5% were on no nephrotoxic medications. There was no significant difference between the two groups regarding the medications with potential nephrotoxicity with p=0.062. Among patients overall, radiology was done as a part of sepsis workup in 22% of patients, for differential diagnosis of acute stroke in 13.5% of patients, cancer workup in 11.5% of patients, for acute abdomen diagnosis in 11.5%, for kidney and ureteric calculi diagnosis in 7% of patients,7%, 5.5%, 3.5% and 2.5% of patients were presented with trauma, intestinal obstruction, pulmonary disorders, and sickle cell crisis respectively. At the same time, 16% of our patients were presented with different etiologies, including post-chemotherapy, arthritis, cervical, lumbosacral disc, and others. The clinical presentation was not significantly different between the two groups with p=0.642, as shown in Table 1.

Among study patients overall, radiology evaluation for abdomen and pelvis was done in 55%, for the brain in 18%, pulmonary angiogram in 9.5%, cerebral angiogram in 5.5%, and spine evaluation was done in 4% of patients. Among those who received contrast media abdomen and pelvis, evaluation was done in 71%, pulmonary and cerebral angiograms were done in (18, 11%) respectively. In the other group of patients, 39% were evaluated for abdomen and pelvis, while 44% were evaluated for brain and spinal disorders.

This study showed no significant difference in the pre-contrast serum creatinine in both groups of patients, while eGFR was significantly higher among those who received contrast media with p (0.094, 0.021) respectively. On the other hand, re-evaluation of serum creatinine after 48 hours of the study showed significantly lower serum creatinine level and significantly higher eGFR among those who received contrast media compared to those who did not receive contrast media with p (0.033, 0.003) respectively as shown in Table 2.

Comparison between serum creatinine and eGFR before and 48 hours after the radiology showed significant improvement in serum creatinine and eGFR levels among the studied patients as a whole with p (0.0001). While the eGFR showed significant improvement among patients who received contrast media with p (0.001) as shown in Table 3.

Patients were subdivided according to changes that occurred in serum creatinine level after 48 hours of radiology, 52 (26%) of our patients showed rising serum creatinine in comparison to basal serum creatinine level. Out of them, 21 (10.5%) patients were matching KDIGO guidelines for the diagnosis of acute kidney injury and serum creatinine increased >26 mmol/dl above their basal levels. On the other hand, 148 (74%) of patients showed either improvement or stabilization of their serum creatinine level as shown in Table 4.

Comparison between patients' subgroups was done as shown in Table 5. Patients with worsening kidney function were older with more prevalent diabetes mellitus and hypertension in comparison to others with p (0.003, 0.012, and 0.032) respectively. Out of the 52 patients who showed worsening of their creatinine level, only 19 (36.5%) patients received contrast media.

Binary logistic regression analysis showed that the most independent predictor for worsening of kidney function was patients' age as shown in Table 6.

Table 1: Clinical and demographic criteria of the studied groups of patients

Parameters	Total patients (200)	Contrast (100)	Without contrast (100)	P
Demographic data:				
- Age mean(SEM) years	55(1.4)	51.6(1.92)[a]	58.44(1.92)[a]	0.051
- Gender n(%)				0.849
o Male n(%)	126(63)	65(65)	61(61)	
o Female n(%)	74(37)	35(35)	39(39)	
- Race n(%)				0.1
o Saudi n(%)	176(88)	83(83)[a]	93(93)[a]	
o Non-Saudi n(%)	24(12)	17(17)[a]	7(7)[a]	
Associated co-morbidities and chronic diseases: n(%)				
- Hypertension n (%)	78(39)	35(35)	43(43)	0.61
- DM n (%)	73(36.5)	33(33)	40(40)	0.532
- CHF n (%)	8(4)	4(4)	4(4)	1
Patients on medications with possible nephrotoxicity: n(%)				0.062
- None n(%)	47(23.5%)	29(29%)	18(18%)	
- Single medication n(%)	31(15.5%)	18(18%)	13(13%)	
- More than one medication n(%)	122(61%)	53(53%)	69(69%)	
Indication for Radiology n(%)				
- Infection n(%)	44(22%)	26(26%)	18(18%)	0.642
- Stroke n(%)	27(13.5%)	10(10%)	17(17%)	
- Malignancy n(%)	23(11.5%)	17(17%)	6(6%)	
- Acute Abdomen n(%)	23(11.5%)	16(16%)	7(7%)	
- Kidney/Ureter calculi n(%)	14(7%)	1(1%)	13(13%)	
- Trauma n(%)	11(5.5%)	0	11(11%)	
- Intestinal obstruction n(%)	7(3.5%)	3(3%)	4(4%)	
- Pulmonary embolism n(%)	6(3%)	6(6%)	0	
- Sickle cell disease n(%)	5(%)	4(4%)	1(1%)	
- Other lung disorders n(%)	8(4%)	4(4%)	4(4%)	
- Others n(%)	32(16%)	13(13%)	13(13%)	
Site for Radiology n(%)				
- Abdomen and pelvis n(%)	110(55%)	71(71)	39(39)	0.0001
- Brain n(%)	36(18%)	0	36(36)	
- Pulmonary angiogram n(%)	19(9.5%)	18(18)	1(1)	
- Cerebral Angiogram n(%)	11(5.5%)	11(11)	0	
- Spine n(%)	8(4%)	0	8(8)	
- Chest n(%)	6(3%)	0	6(6)	
- Renal n(%)	3(1.5%)	0	3(3)	
- Others n(%)	7(3.5%)	0	7(7)	

Table 2: Laboratory characteristic of the studied groups of patients

Parameters	Total patients (200)	With Contrast (100)	Without contrast (100)	P Group-1 Vs. Group-2
Serum Creatinine pre-contrast Mean (SEM)	91.7(3.3)	85.1(4.2)	98.4(5.1)	0.094
eGFR pre-contrast Mean(SEM)	88.4(2.98)	94.6(4.1)	82.1(4.3)	0.021
Serum Creatinine post-radiology Mean (SEM)	87.2(3.3)	81.1(4.5)	93.3(4.84)	0.033
eGFR post-radiology Mean (SEM)	98.1(3.96)	106.9(5.3)	89.03(5.8)	0.003

Table 3: Comparison of laboratory data before and after 48 hours of the radiology study in patients who received contrast media

Parameters	Before Contrast	after contrast	P
Serum Creatinine Mean(SEM)	85.1(4.2)	81.1(4.5)	0.255
eGFR Mean(SEM)	94.6(4.1)	106.9(5.3)	0.001
Comparison laboratory data in patients who did not receive contrast media			
Serum Creatinine Mean(SEM)	98.4(5.1)	93.3(4.84)	0.192
eGFR pre-contrast Mean(SEM)	82.1(4.3)	89.03(5.8)	0.061
Comparison laboratory data in all patients			
Serum Creatinine Mean(SEM)	91.7(3.3)	87.2(3.3)	0.0001
eGFR Mean(SEM)	88.4(2.98)	98.1(3.96)	0.0001

Table 4: Serum creatinine changes in the studied groups of patients after radiology

Parameters	Total patients (200)	With Contrast (100)	Without contrast (100)	P Group-1 Vs. Group-2
Stable and improved creatinine n(%)	148(74%)	81(81%)	67(67)	0.04
Rising serum creatinine<26mmole/dl	31(15.5%))	10(10%)	21(21)	
Rising serum creatinine>26mmole/dl	21(10.5)	9(9%)	12(12)	

Table 5: Clinical and demographic criteria of the studied groups of patients according to renal outcome

