World Family Medicine Journal
incorporating the Middle East Journal of Family Medicine

ISSN 1839-0188

December 2023 - Volume 21, Issue 11

A plea for peace

Editorial

Original Contribution

Review

Population and Community Studies

Editorial

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

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

This is the last issue this year that was a good year for the journal and we all feel sad for all the innocent people being killed in the conflict in the region and for the death of journalists and members of the healthcare teams and children , women and elderly. Let us hope for a peaceful solution for the conflict in the near future and let us hope for a peaceful MENA region in the future.

Alshehri, et al., attempted to determine the prevalence and determinants of self-medication practices among attendants of primary healthcare centers (PHCCs). A data collection sheet was constructed for data collection, which comprised participants' personal features and self-medication practices. About one-third of participants practiced self-medication during the last year, mostly 1-3 times (22.5%). The main motive toward self-medication was a previous positive personal experience with the medication (31.4%), while the main complaint was having minor ailments (41.5%). Analgesics were mainly sought (47.9%), with pharmacists being the main advice providers (50.2%). The condition of 70.7% improved after self-medication. Self-medication was significantly more practiced by older participants (p=0.028), males (p=0.016), Saudis (p=0.001), and both illiterate and university-educated participants than others (p=0.018). It was also significantly influenced by participants' occupation, being highest among retired participants (100%). The authors concluded that Self-medication is commonly practiced in Abha City, mainly due to having prior experience. It is mainly practiced when having a minor ailment. Analgesics are the most frequently purchased drugs for self-medication. Pharmacists are the main source of advice for self-medication. Determinants of more practice of self-medication include older age, male gender, Saudi nationality, and educational level.

Dr Alghamdi looked at the Pleomorphic Adenoma Review of Surgical Management with a focus on histopathological aspects. He stressed that Salivary gland tumors account for 6% of all head and neck tumors. In about 80% of the cases, tumors arise in the Parotid gland. 80% of parotid gland tumors are benign. Pleomorphic adenoma is the most common Salivary gland tumor overall (50-70 %) and accounts for about 80% of all benign tumors. Though benign in nature, Pleomorphic Adenoma can in rare cases give benign metastasis and they harbor malignancy transformation. The primary treatment is Surgical removal, but this can be extremely challenging in some cases because of unusual localization or extensive growth extremely challenging

Alkhaywani et al., did a cross sectional study to explore patients' perspectives regarding the reasons why some less urgent, or non-urgent patients prefer to attend emergency departments (EDs) instead of using other more appropriate healthcare services. The study obtained and analyzed emergency attendance data from King Khalid Hospital, Najran City. A study questionnaire was designed by the researcher to interview 400 ED patients, who inappropriately attended the ED to identify the reasons for their inappropriate attendance to the ED. The interviews were conducted with the non-urgent and less urgent patients during their waiting times. The age of 18.3% of patients were <30 years old, while 28.5% were 30-39 years old. More than half of the participants' visits were non-urgent, while 43.25% were less-urgent, 55.3% of patients visited the ED before due to similar complaints, and 46% visited a primary health care center before their ED visits. The main reasons for visiting the ED instead of the primary healthcare center (PHCC) were to save time (49.3%) and to get an earlier appointment (48%). Patients' triage levels differed significantly according to their age groups (p<0.001), nationality (p=0.022), educational level (p=0.022), marital status (p=0.002), ED visits due to similar complaints (p<0.001), and previously visiting the PHCC for the current health problem (p=0.002). Triage levels also differed significantly according to some reasons for choosing to go to the ED instead of the PHCC, especially to get an earlier appointment (p=0.044), preferring the healthcare services provided by the ED (p=0.005), having a nearby ED (p=0.001), or being at the

hospital at that time (p=0.002). The authors concluded that there is a clear relationship between inappropriate ED visits and certain associated factors, indicating that prevention would be best targeted to certain categories, such as Saudi, younger, and educated patients. The main reasons for inappropriate ED visits are to save time and to avoid getting a late appointment.

Alshareef et al., did a systematic review looking at the Knowledge and attitude towards chronic musculoskeletal pain treated with osteopathy, a systematic review. Chronic pain is a common clinical feature that accompanies osteopathy. Knowledge and attitudes of both patients and their treating clinicians would influence the patients' outcomes and pain control. The following step was reviewing the appearing results to ensure that they were original research articles that examined the knowledge and attitudes about chronic musculoskeletal pain with osteopathy. All the eligible studies should mention the type of participants examined (either patients or clinicians). A total of 89 studies were obtained. After removing review articles and choosing original research studies solely, 11 studies appeared from the filtration process. Eight research articles were eligible. All the included studies had a quantitative cross-sectional design. Only health care professionals were asked about osteopathy, where all the studies included osteopaths from different countries, except one study that included physiotherapists. Osteopaths knew about the benefits of osteopathy, particularly for lower back pain; however, their knowledge about biopsychosocial factors requires improvement. The authors concluded that Knowledge about osteopathy benefits for controlling chronic musculoskeletal pain should be improved even among osteopaths. Awareness campaigns are also needed for patients in orthopedic and physiotherapy clinics about osteopathy.

Helvaci, et al., looked at Atherosclerotic background of cirrhosis. They studied 222 males and 212 females with similar mean ages (30.8 vs 30.3 years, p>0.05, respectively). Beside cirrhosis (8.1% vs 1.8%, p<0.001), smoking (23.8% vs 6.1%, p<0.001), alcohol (4.9% vs 0.4%, p<0.001), transfused red blood cells (RBCs) in their lives (48.1 vs 28.5 units, p=0.000), disseminated teeth losses (5.4% vs 1.4%, p<0.001), ileus (7.2% vs 1.4%, p<0.001), chronic obstructive pulmonary disease (COPD) (25.2% vs 7.0%, p<0.001), leg ulcers (19.8% vs 7.0%, p<0.001), digital clubbing (14.8% vs 6.6%, p<0.001), coronary heart disease (CHD) (18.0% vs 13.2%, p<0.05), chronic renal disease (CRD) (9.9% vs 6.1%, p<0.05), and stroke (12.1% vs 7.5%, p<0.05) were all higher, and autosplenectomy (50.4% vs 53.3%, p<0.05) and mean age of mortality were lower in males, significantly (30.2 vs 33.3 years, p<0.05). the authors concluded that the hardened RBCs-induced capillary endothelial damage initiates at birth, and terminates with multiorgan failures even at childhood. Parallel to cirrhosis, all of the atherosclerotic risk factors or consequences including smoking, alcohol, disseminated teeth losses, ileus, COPD, leg ulcers, digital clubbing, CHD, CRD, and stroke were higher, and autosplenectomy and mean age of mortality were lower in males which can not be explained by effects of smoking and alcohol alone at the relatively younger mean age. So autosplenectomy may be a good whereas male gender alone may be a bad prognostic factor, and cirrhosis may have an atherosclerotic background in the SCDs.

Al-Qahtani1; et al ., did a cross-sectional descriptive study was conducted among 189 mothers in Aseer Region, using a self-administered online questionnaire to assess the knowledge, and practices of mothers on child weaning in the Asir region. Nearly two-thirds of the participants were aware of the terms: weaning, diet, or complementary food (65.1%). Most of the participants (87.3%) knew the nutritional requirements. There was a non-significant relationship between knowledge of mothers and their sociodemographic characteristics (e.g., their level of education, and socioeconomic condition). More than two-thirds of the participants (71.4%) preferred breastfeeding their children associated with semi-solid food during the 6– 9-month period. The majority of the participants (74.6%) initiated weaning with thin-consistent food. There was a significant relationship between the reason for feeding before six months and mothers' socioeconomic condition (P <0.05). the authors concluded that Mothers' knowledge and practices were good. There are no significant relationships between mothers' knowledge level with weaning and sociodemographic characteristics. There was a significant relationship between the reason for feeding before six months and the socioeconomic condition.

Dr Bahjat, wrote an opinion piece that discussed the current conflict in Gaza. While the bombing of Gaza and the resulting loss of civilians continues, I urge the international community to stop the war now, protect civilians (including health-care workers), lift the 16-year blockade on Gaza immediately, and allow international aid to enter Gaza to support the health-care system that has already collapsed.

Patient's Perspective for their Non-Urgent Presentations to the Emergency Department in Najran City

Faisal Hussein Alkhaywani [1]; Ali Yahia Ali Alsalah [2]; Hassan Yahia Ali Alsalah [3]; Ali Muhammad Yahya Al-Khaiwani [4]; Tareq Husain Alqanas [5]; Ali Naser Almurdef [6]; Saud Daghman Hussain Al daghman [7]; Hamad Mahdi Ali Al Zaman [7]; Atheer Abdullah Alqarni [8]

(1) Staff Nurse, Emergency Department, King Khalid Hospital, Najran City, Saudi Arabia
(2) Social Worker Staff, Social Work Department, New Najran General Hospital, Najran City, Saudi Arabia
(3) Epidemiological Monitoring Technician, Public Health Department, New Najran General Hospital, Najran City, Saudi Arabia
(4) Staff Nurse. North Fahd District Health Center. King Khalid Hospital, Najran City, Saudi Arabia
(5) Head Nurse, Nursing Specialist, Endoscopy Department, King Khalid Hospital, Najran City, Saudi Arabia
(6) Ali Naser Almurdef, Nursing Specialist, Endoscopy Department, King Khalid Hospital, Najran City, Saudi Arabia
(7) Staff Nurse, Medical Surgery Department, King Khalid Hospital, Najran City, Saudi Arabia
(8) Intern, Clinical Pharmacy, King Khalid University, Abha City, Saudi Arabia

Corresponding author
Faisal Hussein Alkhaywani
Email: ffffx666@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Faisal Hussein Alkhaywani et al. Patient's Perspective for their Non-Urgent Presentations to the Emergency Department in Najran City. World Family Medicine. December 2023; 21(11): 6-15. DOI: 10.5742/MEWFM.2023.95256218

Abstract

Aim of Study: To explore patients' perspectives regarding the reasons why some less urgent, or non-urgent patients prefer to attend emergency departments (EDs) instead of using other more appropriate healthcare services.

Methods: This study followed a quantitative cross-sectional design. The study obtained and analyzed emergency attendance data from King Khalid Hospital, Najran City. A study questionnaire was designed by the researcher to interview 400 ED patients, who inappropriately attended the ED, to identify the reasons for their inappropriate attendance to the ED. Data collection was performed during the period of two months (November-December, 2022) to explore the proportions of different attendances that were deemed inappropriate according to the hospital's followed triage system. The interviews were conducted with the non-urgent and less urgent patients during their waiting times.

Results: The age of 18.3% of patients were <30 years old, while 28.5% were 30-39 years old. More than half of the participants' visits were non-urgent, while 43.25% were less-urgent, 55.3% of patients visited the ED before due to similar complaints, and 46% visited a primary health care center before their ED visits. The main reasons for visiting the ED instead of the primary healthcare center (PHCC) were to save time (49.3%) and to get an earlier appointment (48%). Patients' triage levels differed significantly according to their age groups ($p<0.001$), nationality ($p=0.022$), educational level ($p=0.022$), marital status ($p=0.002$), ED visits due to similar complaints ($p<0.001$), and previously visiting the PHCC for the current health problem ($p=0.002$). Triage levels also differed significantly according to some reasons for choosing to go to the ED instead of the PHCC, especially to get an earlier appointment ($p=0.044$), preferring the healthcare services provided by the ED ($p=0.005$), having a nearby ED ($p=0.001$), or being at the hospital at that time ($p=0.002$).

Conclusions: There is a clear relationship between inappropriate ED visits and certain associated factors, indicating that prevention would be best targeted to certain categories, such as Saudi, younger, and educated patients. The main reasons for inappropriate ED visits are to save time and to avoid getting a late appointment.

Recommendations: This study emphasized the importance of implementing proper health education and redirecting patients with inappropriate ED visits. Conducting a detailed analysis of the shortages in the utilization of primary healthcare resources is a pressing necessity. Further nationwide studies on patients' perspective for non-urgent ED presentations are largely needed.

Key Words: Emergency Department, Triage, Quantitative Research, Najran City, Saudi Arabia.

Introduction

Emergency departments (EDs) constitute an integral service for healthcare systems worldwide. They provide immediate point-of-access care for urgent medical conditions and injuries. However, overcrowding at EDs may result in increasingly stressed staff and ineffectively provided emergency services. This often leads to increased patient waiting times, treatment delays, impaired access, economic losses, and unethical consequences (1).

Emergency Department crowding is an important patient safety concern and a global public health problem. Many countries report significant and unsustainable increases in emergency presentations. A growing number of studies have found that these increases cannot be explained by population growth alone (2).

The use of emergency departments by non-urgent patients has become an important public health problem. Several studies showed that more than half of emergency visits are not urgent. This undesirably affects the quality of the provided patient care and lowers the satisfaction of both the patients and the staff in the emergency department (3).

Patients' conditions become classified according to standard triage categories. The main purpose of triage is to distinguish non-urgent patients, increase the quality of care for actual urgent patients, and allow urgent cases to become immediately managed. On the other hand, non-urgent patients become evaluated in fast-track units and are taken to the waiting room to be examined in their turn. In the EDs, emergency physicians have to work as if in polyclinics (4).

In Saudi Arabia, ED services are increasingly needed. However, triage practice is not fully standardized, and in some MOH EDs, formal triage is not applied, while others have individually followed several Western systems of triage. These triage systems include the Australian Triage Scale, the Emergency Severity Index, and the Canadian Emergency Department Triage and Acuity Scale, which is widely implemented at tertiary centers (5).

In Saudi Arabia, the lack of a standardized triage system in EDs constitutes many problems, from the confusion regarding who should be seen first to how resources should be distributed. Moreover, there is a growing demand for emergency services, mainly due to the steady population growth, and the inappropriate use of its services. Previous reports estimated that over half of the patients attending EDs in Saudi Arabia are patients with primary care or non-urgent problems. Therefore, the identification of the reasons why some patients unjustifiably attend emergency departments instead of using more appropriate other healthcare services is expected to improve patient safety and promote better and more efficient access to ED services (6).

There is a gap in the current research, as most studies have concentrated on data from hospitals and postal questionnaires (3), rather than patients' reasons for attendance. Moreover, the results of this study are expected to provide important information to health administrators on the magnitude of inappropriate use of emergency departments and how to address this administrative problem.

This study aimed to explore patients' perspectives regarding the reasons why some less urgent, or non-urgent patients prefer to attend emergency departments instead of using other more appropriate healthcare services.

Methodology

This study followed an exploratory cross-sectional design. The research obtained and analyzed emergency attendance data from one large hospital in Najran City for a period of the last 3 years, identifying the proportions of different attendances that were deemed as appropriate (i.e., resuscitation, emergent, or urgent) or inappropriate (less urgent or non-urgent) according to the hospital's followed triage system.

The researchers purposively selected the largest tertiary care hospital in Najran City (i.e., King Khalid Hospital), which receives the largest number of ED patients in Najran City.

Based on the review of relevant literature, the researcher designed a structured interview questionnaire for data collection (3; 7). It included patients' sociodemographic characteristics and the ED visit characteristics.

The researcher conducted a pilot study on 20 ED patients to test the data collection tool. The time needed to fill the questionnaire and its wording was assessed to be about 5 minutes. Based on the findings of the pilot study, the final version of the questionnaire was reached.

This study included adult patients (aged above 18 years) who inappropriately attended the ED (less, and non-urgent cases). Children (aged <18 years) and those with higher emergency levels (resuscitation, emergent, and urgent cases) were excluded.