Parameters	Total patients (200)	Contrast (100)	Without contrast (100)	P
Demographic data:				
- Age mean(SEM) years	55(1.4)	51.6(1.92)[a]	58.44(1.92)[a]	0.051
- Gender n(%)				0.849
o Male n(%)	126(63)	65(65)	61(61)	
o Female n(%)	74(37)	35(35)	39(39)	
- Race n(%)				0.1
o Saudi n(%)	176(88)	83(83)[a]	93(93)[a]	
o Non-Saudi n(%)	24(12)	17(17)[a]	7(7)[a]	
Associated co-morbidities and chronic diseases: n(%)				
- Hypertension n (%)	78(39)	35(35)	43(43)	0.61
- DM n (%)	73(36.5)	33(33)	40(40)	0.532
- CHF n (%)	8(4)	4(4)	4(4)	1
Patients on medications with possible nephrotoxicity: n(%)				0.062
- None n(%)	47(23.5%)	29(29%)	18(18%)	
- Single medication n(%)	31(15.5%)	18(18%)	13(13%)	
- More than one medication n(%)	122(61%)	53(53%)	69(69%)	
Indication for Radiology n(%)				
- Infection n(%)	44(22%)	26(26%)	18(18%)	0.642
- Stroke n(%)	27(13.5%)	10(10%)	17(17%)	
- Malignancy n(%)	23(11.5%)	17(17%)	6(6%)	
- Acute Abdomen n(%)	23(11.5%)	16(16%)	7(7%)	
- Kidney/Ureter calculi n(%)	14(7%)	1(1%)	13(13%)	
- Trauma n(%)	11(5.5%)	0	11(11%)	
- Intestinal obstruction n(%)	7(3.5%)	3(3%)	4(4%)	
- Pulmonary embolism n(%)	6(3%)	6(6%)	0	
- Sickle cell disease n(%)	5(%)	4(4%)	1(1%)	
- Other lung disorders n(%)	8(4%)	4(4%)	4(4%)	
- Others n(%)	32(16%)	13(13%)	13(13%)	
Site for Radiology n(%)				
- Abdomen and pelvis n(%)	110(55%)	71(71)	39(39)	0.0001
- Brain n(%)	36(18%)	0	36(36)	
- Pulmonary angiogram n(%)	19(9.5%)	18(18)	1(1)	
- Cerebral Angiogram n(%)	11(5.5%)	11(11)	0	
- Spine n(%)	8(4%)	0	8(8)	
- Chest n(%)	6(3%)	0	6(6)	
- Renal n(%)	3(1.5%)	0	3(3)	
- Others n(%)	7(3.5%)	0	7(7)	

Table 6: Predictors for worsening of kidney function

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	age	.022	.011	4.354	1	.037	1.022	1.001	1.044
	Contrast	-.624-	.349	3.198	1	.074	.536	.271	1.062
	DM	.526	.420	1.569	1	.210	1.693	.743	3.857
	HTN	.054	.435	.015	1	.902	1.055	.450	2.476
	Constant	-2.897-	.716	16.350	1	.000	.055		

a. Variable(s) entered on step1: age, Contrast, DM, HTN.

Discussion

The majority of CIN research was done on patients who have had percutaneous coronary procedures (PCI) (10,11).

This is one of the few studies addressing CIN in the emergency department that we are aware of, and it is the only one in Saudi Arabia. In 2015, a study was conducted in a Saudi tertiary care hospital to assess the incidence and characteristics of CIN victims (12).

All individuals who had a CT scan at an emergency department between February and December 2017 were included in this study. The goal of the study was to determine the risk of contrast-induced nephropathy and estimate the incidence in low-risk patients.

There was no significant difference in the incidence of CIN between those who had a CT scan with contrast and those who did not. This matches the findings of a prior study by J. McDonald et al, 2014 (6).

When blood creatinine levels were re-evaluated after 48 hours of the trial, individuals who received contrast media had significantly lower serum creatinine levels and significantly greater eGFR than those who did not get contrast media. Previous research has found the same thing (13.14.15).

The greatest independent predictor of decreasing kidney function was patients' age, according to binary logistic regression analysis. This conclusion conflicts with Hinson et al 2017 (3), who found no independent influence other than age.

In comparison to others, individuals with decreasing kidney function were older and had greater diabetes mellitus and hypertension, according to this study. Contrast agents have been discovered to be retained by the kidney, causing tubular toxicity and the formation of reactive oxygen species, both of which can exacerbate renal damage (16,17,18).

Furthermore, numerous studies found that patients over the age of 65 had a higher prevalence of CIN, presumably reflecting a deterioration in renal function with age. Increased arterial stiffness, decreased endothelial function, and diminished vasodilator responses, as well as a lower ability for vascular repair with pluripotent stem cells, are all linked to advanced age. All of these variables raise the risk of CIN in older people and limit their ability to recover quickly (19).

Diabetics with CKD have a fourfold increased chance of acquiring CIN as compared o those without diabetic nephropathy (18,20,21,22).

Diabetes mellitus with renal insufficiency has been established as an independent risk factor for contrast nephropathy, with up to 56% of individuals diagnosed developing irreversible renal failure. Diabetics with advanced chronic kidney disease (serum creatinine >3.5 mg/dL) are more likely to acquire CIN (21,22).

Limitations

The small sample size and wide range of serum creatinine levels at presentation (0.23 mg/dL to 312 mg/dL) were two of the study's shortcomings.

Conclusion

The use of a randomized prospective trial to determine the link between intravenous contrast media and the development of contrast-induced nephropathy is beneficial. The findings of this study show that in today's clinical setting, contrast media delivery is not linked to an elevated risk of acute renal injury.

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Insulin Resistance Related to Metabolic Syndrome

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Abstract

Insulin resistance and metabolic syndrome are one of the major factors associated with higher risks of developing cardiovascular diseases and Type II Diabetes (T2D). Insulin resistance is believed to be one of the underlying causes of the development of T2D. There are numerous environmental and genetic factors influencing the development of these conditions, and while there have been many studies conducted on the topic, there are still many gaps in the scholarly literature on the topic. The interplay between genetic and environmental factors is quite complex, considering that there are many genes involved in the regulation of energy consumption as well as in the protective functions of an organism. Currently, the prevalence of insulin resistance among different populations ranges from 20% to 40%. Still, while the studies conducted before 2016 have found 88 loci associated with the development of T2D most of them are associated with secretion of insulin and function of β-cell, and far fewer studies have identified loci associated with insulin resistance. This means that the vast majority of studies are either focused on the insulin response pathway or on the immune response to inflammatory processes caused by metabolic disorders.

It can be concluded that biological and genetic mechanisms underlying the development of insulin resistance in metabolic syndrome are complex. For now, it is known that insulin resistance in metabolic syndrome develops due to malfunctioning insulin response pathway, or malfunctioning chronic inflammation response system, and other problems associated with energy and fatty acid metabolism.

Considering that the rates of obesity and T2D in developing countries are alarming, it is highly important to develop effective evidence-based interventions targeting this problem.

Key words; Insulin resistance, genetic factors, Metabolic Syndrome, environmental factors, fatty acid metabolism.

Insulin Resistance Related to Metabolic Syndrome

Insulin resistance and metabolic syndrome are one of the major factors associated with higher risks of developing cardiovascular diseases and Type II Diabetes (T2D) (Brown & Walker, 2016). Insulin resistance is believed to be one of the underlying causes of the development of the metabolic syndrome and T2D (Roberts et al., 2013). There are numerous environmental and genetic factors influencing the development of these conditions, and while there have been many studies conducted on the topic, there are still many gaps in the scholarly literature on the topic. Previously studies have identified several important biological factors associated with insulin resistance in metabolic syndrome, such as insulin-like growth factors IGF1 and IGF2 (Hakuno & Takahashi, 2018). Chronic inflammation and macrophages were also identified as crucial factors contributing to metabolic syndrome and insulin resistance (Rung et al., 2009; Paniagua, 2016; Rosen et al., 1989). The interplay between genetic and environmental factors is quite complex, considering that there are many genes involved in the regulation of energy consumption as well as in the protective functions of an organism (Brown & Walker, 2016).

Insulin resistance refers to the inability of an individual's body to stimulate glucose disposal, and when an individual's body is unable to produce sufficient insulin, it leads to T2D development (Brown & Walker, 2016). In other words, insulin resistance occurs when the body is unable to optimally transport glucose to body cells (Roberts et al., 2013). Insulin resistance may develop independently, because of biological factors, or may be caused by environmental factors, such as consumption of unhealthy food, poor diet, and physical activity. Currently, the prevalence of insulin resistance among different populations ranges from 20% to 40% (Brown & Walker, 2016; Guallar-Castillon et al., 2014; Prasad et al., 2012). Still, while the studies conducted before 2016 have found 88 loci associated with the development of T2D most of them are associated with secretion of insulin and function of β-cell, and far fewer studies have identified loci associated with insulin resistance (Brown & Walker, 2016). This means that the vast majority of studies are either focused on the insulin response pathway or on the immune response to inflammatory processes caused by metabolic disorders.