Following a convenience sampling, the researcher consecutively interviewed 400 patients who inappropriately attended the ED and had been triaged as less urgent or non-urgent, during all three shifts (morning, evening, and night) to identify the reasons for their inappropriate attendance to the ED. The researchers visited the study hospital daily to conduct face-to-face interviews with ED patients using the study questionnaire. All interviews were conducted with the patients during their waiting times.

Quantitative data were collected from the hospital record system using existing coding. Collected data were coded and then entered and analyzed using the Statistical Package for Social Sciences (IBM, SPSS, version 25).

Descriptive statistics (frequency and percentage for qualitative variables in addition to mean and standard deviation for quantitative variables) were calculated. Cross-tabulation using X^2-test was used to measure the association between variables. P-values less than 0.05 were considered statistically significant.

Results

Table (1) shows that the age of 18.3% of patients were less than 30 years old, while 28.5% were 30-39 years old, 33.3% were 40-49 years old and 20% were 50 years old or more.

Figure (1) shows that 56.75% of participants' ED visits were non-urgent (Level V), while 43.25% were less-urgent visits (Level IV).

Table (2) shows that 55.3% of patients visited the ED before due to similar complaints, while 46% visited a primary health care center before their visit to the ED.
Table (3) shows that the main reasons for visiting the ED instead of the PHCC were to save time (49.3%), to get an earlier appointment for healthcare (48%), prefer to receive healthcare services at the ED (15.8%), living near an emergency department (14.2%) and visiting the hospital for another reason at that time (12.3%).

Table (4) shows that patients' triage levels differed significantly according to their age groups ($p<0.001$), with the highest non-urgent prevalence among younger patients aged less than 30 years. Saudi patients visited the ED for non-urgent reasons significantly more than non-Saudi patients ($p=0.022$). Moreover, university-educated patients visited the ED for non-urgent reasons significantly more than less educated patients ($p=0.022$). In addition, single patients visited the ED for non-urgent reasons significantly more than married, divorced, or widowed patients ($p=0.002$). However, triage levels did not differ significantly according to patients' gender or employment status.

Table (5) shows that patients' triage levels differed significantly according to previously visiting the ED due to similar complaints ($p<0.001$), with non-urgent visits being higher among those who did not visit the ED before. Moreover, patients' triage levels differed significantly according to previously visiting the PHCC for the current health problem ($p=0.002$), with non-urgent visits being higher among those who have not visited the PHCC before.

Table (6) shows that patients' triage levels differed significantly according to some reasons for choosing to go to the ED instead of the PHCC, especially to get an earlier appointment ($p=0.044$), preferring the healthcare services provided by the ED ($p=0.005$), having a nearby ED ($p=0.001$), or being at the hospital at that time ($p=0.002$). However, triage levels did not differ significantly according to patients' choice to save time.

Table 1: Personal characteristics of participant patients

Personal Characteristics	No.	%
Age (in years)		
• <30	73	18.3
• 30-39	114	28.5
• 40-49	133	33.3
• 50+	80	20.0
Gender		
• Males	227	56.8
• Females	173	43.3
Nationality		
• Saudi	334	83.5
• Non-Saudi	66	16.5
Educational level		
• Illiterate	31	7.8
• School	94	23.5
• University	275	68.8
Employment		
• Student	17	4.3
• Retired	7	1.8
• Private	160	40.0
• Government	135	33.8
• Unemployed/Housewife	81	20.3
Marital status		
• Single	53	13.3
• Married	270	67.5
• Divorced	55	13.8
• Widow	22	5.5

Table 2: Previous visits to emergency departments or PHC centers by participant patients

Patients' previous visits	No.	%
A previous visit to the ED due to similar complaints		
• Yes	221	55.3
• No	179	44.8
A previous visit to a PHCC for the current health problem		
• Yes	184	46.0
• No	216	54.0

Table 3: Patients' perspectives regarding the reasons for visiting the Emergency Department instead of the primary healthcare center

Patients' Perspectives †	No.	%
To save time	197	49.3
To get an earlier appointment	192	48.0
I prefer ED healthcare services	63	15.8
ED is nearby to me	57	14.2
Being at the hospital at that time	49	12.3

† More than one choice is possible

Figure 1: Participant patients' emergency levels

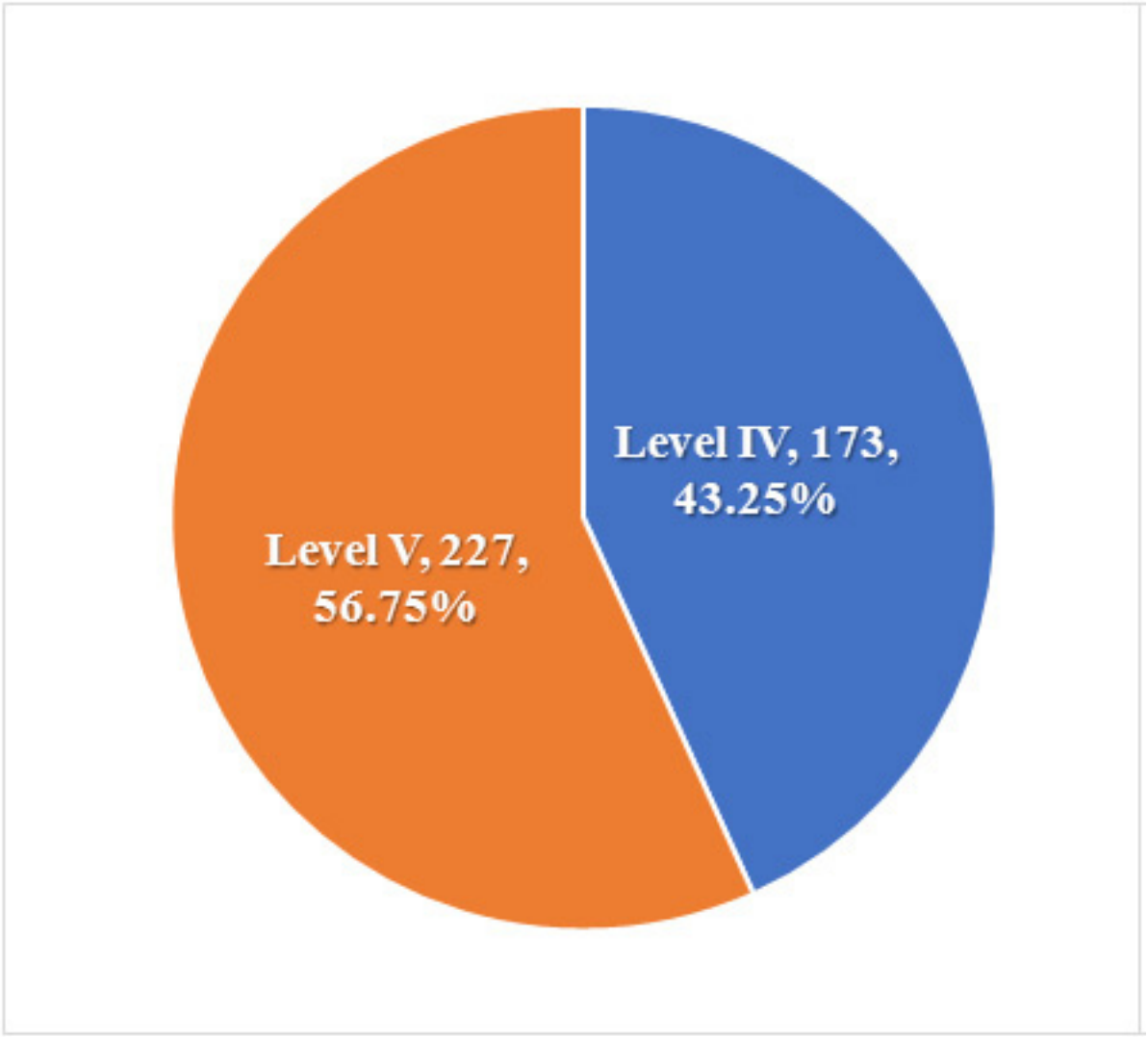


Table 4: Patients' triage levels according to their personal characteristics

Personal Characteristics	Less urgent (Level IV)		Non-urgent (Level V)		P Value
	No.	%	No.	%	
Age (in years)					
• <30	15	20.5	58	79.5	
• 30-39	47	41.2	67	58.8	
• 40-49	64	48.1	69	51.9	<0.001
• 50+	47	58.8	33	41.3	
Gender					
• Males	98	43.2	129	56.8	
• Females	75	43.4	98	56.6	0.971
Nationality					
• Saudi	136	40.7	198	59.3	
• Non-Saudi	37	56.1	29	43.9	0.022
Educational level					
• Illiterate	20	64.5	11	35.5	
• School	51	54.3	43	45.7	0.001
• University	102	37.1	173	62.9	
Employment					
• Student	4	23.5	13	76.5	
• Retired	4	57.1	3	42.9	
• Private	66	41.3	94	58.8	0.394
• Government	62	45.9	73	54.1	
• Unemployed/Housewife	37	45.7	44	54.3	
Marital status					
• Single	12	22.6	41	77.4	
• Married	120	44.4	150	55.6	
• Divorced	26	47.3	29	52.7	0.002
• Widow	15	68.2	7	31.8	

Table 5: Patients' triage levels according to their previous visits to emergency departments or primary healthcare centers

Patient's previous visits	Less urgent (Level IV)		Non-urgent (Level V)		P Value
	No.	%	No.	%	
To ED due to similar complaints					
• Yes	119	53.8	102	46.2	
• No	54	30.2	125	69.8	<0.001
To a PHCC for the same health problem					
• Yes	95	51.6	89	48.4	
• No	78	36.1	138	63.9	0.002

Table 6: Patients' triage levels according to their perspectives regarding the reasons for visiting the Emergency Department instead of the PHC center

Patients' Perspectives	Less urgent (Level IV)		Non-urgent (Level V)		P Value
	No.	%	No.	%	
To save time					
• Yes	81	41.1	116	58.9	
• No	92	45.3	111	54.7	0.396
To get an earlier appointment					
• Yes	93	48.4	99	51.6	
• No	80	38.5	128	61.5	0.044
I prefer ED healthcare services					
• Yes	17	27.0	46	73.0	
• No	156	46.3	181	53.7	0.005
ED is nearby to me					
• Yes	36	63.2	21	36.8	
• No	137	39.9	206	60.1	0.001
Being at the hospital at that time					
• Yes	11	22.4	38	77.6	
• No	162	46.2	189	53.8	0.002

Discussion

It has been shown that more than half of the requests for healthcare services at EDs were completely non-urgent (8). This leads to unnecessary overcrowding at the ED, prolonged waiting times, decreased quality of received patient care, increased risk of medication errors, increased morbidity, excess deaths, and increased patient dissatisfaction (9).

Emergency services at Saudi governmental hospitals are frequently over-utilized for non-emergency cases (10). Therefore, the present study aimed to explore patients' perspectives regarding the reason why some less urgent, or non-urgent patients prefer to attend emergency departments instead of using other more appropriate healthcare services.

This study included 400 patients who non-urgently visited the ED in King Khalid Hospital in Najran City. More than half of the patients (56.75%) were non-urgent (Level V), while 43.25% were less-urgent patients (Level IV). Such inappropriate ED visits can impede the ability of ED physicians to timely and safely treat emergency patients. Therefore, non-urgent patients may hinder access to urgent cases and have a negative impact on staff attitudes (11).

There is wide variability in the magnitude of non-urgent visits to EDs, mainly due to the varying definitions and the subjective nature of measuring the ED visit appropriateness. Internationally, 24-40% of all ED visits are inappropriate (12).

Taype-Huamaní et al. (13) noted that the demands for attention in EDs have been rapidly progressive. However, the group that is growing the most is that of the less urgent patients (Level IV), i.e., those who make inappropriate use of the EDs. For several decades, healthcare providers in developed countries have claimed that up to 55% of the visits to EDs are for non-urgent complaints, which are more suitable for primary healthcare.

The majority of our patients who visited the ED in King Khalid Hospital in Najran City were Saudi (83.5%), males (56.8%), married (67.5%), aged 30-49 years (61.8%), university-educated (68.8%), and employed (73.7%). Moreover, the comparison between non-urgent and less-urgent patients revealed that non-urgent patients were significantly more than less-urgent among younger patients (aged <30 years), significantly more among Saudi than non-Saudi patients, among university-educated than less-educated patients, and among single than married, divorced, or widowed patients.

In Jeddah City, Alabbasi et al. (10) found that among ED patients visiting King Abdullah Medical Complex, 65% were less urgent, while 9.9% were non-urgent. Males constituted 62.5% of the ED patients and their mean age (±SD) was 31.7±16.0 years. In Riyadh City, Alnasser et al. (14) found that 56.4% of ED patients in King Abdullah Bin Abdul-Aziz University Hospital were classified as less-urgent, and 5% were non-urgent. Most of the non-urgent patients were females. There was no significant sex difference between less-urgent and non-urgent patients, but less-urgent patients were significantly younger than non-urgent patients (interquartile ranges: 12-38 vs. 22-41

years, respectively, p<0.001); having more single patients (56.6% vs. 48.2%, respectively, p<0.001), and more Saudi patients (91.3% vs. 80.9%, respectively, p<0.001).

In Sweden, Backman et al. (15) found that non-urgent ED patients were mainly females, aged 35-49 years, married, and mostly high-school or university-educated. Moreover, a study of ED use in the UK found that 78% of ED attendances were quite avoidable (16). Moreover, in the USA, several studies have shown that 30% to 50% of non-urgent conditions visit the ED (17). In Peru, Taype-Huamaní et al. (13) reported that non-urgent ED patients were mainly females, those who live within families, and with high school or university qualifications.

Similar to our findings, McHale et al. (18) reported that males were more likely to attend inappropriately than females. However, females are more likely to visit ED inappropriately than males as reported by Carret et al. (12) and Oktay et al. (19). This variation may reflect differences in the definition of inappropriate ED presentation or differences in the structure and use of healthcare services among countries.

Tsai et al. (20) found that the mean age of non-urgent ED patients in Taiwan was 37.4 years. Similarly, Gentile et al. (21) reported that the mean age of French non-urgent ED patients was 36.3 years. Likewise, in Turkey, Idil et al. (3) reported that the mean age of non-urgent patients was 38.4 years.

McHale et al. (18) noted that patients' age has a strong relationship with their inappropriate ED presentation. Inappropriate presentations were high among the mid-twenties, followed by a steady decrease as age increased thereafter. Therefore, findings suggest that interventions to prevent inappropriate presentations should be targeted toward those in their mid-twenties. This may be achieved through targeted education about the proper use of ED services, or by providing details of other local healthcare services that provide prompt medical advice on when to access primary care and out-of-hours services available. The peak in odds of inappropriate presentations seen in the late twenties could reflect their poor understanding regarding the proper use of ED services, lack of knowledge of other health services available, and poor access to primary care.

The present study revealed that more than half of the participants have visited the ED before due to similar complaints, while 46% visited a primary health care center before they visited the ED. Patients' main perspectives regarding the reasons for visiting the ED instead of the PHCC were to save time, to get an earlier appointment for healthcare, prefer the ED to receive healthcare, live nearby to an ED emergency department, and be at the hospital for any other reason. Non-urgent visits were significantly higher among those who did not visit the ED before. Moreover, non-urgent visits were significantly higher among those who came directly to the ED without a previous visit to the PHCC. Moreover, patients' triage levels differed significantly according to patients' perspectives regarding visiting the ED or the PHCC, especially to obtain an earlier appointment, preferring the healthcare services provided by the ED, having a nearby ED, or being at the hospital at that time.