NAT2 is one of the loci directly associated with insulin resistance, however, it did not reach genome-wide significance (Brown & Walker, 2016). NAT2 is involved in the acetylation process and is also associated with resistance to certain drugs (Sim et al., 2014). The studies have also identified loci near GCKR as well as loci near IGF1 associated with insulin resistance. Previous studies have also found that risk loci associated with insulin resistance can be subdivided into 5 major clusters, and one cluster is associated with four loci PPARγ, KLF14, IRS1, and GCKR (Dimas et al., 2014). Additional loci, such as IRS1, COBLL1-GRB14, PPP1R3B, PDGFC, UHRF1BP1, and LYPLAL1 were also found to be associated with insulin resistance. The researchers have also found loci associated with fasting insulin levels, that could also be related to insulin resistance, including TCF7L2, PPARG, FTO, RSPO3, ANKRD55-MAP3K1, ARL15, HIP1, TET2, YSK4, PEPD, and FAM13A (Brown & Walker, 2016). It should be noted that IGT as well as impaired fasting glucose are the most commonly used clinical measures for insulin resistance (Roberts et al., 2013). Loci associated with lower HDL and higher triglycerides are also likely to be associated with insulin resistance. These loci are: IRS1, GRB14, ARL15, PPARG, PEPD, ANKRD55-MAP3K1, PDGFC, LYPLAL1, RSPO3, and FAM13A1 (Scott et al., 2012; Mahajan et al., 2014; Altshuler et al., 2000). Additionally, the study by Walker et al., (2016) has found that 2 loci near r TMEM163 (transmembrane protein 163) are associated with lower plasma insulin and the homeostasis model assessment (HOMA-IR).

One of the first genetic variants identified that is associated with insulin resistance is the peroxisome proliferator-activated receptor gamma (PPARγ) variant Pro12Ala (Deeb et al., 1998; Altshuler et al., 2000). Studies have found that PPARγ is a nuclear receptor that is directly involved in energy metabolism and fatty acid metabolism, and therefore agonists of this receptor are commonly used for treating T2D nowadays (Brown & Walker, 2016). Another important component associated with insulin resistance is IRS1 (insulin receptor substrate 1) and IRS2, which are actively involved in the pathway initiating the activation of PI3K as the response to insulin (Roberts et al., 2013). In fact, the C allele at rs2943641 adjacent to IRS1 is directly associated with insulin resistance (Rung et al., 2009). The insulin-stimulated tyrosine phosphorylation, which takes an active part in response to insulin can be reduced by mutations and various genetic factors, which in turn leads to the development of insulin resistance (Roberts et al., 2013). IRS1, as well as IRS2, are directly involved in the transportation of glucose, and mutations in these proteins were found to be related to both T2D and insulin resistance (Araki et al., 1994; Tamemoto et al., 1994). IRS2 is expressed in all the primary glucoregulatory tissues, and mutations in IRS2 can result in the malfunctioning of the liver, pancreas, skeletal muscles, and adipose (Roberts et al., 2013; Figure. 2).

Figure 1. Mechanisms underlying the development of dysfunctional adipose tissue (Paniagua, 2016)

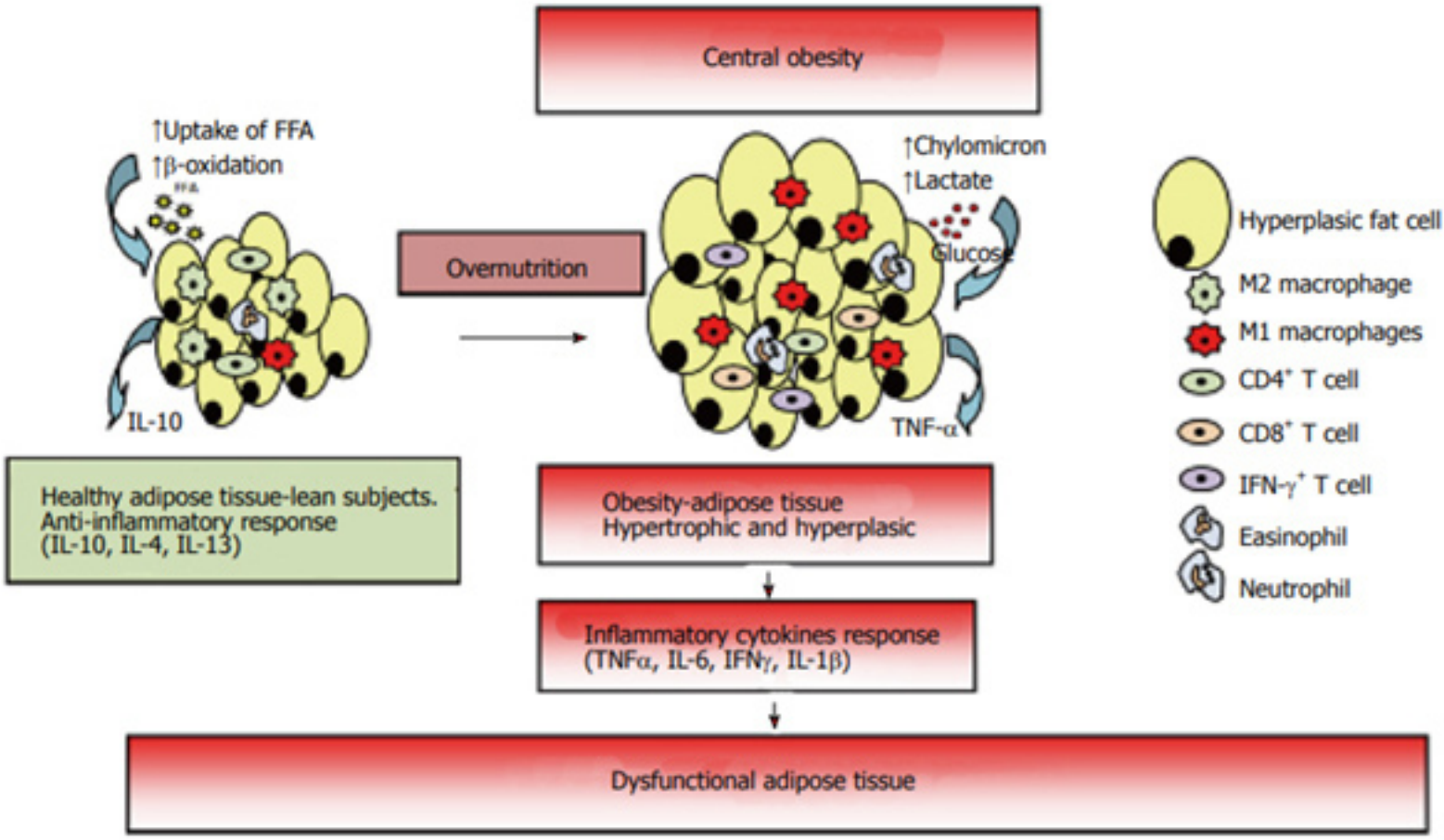

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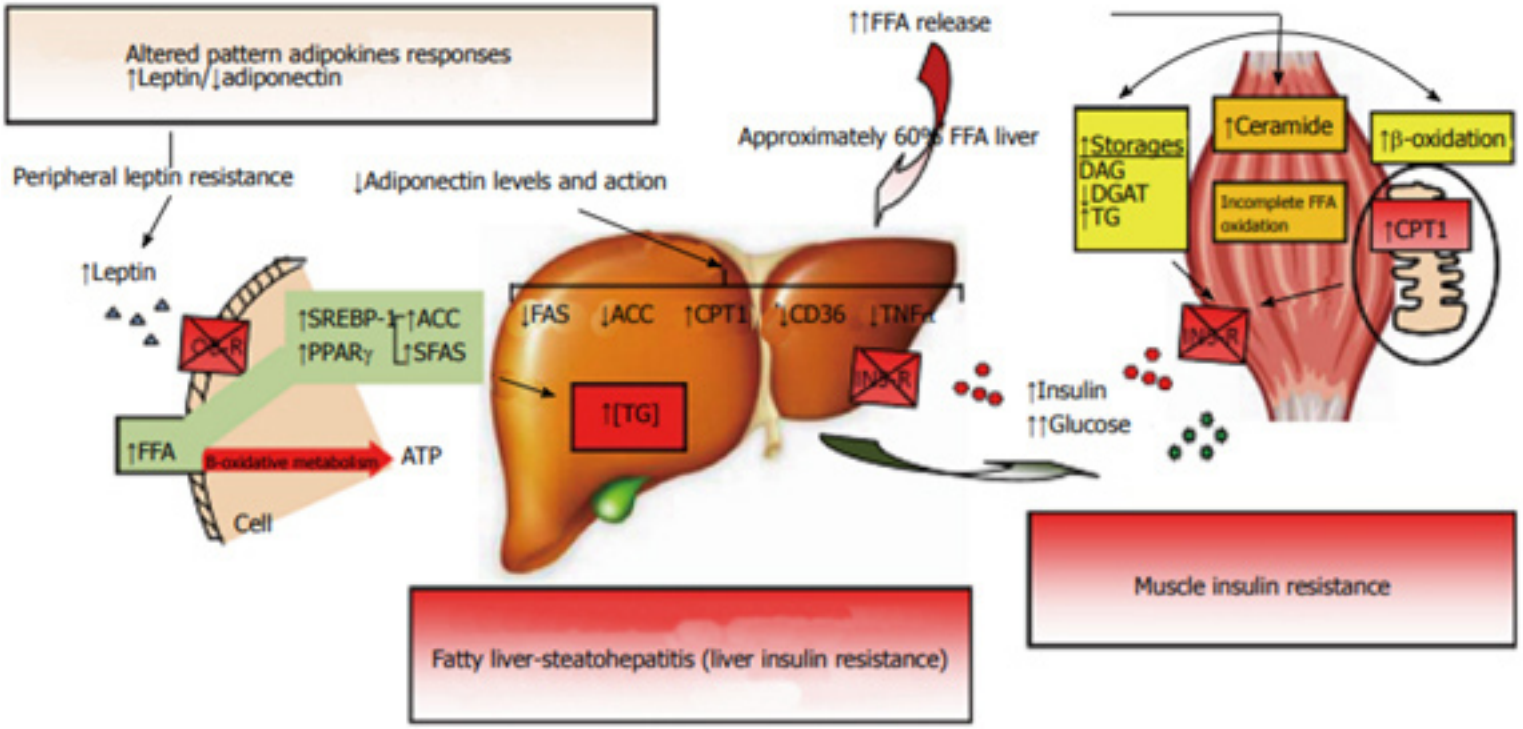
Figure 2: Dysfunctional Adipose Tissue (Paniagua, 2016)