These findings be explained by that younger patients would presumably have less self-health knowledge and/or have no prior experience of their current reason for attending, and therefore do not know if their condition was urgent or not.

Al-Nozha et al. (22) reported that half of the medical directors in Riyadh City, KSA, complained that ED overcrowding is a major problem due to inappropriate ED visits. The current healthcare system in Saudi Arabia has identified a considerable rise in the number of ED visits, leading to a considerable increase in lengths of waiting times for ED patients, which ultimately leads to ED overcrowding (5).

Morley et al. (2) warned that the negative consequences of ED crowding include poorer patient outcomes and the inability of staff to adhere to guideline-recommended treatment. Moreover, overcrowding may compromise patient care and is one of the most challenging problems facing EDs every day.
Bezzina et al. (23) argued that an avoidable part of the increased overcrowding in EDs is induced by patients with non-urgent problems who refer themselves are unlikely to require admission and are more suitable for other services, at primary healthcare centers. Moreover, Khattab et al. (5) emphasized that, in modern healthcare systems, overcrowding and poor hospital flow are intolerable. Therefore, data-driven, evidence-based policies are needed.

McHale et al. (18) noted that primary care services are frequently insufficient to manage the demand for health treatment and require modification to reduce the burden on ED. Uscher-Pines et al. (17) stressed that, ideally, need should be the major determinant of healthcare utilization; however, a non-urgent ED visit occurs when care is sought at an ED that could have been handled in a primary care setting.

For the management of inappropriate ED visits, the solutions should be directed at the introduction of whole-of-system initiatives to meet timed patient disposition targets, as well as extended hours of primary care, with system-wide solutions tailored to address identified patients' perspectives (2). Developing and targeting interventions to reduce or manage levels of these inappropriate presentations should be a pressing necessity. As a first step, it is necessary to gain a good understanding of the perspectives of patients who are most likely to present inappropriately, and why such attendances are most likely to occur (18).

Although there have been several attempts to reduce the occurrence of non-urgent visits (e.g., by providing a primary care service in EDs), inappropriate visits to EDs remain a burden on ED services (18). An effective method of addressing inappropriate ED presentation included

the provision of primary healthcare physicians either alongside emergency physicians in the ED itself or attached to the ED in general surgery practice. This has been intended to provide alternative options for what is considered inappropriate ED attendance (24).

It is to be noted that both the Saudi "National Transformation Program 2020" and the "Saudi Vision 2030" plans have identified problems with the current healthcare system, including the heavy burden faced by the EDs, and have proposed targets for improving access to and quality of healthcare in the KSA, especially primary and preventive care. These plans have identified problems with the current healthcare system, including the burden faced by EDs, and have proposed targets for improving access to and quality of healthcare in the KSA, particularly primary and preventative care (5).

Study Strengths and Limitations

This study contributes to evidence-based decisions to minimize inappropriate emergency attendance and reduce costs. The results of the present study are expected to help policymakers and administrators in the Saudi Ministry of Health to improve provided emergency healthcare services. Our study provides insight into the magnitude of the ED inappropriate attendance problem and its solution. Moreover, patient identified perspectives will provide healthcare administration with a clear identification of problems in the primary healthcare system that encourage patients to make inappropriate short-cut ED visits. Moreover, to the researcher's knowledge, this study is the first in Saudi Arabia to explore patient perspectives regarding their inappropriate visits to emergency departments. However, a few study limitations are to be considered. First, this study followed a cross-sectional research design, which is good for hypothesis generation, rather than hypothesis testing (25). Moreover, data collection regarding patients' perspectives was completely subjective. In addition, the study included a single site, i.e., King Khalid Hospital in Najran City.

In conclusion, there is a clear relationship between inappropriate ED visits and certain associated factors, e.g., patients' age, nationality, and education indicating that prevention would be best targeted to certain categories, such as Saudi, younger, educated patients. Patients stated main reasons for their inappropriate ED visits are to save time and to avoid getting a late appointment. Therefore, it is important to implement proper health education and to redirect patients with inappropriate ED visits. Moreover, it is important to conduct a detailed analysis of the shortages in the utilization of primary healthcare resources which is a pressing necessity as well as to raise the public's awareness regarding the negative consequences of inappropriate visits to emergency departments.

References

1. Mohr, N.M.; Wessman, B.T.; Bassin, B.; Elie-Turenne, M.C.; Ellender, T.; Emlet, L.L.; et al. (2020). Boarding of Critically Ill Patients in the Emergency Department. Crit Care Med. , 48(8): 1180–1187. doi: 10.1097/CCM.0000000000004385.
2. Morley, C.; Unwin, M.; Peterson, G.M.; Stankovich, J.; & Kinsman L. (2018). Emergency department crowding: A systematic review of causes., consequences and solutions. PLoS ONE, 13(8): e0203316. https://doi.org/10.1371/journal.pone.0203316.
3. Idil, H., Kilic., T.Y., Toker., I., Turan., K.D., & Yesilaras., M. (2018). Non-urgent adult patients in the emergency department: Causes and patient characteristics. Turkish Journal of Emergency Medicine 18:71-74.
4. Yancey, C.C. & O'Rourke, M.C. (2021). Emergency Department Triage. StatPearls [Internet]. Website: Emergency Department Triage - StatPearls - NCBI Bookshelf (nih.gov). Accessed on May 1st., 2022.
5. Khattab, E.; Sabbagh, A.; Aljerian, N.; Binsalleeh, H, Almulhim, M, Alqahtani, A et al. (2019). Emergency medicine in Saudi Arabia: a century of progress and a bright vision for the future. International Journal of Emergency Medicine; 12:16.
6. Aljohani, M.S. (2017). Emergency department triage in Saudi Arabia: towards a standardised national triage system. Medicine. DOI:10.4225/03/5894008D94B97. Corpus ID: 201151173. Website: [PDF] Emergency department triage in Saudi Arabia: towards a standardised national triage system | Semantic Scholar. Accessed on 2/3/2022.
7. Arafat, A.; Al-Farhan, A.; & Abu Khalil, H. (2016). Implementation of the Canadian Emergency Department Triage and Acuity Scale (CTAS) in an Urgent Care Center in Saudi Arabia. International Journal of Emergency Medicine 2016; 9:17.
8. Read, J.G.; Varughese, S.; & Cameron PA. (2014). Determinants of non-urgent Emergency Department attendance among females in Qatar. Qatar Med J., 16:98e105.
9. Di Somma S., Paladino L., Vaughan L., Lalle I., Magrini L., Magnanti M. Overcrowding in emergency department: an international issue. Intern Emerg Med. 2015; 10(2): 171–5.
10. Alabbasi K.; Kruger E.; Tennant, M. (2021). Evaluation of Emergency Health-Care Initiatives to Reduce Overcrowding in a Referral Medical Complex., Jeddah., Saudi Arabia. Saudi J Health Syst Res, 1:134–139. DOI: 10.1159/000517487.
11. Durand., A.C., Palazzolo., S., Tanti-Hardouin., N., Gerbeaux., P., Sambuc., R., Gentile., S. (2012). Non-urgent patients in emergency departments: rational or irresponsible consumers? Perceptions of professionals and patients. BMC Res Notes 2012; 5:525-533.
12. Carret, M., Fassa A., Kawachi, I. (2007). Demand for emergency health service: factors associated with inappropriate use. BMC Health Serv Res, 7:131.