Discussion

Early obesity results in the development of chronic inflammation in the body, and the influence of chronic inflammation puts excessive stress on protecting mechanisms of the organism (Weisberg et al., 2003; Xu et al., 2003). This chronic inflammation is associated with slow infiltration of macrophages which are the important source of inflammation of adipose tissue (Paniagua, 2016). Immune cells, such as T-cells, as well as macrophages and adipocytes, participate in the creation of cytokines (Paniagua, 2016). There are two different types of macrophages, which are M1 and M2. M1 macrophages are the major source of inflammatory cytokines such as TNF-α, while M2 macrophages are activated by type 2 (Th2) cytokines such as IL-4 and IL-13 (Rung et al., 2009; Paniagua, 2016; Rosen et al., 1989). M2 macrophages are abundant in adipose tissue of lean subjects (Paniagua, 2016; Fig. 1). Hence, while lean subjects provide a normal healthy response to the inflammatory process, people suffering from obesity have problems associated with inflammatory response, resulting in damage to the liver and other body organs. The inflammation response caused by M1 macrophages eventually leads to the development of insulin resistance because the liver is unable to function properly any more, as well as other organs with adipose tissue. This condition is also often referred to as fatty liver and is associated with various metabolic disorders and other health-related issues. Inflammatory cytokines TNF-α produced by M1 macrophages result in inhibition of differentiation to mature adipocyte, which leads to insulin resistance (Prieur et al., 2011; Chadli et al., 2012; Paniagua, 2016). IL-6 cytokines associated with the chronic inflammatory process were also found to be associated with both T2D and insulin resistance. It should be noted that resistin and leptin cytokines were also found to be associated with insulin resistance (Steppan et al., 2001). While leptin is supposed to decrease FFA, its effects can be blocked by the anabolic effects of hyperinsulinemia (Panuagua et al., 2014). Hence, cytokines that are produced by an improperly functioning immune system, that experiences enormous stress due to chronic inflammation, is one of the main explanations of why insulin resistance develops. The metabolic syndrome exhausts the protective resources of the body.

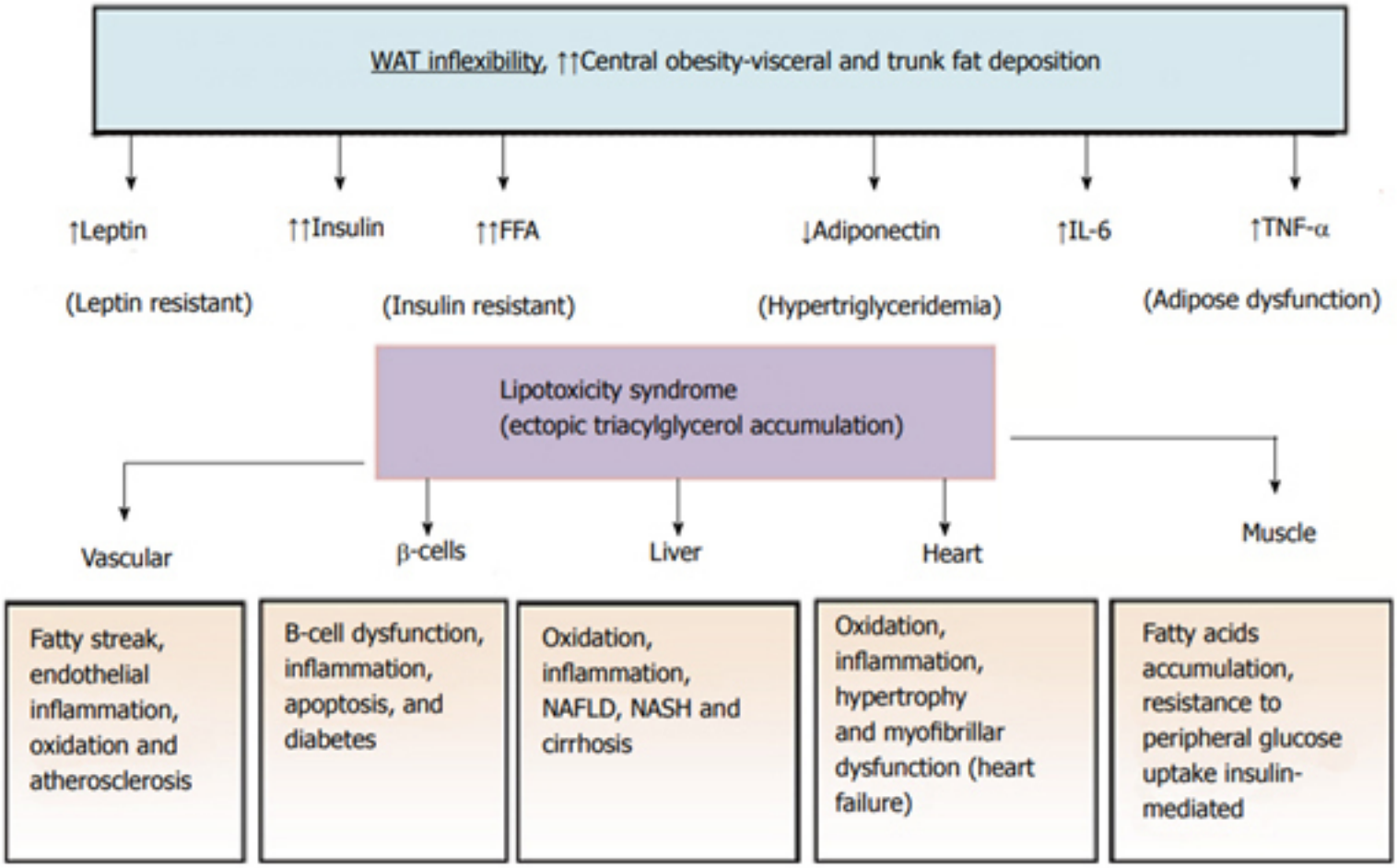
The problems caused by insulin resistance in adipose tissue result in chronic inflammation in the above mentioned organs, which contributes to lipotoxicity and the malfunctioning of different processes in the body (Paniagua, 2016). Chronic inflammation in the liver results in an increase in the total release of TNF-α and IL-6 (Vidal-Puig & Unger, 2010).

Paniagua (2016) proposes the following model explaining how metabolic syndrome and insulin resistance occur (Figure 3). This model states that people with sedentary lifestyles and obesity, as well as some people who may have genetic mutations and other biological factors, face problems associated with the malfunctioning immune response to chronic inflammation, which results in the increase of Leptin, Insulin, FFA (Fatty Acids), IL-6 and TNF-α, while Adiponectin is decreased (Paniagua et al., 2014). An increase in Insulin and FFA contribute to insulin resistance, as well as other problems associated with metabolic syndrome (Vidal-Puig & Unger, 2009). It creates a vicious circle because adipose tissue starts to function improperly, which results in even more problems and worsens insulin resistance. Insulin responsiveness in patients with metabolic disorders and those who have insulin resistance can be improved by reducing body weight and encouraging them to exercise more (Melanson et al., 2009). Apparently, lower body weight reduces inflammatory processes inside the body, which stimulate the body to respond to inflammation more efficiently and adequately. Hence, the primary goal should be weight loss, because without a weight loss insulin resistance can't be addressed effectively as was found by Stuart et al., (2013).