13. Taype-Huamaní, W.; De la Cruz-Rojas, L.; Miranda-Soler, D.; & Amado-Tineo, J. (2020). Characteristics of the non-urgent demand in the emergency service of a social security hospital in Peru. Rev. Fac. Med. Hum, 20(1):20-26. DOI 10.25176/RFMH.v20i1.2544.
14. Alnasser, S.; Alharbi M.; Alibrahim AA.; Al Ibrahim AA.; Kentab O.; Alassaf W.; et al. Analysis of Emergency Department Use by Non-Urgent Patients and Their Visit Characteristics at an Academic Center. International Journal of General Medicine 2023:16 221–232.
15. Backman, A-S.; Blomqvist, P.; Lagerlund, M.; Carlsson-Holm, E.; & Adami, J. (2008). Characteristics of non-urgent patients. Cross-sectional study of emergency department and primary care patients. Scandinavian Journal of Primary Health Care, 26: 181-187.
16. Harris, M.J., Patel, B., & Bowen, S. (2011). Primary care access and its relationship with emergency department utilisation: an observational., cross-sectional., ecological study. Br J Gen Pract, 61:e787–e793.
17. Uscher-Pines, L.; Pines, J.; Kellermann, A.; Gillen, E.; & Mehrotra, A. (2013). Emergency department visits for nonurgent conditions: systematic literature review. Am J Manag Care; 19(1):47–59.
18. McHale, P.; Wood, S.; Hughes, K.; Bellis, M.A.; Demnitz, U. & Wyke, S. (2013). Who uses emergency departments inappropriately and when - a national cross-sectional study using a monitoring data system. BMC Medicine., 11:258.
19. Oktay, C.; Cete, Y.; Eray, O.; Pekdemir, M.; & Gunerli, A, (2003). Appropriateness of emergency department visits in a Turkish university hospital. Croat Med J, 44:585–591.
20. Tsai, J.C.H.; Liang, Y.W.; & Pearson, W.S. (2010). Utilization of emergency department in patients with non-urgent medical problems: patient preference and emergency department convenience. J Formos Med Assoc., 109:533e542.
21. Gentile S., Vignally, P., Durand, A.C., Gainotti, S., Sambuc R., Gerbeaux, P. (2010). Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res, 10(1):66.
22. Al-Nozha, M.M.; Abdullah, M.; Arafah, MR.; Khalil, M.Z.; Khan, N.B.; Al-Mazrou, Y.Y.; et al. (2007). Hypertension in Saudi Arabia. Saudi Med J., 28(1):77–84.
23. Bezzina, A.J., Smith, P.B., Cromwell, D., & Eagar, K. (2005). Primary care patients in the emergency department: Who are they? A review of the definition of the 'primary care patient' in the emergency department. Emerg Med Australas., 17:472–479.
24. Bosmans., J.E., Boeke., A.J., van Randwijck-Jacobze., M.E., Grol., S.M., Kramer., M.H., van der Horst., H.E., van Tulder., M.W. (2012). Addition of a general practitioner to the accident and emergency department: a cost-effective innovation in emergency care. Emerg Med J., 29:192–196.
25. Wang, X.; & Cheng, Z. (2020). Cross-Sectional Studies: Strengths., Weaknesses., and Recommendations. Chest, 158(1): S65-S71.

Prevalence and Determinants of Self-medication among Attendants of Primary Health Care Centers in Abha City, Saudi Arabia

Ali MH Alshehri[1], ; Hassan MH AlShehri[2],; Amer MH Alshehri [3], Salem MH Alshehri [4]; Saeed Doos S. Almontashri [5]; Saad Abdullah Algarni [1], Dafer Abdullah Alshehri [6] Khalid Hassan Alasmri [7]

1) SBFM, Family Medicine Consultant, Medical Consultation Center, Abha City, Ministry of Health, Saudi Arabia
2) SBFM, Family Medicine Consultant, National Guard Hospital, Riyadh City, Saudi Arabia
3) SBFM, Family Medicine Consultant, Muhayel Primary Healthcare Center, Aseer Region, Saudi Arabia
4) BDS, Primary Healthcare Center, General Health Directorate, Bisha City, Saudi Arabia
5) Family Medicine Consultant, Health Programs Administration, Ministry of Health, Saudi Arabia
6) MBBS, General Practitioner, Abha Health Sector, Ministry of Health, Saudi Arabia
7) **Pharma D,** Intern, College of Pharmacy, King Khalid University, Abha, City, Saudi Arabia

Corresponding Author
Dr. Ali MH Alshehri
Email: Proph.ali@hotmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Ali MH Alshehri et al. Prevalence and Determinants of Self-medication among Attendants of Primary Health Care Centers in Abha City, Saudi Arabia. World Family Medicine. December 2023; 21(11): 16-25.
DOI: 10.5742/MEWFM.2023.95256225

Abstract

Objectives: To determine the prevalence and determinants of self-medication practices among attendants of primary healthcare centers (PHCCs) in Abha City, Saudi Arabia.

Methods: The researchers interviewed 400 patients attending Al-Numees PHCC. A data collection sheet was constructed for data collection, which comprised participants' personal features and self-medication practices.

Results: About one-third of participants practiced self-medication during the last year, mostly 1-3 times (22.5%). The main motive toward self-medication was a previous positive personal experience with the medication (31.4%), while the main complaint was having minor ailments (41.5%). Analgesics were mainly sought (47.9%), with pharmacists being the main advice providers (50.2%). The condition of 70.7% improved after self-medication. Self-medication was significantly more practiced by older participants (p=0.028), males (p=0.016), Saudis (p=0.001), and both illiterate and university-educated participants than others (p=0.018). It was also significantly influenced by participants' occupation, being highest among retired participants (100%).

Conclusions: Self-medication is commonly practiced in Abha City, mainly due to having prior experience. It is mainly practiced when having a minor ailment. Analgesics are the most frequently purchased drugs for self-medication. Pharmacists are the main source of advice for self-medication. Determinants of more practice of self-medication include older age, male gender, Saudi nationality, and educational level.

Key Words: Self-medication; prevalence; primary health care.

Introduction

Every day people throughout the world act on their own for their health; they practice self-care. Most people hold the view that medicines should be used in the event of any sickness or discomfort(1). Therefore, human beings have an inherent tendency to use medications for self-medication(2).

Alhomoud et al.(3) noted that self-medication denotes obtaining medicines without having a prescription, buying medicines based on a previous prescription, or sharing medicines with others. It also includes using leftover medicines for the treatment of self-diagnosed symptoms or diseases(4).

Self-medication mainly encourages an individual to look after minor ailments with simple and effective remedies (5). It is a part of the larger frame of self-care (6). It can be described as obtaining and consuming drugs without the advice of a physician either for diagnosis, or treatment (2).

The World Health Organization (WHO) stressed the role of self-care through the "Health for All by the Year 2000" initiative, which was applied in several countries, including the Kingdom of Saudi Arabia (7).

Medicines for self-medication are called non-prescription medicines or "over-the-counter" (OTC) medicines. They are more common in some developing countries, where pharmacies easily supply prescription medicines without having a prescription. However, these practices also exist in developed countries, where dispensing of medicines is strictly regulated (8).

Optimal therapy with OTC medicines requires that consumers diagnose the underlying condition correctly and use the medicine in a manner that minimizes risk. This is possible only if consumers have some basic knowledge about the medicine, its appropriate use, adverse drug reactions, precautions, and contraindications. They should know when to seek further medical attention and when not to self-medicate (9).

Covington stated that of the 3.5 billion health problems treated in the USA annually, 57% were treated with a non-prescription drug (10). In the United Kingdom, about 50% of health care services take place within the field of self-medication. Al-Freihi et al., in Saudi Arabia, drew attention to the potential for drug misuse due to the lack of adherence to this regulation governing the dispensing of drugs by community pharmacies (11). Therefore, there is a pressing need to provide adequate information to consumers so that they choose the right medicine for a particular illness to gain benefits from self-medication.

This study aimed to determine the prevalence and motives for self-medication practices among PHC patients in Abha City, Saudi Arabia.

Methods

Following a cross-sectional design, this study was conducted during January-March, 2017 at "Al-Numees" PHCC, Abha City, in the southwestern region of Saudi Arabia.