Interestingly, people with certain hormonal problems may be at a higher risk of developing insulin resistance. The study by Arlien-Søborg et al., (2022) has focused on understanding how to reverse insulin resistance induced by growth hormone (GH) in patients suffering from acromegaly. However, the underlying molecular mechanisms still remain unknown. For now, it is clear that GH can induce insulin resistance through activating lipolysis. By suppressing the production of GH with somatostatin, it is possible to reduce insulin resistance in patients with acromegaly (Melmed et al., 2005). GH may affect tissues through the JAK/STAT pathway, leading to phosphorylation and dimerization of STAT5 Arlien-Søborg et al., (2022). The expression of GH-regulated genes CISH and IGF-I were detected in muscle and fat and were induced by GH signaling (pSTAT5) activation (Arlien-Søborg et al., 2022). Studies have found that the IGF-I factor is quite similar to insulin in its functions because it regulates growth and development. The studies have found that lower IGF-I is associated with higher insulin resistance (Belfiore et al., 2009; Hakuno & Takahashi, 2018; Succuro et al., 2009). Hence, higher exposure to GH induced by acromegaly may result in lower IGF-I factor, which could lead to the development of insulin resistance and other problems.

It can be concluded that biological and genetic mechanisms underlying the development of insulin resistance in metabolic syndrome are complex (Brown & Walker, 2016). There are hundreds of factors associated with the development of the abovementioned disorders, and more studies should be conducted to identify all possible loci and genes associated with these problems. For now, it is known that insulin resistance in metabolic syndrome develops due to malfunctioning insulin response pathway, or malfunctioning chronic inflammation response system, and other problems associated with energy and fatty acid metabolism (Vidal-Puig & Unger, 2010; Weisberg et al., 2003; Xu et al., 2003; Rung et al., 2009; Paniagua, 2016; Rosen et al., 1989; Prieur et al., 2011; Chadli et al., 2012). Insulin resistance may be observed in patients with various hormonal pathologies, including those suffering from acromegaly, when the body produces too much growth hormone (Arlien-Søborg et al., 2022) Considering that the rates of obesity and T2D in developing countries are alarming, it is highly important to develop effective evidence-based interventions targeting this problem.

Figure 3: Adipose Tissues Expandability and Metabolic Syndrome



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The prevalence of iron supplements use during pregnancy among the study participants was 99.6%. There were no significant association between the age, weight and number of pregnancies (p value >0.05). The authors concluded that there is a need to encourage pregnant women to visit early for antenatal care. Iron and folic acid supplements, dietary intake preferences, diagnosis and continuous follow up of pregnant women are approaches to reduce anemia during pregnancy in Taif region. The purpose of this study was to enhance the public awareness about iron supplements during pregnancy.

Alshahrani. et al., did a descriptive cross-sectional approach was used targeting all accessible population in Southern of Saudi Arabia Data were collected from participants using an online pre-structured questionnaire. The questionnaire covered the following data: participants' socio-demographic data, participants' awareness, and participants' perception towards CKDs, preventive measures and risk. A total of 1317 participants fulfilling the inclusion criteria completed the study questionnaire. The authors concluded that the current study revealed that public awareness in Southern region of Saudi Arabia about CKD and its risk factors is low in contrast to their perception towards the disease and its associated risk. Having information from scientific sources such as books, health education campaigns or study was associated with high awareness level.

Masarit et al., did a cross-sectional study was conducted to assess knowledge of 103 family medicine residents about childhood autism. A structured self-administered web-based Healthcare Workers (KCAHW) Questionnaire was use to assess knowledge of childhood autism among participant residents. female participants. Residents' total score (Mean±SD) was 13.18±2.80 (out of 19, 69.4%). The authors concluded that Knowledge of family medicine residents regarding childhood autism is suboptimal. It is important to update the knowledge gaps of healthcare workers who have limited knowledge regarding childhood autism and to train them to be able to provide healthcare service that would ensure early diagnosis and interventions for management of autism.

Alhafithi et al., did a cross-sectional study was conducted among 249 nurses aimed at assessing the prevalence and associated factors of burnout among nurses in Yanbu General Hospital, Saudi Arabia. High burnout was found among 168 (67.5%) participants. The EE score was significantly higher among Saudis, (p=0.004), among those who worked >40 hours per week (p<0.001) and among those who had more than 8 shifts per week (p=0.001). The authors concluded that burnout was highly prevalent among nurses in this study and was associated significantly with work related factors and sources of stress in the workplace. working conditions should be improved to minimize the impact and consequences of burnout among nurses.

Fadl et al., did a cross-sectional study among undergraduate medical students in Saudi Arabia. Volunteer participants answered the questions relating to demographics and surveys containing the Rome III criteria and the Self-reported Stress questionnaire. A total of 300 participants were recruited with 63.7% of whom were females. The authors concluded that Higher prevalence of IBS was detected in undergraduate medical students in Saudi Arabia than worldwide prevalence. Female genders, higher academic grades, less exercise practicing and sleep disturbance were predictors for IBS. More screening and management of stress causes are needed to decrease medical field stressors.

Alshahrani, et al., did a cross-sectional study to assess prevalence of burnout among Emergency Department (ED) staff in Dammam City, Saudi Arabia, and to assess the potential associated factors. Most participants suffered from high level burnout for depersonalization and low personal achievement. The burnout was found among 76% of them. The authors concluded that most physicians and nurses working at emergency hospitals in Dammam City, Saudi Arabia, had burnout disorder, especially high passionate fatigue and low personal achievement.

AlOtaibi, et al, did cross-sectional survey to explores the perceptions of physicians and their attitudes toward the implementation of the electronic medical record (EMR) in general hospitals in Riyadh to identify the perceived difficulties, burdens, and usefulness of implementing electronic medical records. A total of 160 physicians filled out the questionnaire. The majority of physicians (91.3%) stated that they had heard of the EMR. Physicians rated their agreement on the usefulness of implementing the EMR positively (mean score, 3.8/5). The authors concluded that there is a necessity for formal educational programs to improve physicians' overall attitude toward the EMR.

Alzunidi et al., did an observational, descriptive, cross-sectional study. Among 162 Medical and Pharm D students. To assess the relation between sleep pattern and academic performance among Almaarefa University medical and pharmacy students in Riyadh. The authors concluded that sleep pattern and GPA had no relation. However, male students had deeper sleep than females. The percentage of female students in a shared room was higher than males. Finally, medical students had a higher percentage in sharing a room than pharmacy students. Most of the respondents are majoring in medicine, as well as females were triple the number of males, this may have affected the results.

Khmour, et al., did a cross-sectional retrospective data analysis extracted from medical records of patients with Diabetes Meletus type 2 following at PHCC, in year 2020. Qatar considered as one of highly prevalence countries in type 2 diabetes, with a prevalence of 17 % , after the start of global pandemic of COVID 19 the type of service and the access to health center had been change during the pandemic, so we wanted to know the effect of this major change in level of

the glycemic control to type 2 diabetes patient followed in PHCC(primary health care corporation) and compare it with previous studies, also we to now the relation between level of glycemic control and number of phone consultation done to each one and finally the prevalence of covid 19 in type 2 diabetic patient followed in PHCC. The authors concluded that the results showed no significant difference in level of glycemic control during the year 2020 as the mean of HbA1C not changed the mean was 7.0% and became 6.9%, with prevalence of 8.1 for positive cases of Covid in the sample

Hnish et al., did a cross-sectional study that used an anonymous paper survey. All medical residents from all programs throughout all postgraduate year levels in HMC were invited to participate in the study. The study was looking at the prevalence of Generalized Anxiety Disorder among Medical Residents in Hamad Medical Corporation in 2020. Of the 244 participants, 73 (29.9 %) reported anxiety symptoms with a GAD-7 score of 10 or more. This study highlights the prevalence of anxiety disorders among medical residents, and it was found to be high but relatively like the prevalence found in other studies internationally and locally, the level of anxiety was significantly higher among overseas residents in comparison to local residents. There was a significant number of residents who were not aware of the presence of mental health services within the institution, in addition, among those with anxiety who were aware of the mental health services but not utilizing them, there were two common reasons, the lack of time followed by confidentiality issues.

Nasir., et al., did a review on Alzheimer's Dementia. They stressed that Alzheimer's Disease (AD), identified almost a century back and is slowly progressing as a global pandemic. This disease is one of the most common causes of Dementia. In this condition, an affected individual loses their recent memories and almost all cognitive functions, and eventually, the person becomes incapable of performing even the simplest of tasks. This paper aims to review the epidemiology, clinical features, diagnostic criteria, pathophysiology, and various treatment strategies of AD dementia.

Dr. Dima reviewed Nutrition and puberty. She stressed that Nutrition plays an important role in the growth, development and puberty of children. Adequate nutrition is very important for the normal development of the child during the various stages of childhood and into puberty. Unfortunately, we note the spread of fast food and the adoption of wrong methods in feeding the child, such as making him watch TV to motivate him to eat a larger amount of food …etc. this led to the spread of obesity and overweight among children. Overweight or obese children are more likely to enter puberty early. Some evidence suggests that obesity can accelerate the onset of puberty in girls and this is a major reason why girls begin puberty at an earlier age compared to past decades while overweight or obesity may delay the onset of puberty in boys. On the other hand, Severe primary or secondary malnutrition also can delay the onset and progression of puberty.

Dr. Rahma reported a case of Erythroderma following Terbinafine therapy. A 52-year-old female patient had received oral terbinafine for onychomycosis. The patient had a family history of lupus, but no personal history. Six weeks after initiating treatment with terbinafine the patient developed cutaneous lupus which was diagnosed clinically and by histology. This report, along with previous cases described, suggests the association between terbinafine therapy and the onset or exacerbation of SLE often occurring in a patient with history of systemic lupus erythematosus or SLE.

Khmour, et al., report on a rare case of lower limb weakness. This is a 53 years old male, previously healthy, presented to primary care physician, complaint from chronic back pain, was seen multiple time with same problem, treated as Myalgia with pain killers only, after proper approach and investigation was found to have ALS Amyotrophic lateral sclerosis

The Quality of Life among the Adult Population during COVID-19 in Saudi Arabia

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Abstract

Background: Quality of Life (QoL) is affected by many factors such as age, sex, mental health, relationships, economic status, sociodemographic characteristics and stress. The COVID-19 pandemic is a stressful factor globally, which may affect QoL. Therefore, this study assessed the QoL among the adult population during the COVID-19 pandemic in Saudi Arabia.

Methodology: This cross-sectional study evaluated the QoL in the general population of Saudi Arabia during the COVID-19 pandemic using the World Health Organization Quality of Life-BREF questionnaire. A p-value <0.05 was considered to be statistically significant. Ethical approval was obtained from the Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia.

Results: A total of 1,978 participants were recruited from across the Kingdom of Saudi Arabia. Half of the participants were women (1136, 57.4%). Most (1,890, 95.6%) were Saudis. Half of the participants had good QoL in the physical, psychological, social, and environment domains, representing 1,104 (55.8%), 1143 (57.8%), 1,233 (62.3%), and 1,022 (51.7%), respectively. A significant association was noticed between age/BMI and the physical domain (p-values of 0.001 and 0.001, respectively).

Conclusion: The COVID-19 pandemic has affected QoL in many aspects. Women, university and below students; widowed, separated, and divorced people; the retired; people not working in the medical field and people with a chronic disease reported poor QoL.

Key words:
Quality of life, COVID-19 pandemic, general population, Saudi Arabia, Adult.

Introduction

Quality of life (QoL) defines an individual's perceptions of the cultural context and value systems they live to with regard to their goals, expectations, standards, and responsibilities. The eight QoL domains include physical and psychological health, independence, social relations, spirituality, and personal beliefs. The COVID-19 pandemic has affected more than 235 countries and is a stressful factor globally. Many countries have endorsed a lockdown and shifted to virtual learning, among many other factors, to decrease the rate of infection]1[. QoL is affected by many factors such as age, sex, mental health, relationships, economic status, and sociodemographic characteristics]2,3[. Many instruments, both generic and disease-specific, can measure QoL. The World Health Organization (WHO) has created a generic instrument to measure QoL.

The WHOQOL is an acceptable instrument used in many languages. The validity of the Arabic version was reported in 2009]4[.

The COVID-19 pandemic, as announced by the WHO in March 2020]5[, is an infectious disease caused by severe acute respiratory syndrome coronavirus 2]6,7[. The first identification of the disease was in December 2019 in Wuhan, China. By 29 September 2020, more than 235 countries had been affected by the disease, with 33 million confirmed cases and more than one million deaths worldwide]8[.

Hajj and Umrah make Saudi Arabia one of the most affected countries during the COVID-19 pandemic due to mass gatherings. The tremendous effort by the government and Ministry of Health includes stopping direct flights from China, pending hajj and Umrah, and closing two holy mosques for cleaning and disinfection. Moreover, education was shifted to remote learning and virtual classrooms; however, these, plus stay-at-home orders increased anxiety, stress, and depression]9,10[. Previous studies have linked COVID-19 to a notable psychological influence on the general population, particularly younger people, women, and patients with a chronic disease in contrast to older individuals, men, and well-educated people with post-graduate degrees. Despite these factors, when family members, relatives, or friends become infected with COVID-19, anxiety levels increase]11,12[. The impact of COVID-19 on the QoL of the Saudi population is not well characterized. Therefore, this study assessed the QoL among the adult population during COVID-19 in Saudi Arabia.

Subjects and Methods

Study design and population

During the COVID-19 pandemic, this cross-sectional study evaluated the QoL in the general population of Saudi Arabia using the WHOQOL-BREF questionnaire through a link shared on social media. The population sampling techniques used were the convenience and snowball sampling techniques, and the participants who accepted to be involved in the study met the inclusion criteria.

Inclusion and exclusion criteria

In this study, both genders aged 18 years or more of the Saudi and non-Saudi populations who agreed to give informed consent, who can read and understand Arabic or English, and who have access to social media, were included. People who declined to participate in this study or had a psychiatric illness were excluded.

Data collection

Using Google Forms that include consent forms, data were collected using anonymous Arabic and English online questionnaires shared through social media (WhatsApp, Facebook) and email. Motivating the participants to distribute the questionnaire to more people was a goal to raise the number of respondents. The questionnaire consisted of two parts: FIRST, Demographic and socioeconomic characteristics include age, gender, residence, height, weight, smoking status, level of education, occupation, working in the medical field, income, marital status, and other comorbidities. SECOND, The WHOQOL-BREF is a simple, self-administered tool to assess QoL]13[. The validity and reliability of the Arabic version of the WHOQOL-BREF were evaluated in a previous study]4[. It consists of 26 questions. Using a five-point Likert response scale ranging from 1 (very dissatisfied/very poor) to 5 (very satisfied/very good), the 26 questions representing the four main domains of physical health (seven items), social relations (three items), psychological health (six items), and environment (eight items) were rated. The remaining two items were a rating of subjective satisfaction with health and an overall rating of QoL, and these constituted the general items on QoL and health.

The scores were totaled in three ways. The first was a summation of the raw scores of the constituent items. The second and third ways consisted of transforming the raw scores. In the second way, the raw scores were transformed into scores that ranged from 4 to 20 to be in line with the WHOQOL-100 instrument. The third way converted the 4–20 scores into a 0–100% scale to show the positive correlation between the domain score and QoL. The cutoff value for the WHOQOL-BREF in this study was <60 for the overall domains to determine those participants with poor QoL]14[. The license for this index was taken from the official site of the WHO, the owner of this index; and the License ID code was 362004.

Statistical analysis

Statistical Package for the Social Sciences (SPSS) version 25 was used for the statistical analysis. The mean and standard deviation were calculated to describe the continuous variables, while numbers and percentages were used for the categorical variables. Chi-square test was used to compare between variables. A p-value <0.05 was statistically significant.

Research ethics

The ethics committee of the Faculty of Medicine, Umm Al-Qura University (Code: HAPO-02-K-012-2021-01-519) approved this study. All the participants included in this study were informed about their consent. No financial prizes were given for finishing the survey.