Following a consecutive sample, 400 attendants were interviewed. The inclusion criteria were being an attendant of Al-Numees PHCC, aged 18 years or more. The exclusion criteria were the inability to communicate (e.g., mental retardation, major speech or hearing problems).

Based on a thorough review of the literature, the researchers constructed a data collection sheet (in a simple Arabic Language). It comprised the following parts:

1- Personal characteristics: Age, gender, residence, nationality, occupation, marital status, and highest attained educational level.

2- Self-medication practice: Receiving a medication without being prescribed by a physician for a health problem within the last year, the reason for that, type of medication, the person who advised the medication, outcome, and source of medication information.

The validity of the study tool was assessed by three consultants of Family Medicine. Moreover, the researchers conducted a pilot study on 20 subjects to check the wording, clarity, and reliability of responses to the questions. The results of the pilot study helped in re-phrasing, adding, or omitting some questions. Collected data within the pilot study were excluded from the main study.

Ethical approval permission was obtained in December 2016 from the King Khalid College of Medicine Institutional Research Board (IRB). Prior to the interview, potential participants were briefed by the researcher as regards study objectives. They were assured that no harm is expected to occur if they decide to participate in this study and their participation is absolutely optional. They were also assured of the full anonymity and confidentiality of their responses. Their verbal consent to participate was obtained.

The Statistical Package for Social Sciences (IBM-SPSS version 25.0) was used for the statistical analysis of collected data. Descriptive statistics (e.g. number, percentage) and hypothesis testing (i.e., $\chi 2$) were applied. P-values <0.05 were considered as statistically significant.

Results

Table (1) shows that the age group of most participants was 20-40 years (76%), 68% were females and 88.8% were Saudi. Participants' highest attained educational level was mainly a university degree in 42.5%, secondary level in 35.5%, while 3% were illiterate. Around one-quarter of participants were governmentally employed (28.5%) or students (24.8%). About one-third (34.5%) were not working (unemployed or housewives). Most participants were married (72.8%).

Table (2) and Figure (1) show that almost one third of participants practiced self-medication during the last year (30.2%). Most of them practiced self-medication 1-3 times (22.5%), mainly because of a previously positive personal experience with a medication (31.4%), for which the patient developed trust (17.4%) and having no time to waste by prolonged waiting times at clinics (17.4%), or due to difficult transportation (14%). Moreover, 10.7% of participants justified their practice by their lack of confidence towards their PHC physicians, or that service hours at the PHCC are not suitable (9.1%). Analgesics and anti-dyspepsia were the main drugs bought for self-medication (47.9% and 32.2%, respectively), followed by antipyretics and nasal decongestants (16.5% and 15.7%, respectively).

Table (3) shows that the main complaints for self-medication were having minor ailments (41.5%), followed by dyspepsia (27.5%), having a skin disease (10.5%), joint or muscle pain (7.9%), toothache (7.9%) or colic (4.8%). Most participants' conditions (70.7%) improved after self-medication. However, the condition deteriorated in 7%, while there was no change in 22.3%.

Table (4) shows that pharmacists constituted the main source of advice (50.2%). Physicians were the source for 24% of participants, followed by family members (13.1%), friends (11.8%), or neighbours (0.9%).

Table (5) shows that self-medication was significantly more practiced by older participants (p=0.028), more by males than females (38.3% vs. 6.5%, respectively, p=0.016), and more by Saudi than non-Saudi (33% vs. 8.9%, respectively, p=0.001). It was significantly more practiced by both illiterate and university-educated participants than others (p=0.018). Self-medication practices were also significantly influenced by participants' occupation, being highest among retired participants (100%). Self-medication practices were not significantly associated with participants' marital status.

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Age groups (in years)		
• <20 years	52	13.0
• 20-40 years	304	76.0
• >40 years	44	11.0
Sex		
• Males	128	32.0
• Females	272	68.0
Nationality		
• Saudi	355	88.8
• Non-Saudi	45	11.3
Education level		
• Illiterate	12	3.0
• Primary	16	4.0
• Intermediate	60	15.0
• Secondary	142	35.5
• University	170	42.5
Occupation		
• Unemployed/housewife	138	34.5
• Governmental	114	28.5
• Private	21	5.3
• Military	23	5.8
• Retired	5	1.3
• Student	99	24.8
Marital status		
• Single	92	23.0
• Married	291	72.8
• Divorced	6	1.5
• Widow	11	2.8

Table 2: Frequency and percentage of self-medication practices within the last year

Self-medication practices	No.	%
• No	279	69.8
• Yes:	121	30.2
• 1-3 times	90	22.5
• More than three times	31	7.7
Main reasons for self-medication:		
• Previous personal experience	38	31.4
• I trust my medical knowledge	21	17.4
• To save time by sparing long waiting times	21	17.4
• Difficult transportation	17	14.0
• No confidence toward PHC physicians	13	10.7
• Service hours at PHCC are not suitable	11	9.1
Main types of self-medications		
• Analgesic	58	47.9
• Anti-dyspepsia	39	32.2
• Antipyretic	20	16.5
• Nasal decongestant	19	15.7
• Anti-diarrheal	12	9.9
• Antihistamines	12	9.9
• Vitamins	10	8.3
• Antitussive/expectorant	9	7.4