Results

A total of 1,978 participants were recruited from across the Kingdom of Saudi Arabia. Most were from the western region (1,433, 72.7%). Just over half of the participants were women (1,136, 57.4%), with 842 (42.6%) men. Most of them (1,890, 95.6%) were Saudi citizens, and 88 (4.4%) were other nationalities. Nearly all the participants (1,598, 80.8%) were non-smokers. Most (1,573, 79.5%) had a university level of education. Half (1,013, 51.2%) were single. About one-third (705, 36.6%) had a job, and 677 (34.2%) were students. More than one-third (780, 36.6%) reported a sufficient income , and 384 (19.4%) mentioned that they had an insufficient income. The minority of the participants (353, 17.8%) had a chronic disease, and only 108 (5.5%) had a psychological illness. Altogether, 267 (13.5%) participants were infected with COVID-19, and 776 (39.9%) had had contact with a confirmed case of COVID-19 (Table 1).

Table 1: Demographic Data

Age	32.68 (SD±13.17) 95%CI (32.10-33.26)	
BMI	26.43 (SD±6.58) 95%CI (26.14-27.71)	
Gender	Male	842 (42.6%)
	Female	1136 (57.4%)
Residency	Western Region	1433 (72.4%)
	Southern Region	124 (6.3%)
	Eastern Region	154 (7.8%)
	Central Region	223 (11.3%)
	Northern Region	44 (2.2%)
Nationality	Saudi	1890 (95.6%)
	Non - Saudi	88 (4.4%)
Smoker	Yes	380 (19.2%)
	No	1598 (80.8%)
Level of education	Illiterate	9 (0.5%)
	University	1573 (79.5%)
	Below university	396 (20%)
Marital status	Single	1013 (51.2%)
	Married	881 (44.5%)
	Widowed, Separated, Divorced	84 (4.2%)
Current employment status	Working	705 (36.6%)
	Unemployment	409 (20.7%)
	Student	677 (34.2%)
	Retired	187 (9.5%)
Work in medical field	Yes	237 (12%)
	No	1741 (88%)
Totally monthly household income	Insufficient income	384 (19.4%)
	Sufficient income	780 (39.4%)
	Middle income	814 (41.2%)
Currently ill OR do you have a medical condition	Yes	353 (17.8%)
	No	1625 (82.2%)
Suffer from psychological disease	Yes	108 (5.5%)
	No	1870 (94.5%)
Get COVID-19 infection	Yes	267 (13.5%)
	No	1711 (86.5%)
Contact with confirmed case of COVID-19	Yes	776 (39.2%)
	No	1202 (60.8%)

Abbreviation BMI: Body Mass index
Frequency test, mean, Stander deviation used to describe the variables

Half of the participants had good QoL in the physical, psychological, social, and environmental domains, accounting for 1,104 (55.8%), 1,143 (57.8%), 1,233 (62.3%), and 1,022 (51.7%), respectively (Table 2).

Table 2: Frequency table of the domains

Domain	Poor QOL	Moderate QOL	Good QOL
Physical health	241 (12.2%)	633 (32%)	1104 (55.8%)
Psychological well-being	290 (14.7%)	545 (27.6%)	1143 (57.8%)
Social relationships	305 (15.4%)	440 (22.2%)	1233 (62.3%)
Environment	224 (11.3%)	732 (37%)	1022 (51.7%)

Abbreviation: QOL: Quality of life
Frequency test used to describe the variables

The majority of the male and female participants had good QoL in the physical domain, 535 (63%) and 569 (50.1%), respectively (p=0.001). A significant relation was observed between chronic disease and poor QoL (p=0.001). The participants who had a psychological illness had poor QoL (p=0.001). A significant association was noticed between age/BMI and the physical domain (p-values of 0.001 and 0.001, respectively). No significant impact of smoking was found in this domain (p=0.789). No relationship was noted between COVID-19 infection and good QoL (p=0.155) (Table 3).

Table 3: Physical health domain compared to Demographic data

		Poor QOL	Moderate QOL	Good QOL	P value
Gender	Male	89 (10.6%)	218 (25.9%)	535 (63.5%)	0.001
	Female	152 (13.4%)	415 (36.5%)	569 (50.1%)	
Residency	Western Region	181 (12.6%)	456 (31.8%)	796 (55.5%)	0.795
	Southern Region	13 (10.5%)	44 (35.5%)	67 (54%)	
	Eastern Region	19 (12.3%)	50 (32.5%)	85 (55.2%)	
	Central Region	26 (11.7%)	66 (29.6%)	131 (58.7%)	
	Northern Region	2 (4.5%)	17 (38.6%)	25 (56.8%)	
Nationality	Saudi	229 (12.1%)	599 (31.7%)	1062 (56.2%)	0.286
	Non - Saudi	12 (13.6%)	34 (38.6%)	42 (47.7%)	
Smoker	Yes	47 (12.4%)	116 (30.5%)	217 (57.1%)	0.789
	No	194 (12.1%)	517 (32.4%)	887 (55.5%)	
Level of education	Illiterate	3 (33.3%)	2 (22.2%)	4 (44.4%)	0.296
	University	184 (11.7%)	506 (32.2%)	883 (56.1%)	
	Below university	54 (13.6%)	125 (31.6%)	217 (54.8%)	
Marital status	Single	96 (9.5%)	330 (32.6%)	587 (57.9%)	0.002
	Married	133 (15.1%)	270 (30.6%)	478 (54.3%)	
	Widowed, Separated, Divorced	12 (14.3%)	33 (39.3%)	39 (46.4%)	
Current employment status	Working	92 (13%)	195 (27.7%)	418 (59.3%)	0.001
	Unemployment	50 (12.2%)	139 (34%)	220 (53.8%)	
	Student	51 (7.5%)	234 (34.6%)	392 (57.9%)	
	Retired	48 (25.7%)	65 (34.8%)	74 (39.6%)	
Work in medical field	Yes	17 (7.2%)	66 (27.8%)	154 (65%)	0.004
	No	224 (12.9%)	567 (32.6%)	950 (54.6%)	
Totally monthly household income	Insufficient income	51 (13.3%)	141 (36.7%)	192 (50%)	0.100
	Sufficient income	94 (12.1%)	231 (29.6%)	455 (58.3%)	
	Middle income	96 (11.8%)	261 (32.1%)	457 (56.1%)	
Chronic disease	Yes	188 (53.3%)	152 (43.1%)	13 (3.7%)	0.001
	No	53 (3.3%)	481 (29.6%)	1091 (67.1%)	
Psychological disease	Yes	25 (23.1%)	50 (46.3%)	33 (30.6%)	0.001
	No	216 (11.6%)	583 (31.2%)	1071 (57.3%)	
Got COVID-19 infection	Yes	34 (12.7%)	98 (36.7%)	135 (50.6%)	0.155
	No	207 (12.1%)	535 (31.3%)	969 (56.6%)	
Contact with confirmed case of COVID-19	Yes	90 (11.6%)	250 (32.2%)	436 (56.2%)	0.815
	No	151 (12.6%)	383 (31.9%)	668 (55.6%)	

Abbreviation: QOL: Quality of life
Chi-square test used to compare between variables

More than half of the men and women showed good QoL in the psychological domain (p=0.001). There was a significant association between poor QoL and chronic medical disease/psychological disease (p=0.001). Age and BMI were found to have significant relationships with the psychological domain (p-values of 0.001 and 0.001, respectively). No relation between COVID-19 infection/contact with a confirmed case of COVID-19 and poor QoL was found (p-values of 0.297 and 0.934, respectively) (Table 4).

Table 4: Psychological well-being Domain compared to Demographic data

		Poor QOL	Moderate QOL	Good QOL	P value
Gender	Male	96 (11.4%)	194 (23%)	552 (65.6%)	0.001
	Female	194 (17.1%)	351 (30.9%)	591 (52%)	
Residency	Western Region	220 (15.4%)	394 (27.5%)	819 (57.2%)	0.498
	Southern Region	15 (12.1%)	39 (31.5%)	70 (56.5%)	
	Eastern Region	22 (14.3%)	36 (23.4%)	96 (62.3%)	
	Central Region	26 (11.7%)	60 (26.9%)	137 (61.4%)	
	Northern Region	7 (15.9%)	16 (36.4%)	21 (47.7%)	
Nationality	Saudi	277 (14.7%)	514 (27.2%)	1099 (58.1%)	0.230
	Non - Saudi	13 (14.8%)	31 (35.2%)	44 (50%)	
Smoker	Yes	52 (13.7%)	99 (26.1%)	229 (60.3%)	0.551
	No	238 (14.9%)	446 (27.9%)	914 (57.2%)	
Level of education	Illiterate	3 (33.3%)	1 (11.1%)	5 (55.5%)	0.220
	University	219 (13.9%)	437 (27.8%)	917 (58.3%)	
	Below university	68 (17.2%)	107 (27%)	221 (55.8%)	
Marital status	Single	115 (11.4%)	315 (31.1%)	583 (57.6%)	0.001
	Married	152 (17.3%)	211 (24%)	518 (58.8%)	
	Widowed, Separated, Divorced	23 (27.4%)	19 (22.6%)	42 (50%)	
Current employment status	Working	98 (13.9%)	183 (26%)	424 (60.1%)	0.001
	Unemployment	64 (15.6%)	114 (27.9%)	231 (56.5%)	
	Student	70 (10.3%)	207 (30.6%)	400 (59.1%)	
	Retired	58 (31%)	41 (21.9%)	88 (47.1%)	
Work in medical field	Yes	14 (5.9%)	71 (30%)	152 (64.1%)	0.001
	No	276 (15.9%)	474 (27.2%)	991 (56.9%)	
Totally monthly household income	Insufficient income	65 (16.9%)	126 (32.8%)	193 (50.3%)	0.001
	Sufficient income	114 (14.6%)	177 (22.7%)	489 (62.7%)	
	Middle income	111 (13.6%)	242 (29.7%)	461 (56.6%)	
Chronic disease	Yes	241 (68.3%)	103 (29.2%)	9 (2.5%)	0.001
	No	49 (3%)	442 (27.2%)	1134 (69.8%)	
Psychological disease	Yes	38 (35.2%)	38 (35.2%)	32 (29.6%)	0.001
	No	252 (13.5%)	507 (27.1%)	1111 (59.4%)	
Get COVID-19 infection	Yes	45 (16.9%)	79 (29.6%)	143 (53.6%)	0.297
	No	245 (14.3%)	466 (27.2%)	1000 (58.4%)	
Contact with confirmed case of COVID-19	Yes	111 (14.3%)	214 (27.6%)	451 (58.1%)	0.934
	No	179 (14.9%)	331 (27.5%)	692 (57.6%)	

Abbreviation: QOL: Quality of life
Chi-square test used to compare between variables

In the social relationship domain, 60.6% of the participants who had a chronic disease had significantly poor QoL compared with only 5.6% who did not (p=0.001). In addition, there was a relationship between poor QoL and psychological illness (p=0.001). In the social relationship domain, there were significant relationships between it and age and BMI (p-values of 0.001 and 0.001, respectively). No association was found between COVID-19 infection/contact with a confirmed case of COVID-19 and poor QoL (p-values of 0.220 and 0.837, respectively) (Table 5).

Both psychological disease and history of chronic disease showed a significant relation with poor QoL in the environment domain (p=0.001). A significant association was noticed for age/BMI and the environment domain (p-values of 0.001 and 0.001, respectively) (Table 5).

Table 5: Social relationships Domain compared to Demographic data

		Poor QOL	Moderate QOL	Good QOL	P value
Gender	Male	110 (13.1%)	150 (17.8%)	582 (69.1%)	0.001
	Female	195 (17.2%)	290 (25.5%)	651 (57.3%)	
Residency	Western Region	232 (16.2%)	320 (22.3%)	881 (61.5%)	0.094
	Southern Region	15 (12.1%)	25 (20.2%)	84 (67.7%)	
	Eastern Region	20 (13%)	41 (26.6%)	93 (60.4%)	
	Central Region	33 (14.8%)	38 (17%)	152 (68.2%)	
	Northern Region	5 (11.4%)	16 (36.4%)	23 (52.3%)	
Nationality	Saudi	295 (15.6%)	418 (22.1%)	1177 (62.3%)	0.516
	Non - Saudi	10 (11.4%)	22 (25%)	56 (63.6%)	
Smoker	Yes	54 (14.2%)	90 (23.7%)	236 (62.1%)	0.641
	No	251 (15.7%)	350 (21.9%)	997 (62.4%)	
Level of education	Illiterate	3 (33.3%)	0 (0%)	6 (66.7%)	0.123
	University	233 (14.8%)	363 (23.1%)	977 (62.1%)	
	Below university	69 (17.4%)	77 (19.4%)	250 (63.1%)	
Marital status	Single	130 (12.8%)	232 (22.9%)	651 (64.3%)	0.002
	Married	152 (17.3%)	194 (22%)	535 (60.7%)	
	Widowed, Separated, Divorced	23 (27.4%)	14 (16.7%)	47 (56%)	
Current employment status	Working	104 (14.8%)	148 (21%)	453 (64.3%)	0.001
	Unemployment	64 (15.6%)	103 (25.2%)	242 (59.2%)	
	Student	78 (11.5%)	156 (23%)	443 (65.4%)	
	Retired	59 (31.6%)	33 (17.6%)	95 (50.8%)	
Work in medical field	Yes	20 (8.4%)	60 (25.3%)	157 (66.2%)	0.006
	No	285 (16.4%)	380 (21.8%)	1076 (61.8%)	
Totally monthly household income	Insufficient income	72 (18.8%)	102 (26.6%)	210 (54.7%)	0.011
	Sufficient income	108 (13.8%)	173 (22.2%)	499 (64%)	
	Middle income	125 (15.4%)	165 (20.3%)	524 (64.4%)	
Chronic disease	Yes	214 (60.6%)	110 (31.2%)	29 (8.2%)	0.001
	No	91 (5.6%)	330 (20.3%)	1204 (74.1%)	
Psychological disease	Yes	42 (38.9%)	29 (26.9%)	37 (34.3%)	0.001
	No	263 (14.1%)	411 (22%)	1196 (64%)	
Get COVID-19 infection	Yes	50 (18.7%)	53 (19.9%)	164 (61.4%)	0.220
	No	255 (14.9%)	387 (22.6%)	1069 (62.5%)	
Contact with confirmed case of COVID-19	Yes	117 (15.1%)	169 (21.8%)	490 (63.1%)	0.837
	No	188 (15.6%)	271 (22.5%)	743 (61.8%)	

Abbreviation: QOL: Quality of life
Chi-square test used to compare between variables

Discussion

The study assessed the QoL among the adult population during COVID-19 in Saudi Arabia. The main objective was to investigate the possible differences in QoL related to both demographic and pandemic-specific factors, with particular attention to the physical, psychological, social, and environmental domains of QoL. Despite some of the limitations of online studies, our study's finding provides useful insight into the effects of the COVID-19 pandemic on the QoL and its associated factors. Our results showed several significant differences in QoL levels related to the relevant variables.

According to gender, women reported significantly poorer QoL than men in all the domains (physical, psychological, social, and environment). By contrast, a study conducted in Italy revealed significant results in all the domains except the social domain]15[. This contradicts a Saudi Arabian study that showed an overall increased risk of lower QoL in men]16[.

Regarding the level of education, no significant results were observed in any of the domains. However, the Italian study showed poor QoL in students at both the university level and below]15[.

Regarding marital status, single people reported better QoL in all the domains, while widowed, separated, and divorced individuals had poorer QoL.
Concerning employment status, retired individuals demonstrated the poorest QoL compared with workers, the unemployed, and students. On the contrary, in the literature, unemployed individuals before the pandemic and people who lost their job during the pandemic reported a decrease in QoL]15,16[.

On the contrary, those who work in the medical field had good QoL compared to people outside the medical field. Health care workers have reliable information about the pandemic and know how to deal with such situations.

Concerning the influence of chronic disease on QoL, our results showed significantly lower QoL in people with a chronic illness, which is consistent with the findings of previous studies]16,17[. However, an Italian study found no significant result]15[. This finding can be described by the urgency of medical care that could be difficult to provide to people with chronic diseases during the COVID-19 pandemic.

Limitations

When interpreting the results, the following limitations must be considered. Age was not included in the analysis. Considering the online survey, the outcome of the result was not distributed equally through the five regions of the Kingdom; moreover, the online survey was based on a self-rating test rather than clinical assessment, despite that being the best method to collect data during the COVID-19 pandemic and lockdown. We are unaware of any studies that have assessed QoL before the COVID-19 pandemic in the general Saudi population; thus, two measurement comparisons were missing (before and during the pandemic).

Conclusion

The COVID-19 pandemic has affected QoL in many aspects. Overall, women, university and below students; widowed, separated, and divorced people; the retired; people not working in the medical field; and people with a chronic disease reported poor QoL during the COVID-19 pandemic and lockdown in Saudi Arabia. For those people, certain measures should be initiated. There needs to be more attention and more accessibility to public health in line with the Saudi vision 2030, which provides a healthy life for any individuals living in the Kingdom.

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