Figure 1: Frequency and percentage of self-medication within the last year

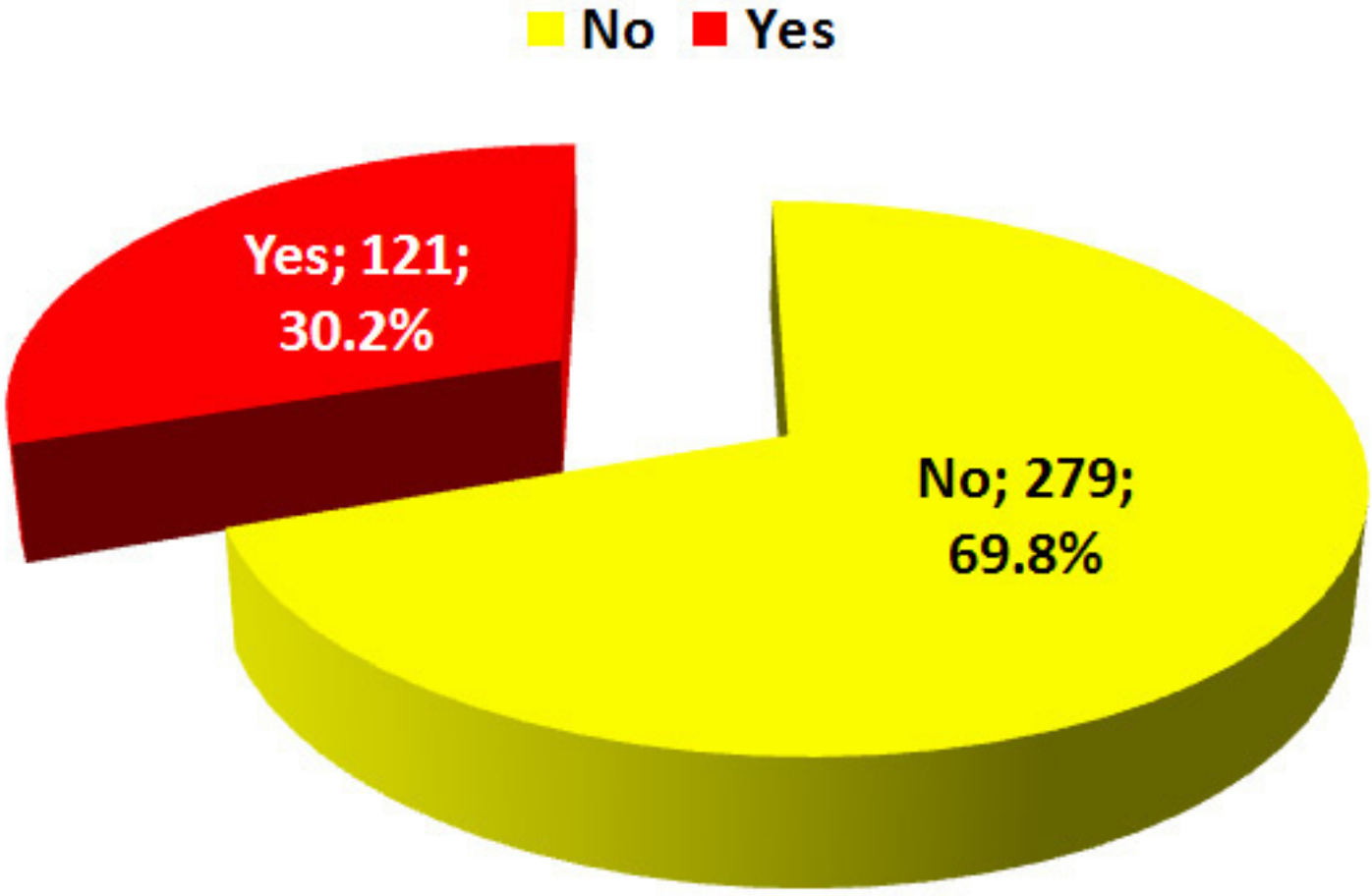


Table 3: Main complaints of participants who practiced self-medication (1), and the outcome of self-medication (n=229)

Complaints and Outcome	No.	%
Complaints for self-medication:		
• Minor ailments[2]	95	41.5
• Dyspepsia	63	27.5
• Skin diseases	24	10.5
• Joint or muscle pain	18	7.9
• Toothache	18	7.9
• Colic	11	4.8
Outcome of self-medication:		
• Improved	162	70.7
• Deteriorated	16	7.0
• No change	51	22.3

(1) Participants were allowed to mention more than one complaint
(2) Minor ailments include: diarrhea, cough, sore throat, mild fever, or headache

Table 4: Main sources of advice for self-medication in each complaint (n=229)

Sources of advice	No.	%
Pharmacist	115	50.2
Physician	55	24.0
Family member	30	13.1
Friend	27	11.8
Neighbor	2	0.9

Table 5: Practice of self-medication according to personal characteristics of participants

Personal Characteristics	No (n=279)		Yes (n=121)		p-value
	No.	%	No.	%	
Age groups (in years)					
<20 years	44	84.6	8	15.4	
20-40 years	208	68.4	96	31.6	
>40 years	27	61.4	17	38.6	0.028†
Sex					
Males	79	61.7	49	38.3	
Females	200	73.5	72	26.5	0.016†
Nationality					
Saudi	238	67.0	117	33.0	
Non-Saudi	41	91.1	4	8.9	0.001†
Education					
Illiterate	7	58.3	5	41.7	
Primary	13	81.3	3	18.8	
Intermediate	50	83.3	10	16.7	
Secondary	103	72.5	39	27.5	
University	106	62.4	64	37.6	0.018†
Occupation					
Unemployed/housewife	99	71.7	39	28.3	
Governmental	75	65.8	39	34.2	
Private	16	76.2	5	23.8	
Military	18	78.3	5	21.7	
Retired	0	0.0	5	100.0	
Student	71	71.7	28	28.3	0.015†
Marital status					
Single	69	75.0	23	25.0	
Married	197	67.7	94	32.3	
Divorced	3	50.0	3	50.0	
Widow	10	90.9	1	9.1	0.156

† Statistically significant

Discussion

Our results indicated that self-medication is a common practice among attendants of PHCCs in Abha City. Almost one-third of participants practiced self-medication during the previous year.

This is quite alarming, in view of the possible hazards associated with such practice. This finding confirms the previously published reports that self-medication is widespread among the Saudi general population (12). This finding is in agreement with those reported by several studies. In Riyadh City, Alghanim found that, over a period of two weeks before his survey, 35.4% of respondents used self-medication (13).

However, studies conducted in different parts of the world varied in their estimation of the percentage of patients who practice self-medication, with prevalence rates ranging from 13% to 92% (14). In China, Bi et al.(15) reported that 32.5% of the population practice self-medication. In Pokhara Valley, Western Nepal, Shankar et al.(16) reported that 59% had taken some form of self-medication during the preceding six months. In Ethiopia, Solomon and Abebe reported that the prevalence of self-medication was 27.6% (17). A rate of 85% was reported by Omolase et al.(18) among patients attending the General Outpatient Clinic in Nigeria.

Alghanim explained this wide range in self-medication practices by the variable definitions of self-medication, employed methodologies, their cultures, and health care systems (13).

Our study indicated that the main motives for practicing self-medication were positive past experiences with the medication, for which the patient developed trust, to avoid long waiting times outside the doctor's clinic, difficult transportation, lack of confidence towards PHC physicians (10.7%), or unsuitable PHCC service hours.

These findings are in accordance with those of Alghanim, who stated that four health-related variables (perceived health status, presence of chronic illness, perceived

access to healthcare, and satisfaction with health care) have significant independent associations with the practice of self-medication (13).

Several studies have revealed that different factors may influence self-medication, including lack of patient satisfaction with the healthcare provider, and high cost of drugs (14). Yousef et al.(19) noted that the common reasons for self-medication in Amman, Jordan were the long waiting time to be seen by the doctors; avoiding the high cost of doctors' visits; and having ailments that are too minor to be cared for by a doctor.

Fuentes et al.(20) in Chile and Balbuena et al.(21) in Mexico reported that respondents who had difficulties in accessing healthcare facilities were more likely to practice self-medication. In Ethiopia, previous experience and the non-seriousness of the illness were the two major reasons for self-medication(22).

In Saudi Arabia, Alghanim stated that several reasons were stated by respondents for self-medication, which include: lack of time to attend health facilities, long waiting times to be seen by the doctor, and to save the cost of consultations (13). He stressed that these findings raise a number of questions related to the availability of, and accessibility relevant to the whole PHC system, i.e., the working hours of the PHC facilities, the waiting times, and patients' perception regarding the quality of provided health services.

Our study revealed that the main complaint for self-medication practice was having minor ailments, followed by dyspepsia and skin disease. These findings are in agreement with those of Solomon and Abebe in Ethiopia; (17) and Jaquier et al. (23), in France, who reported that the commonest illnesses that led to self-medication were minor ailments (e.g., headache, mild fever, cough, and diarrhea).

The present study indicated that analgesics were the main drug sought for self-medication (47.9%), followed by anti-dyspepsia (32.2%), antipyretics (16.5%), antihistamines (9.9%), vitamins (8.3%), and antitussive/expectorant (7.4%).

In Ethiopia, Abay and Amelo reported that the most common drugs for self-care were paracetamol (46.3%), followed by antacids (12.2%), anti-helminths (10.9%), antibiotics (4.8%), and antimalarials (3.7%)(24). In Nepal, antimicrobials were commonly used for self-medication (16).

Our study showed that pharmacists constituted the main source for participants' information and advice about self-medications, followed by the physician. Similarly, Alghanim indicated that about 80% of respondents who reported using self-medication declared that the pharmacist was their major source of both provision of self-medication and information (13).

This is not surprising, since, except for a very limited number of drugs, it is possible for any individual in Saudi Arabia to buy any drug products over-the-counter without the need to have a prescription. This is probably due to the lack of regulations enforcement regarding drug dispensing.

These findings are consistent with those reported from other neighboring countries, such as Sudan, (25), and Palestine, (7) which confirmed that pharmacies in these countries play a major role in the wide prevalence of self-medication among the population. In Jordan, Yousef et al.(19) added that patients' choice of non-prescription medication was based on advice received from pharmacy staff, friends/relatives, or informal advice from other health professionals. Alternatively, patients used to select medications according to their previous experience with similar symptoms or diseases.

Raynor et al.(26) stated that pharmacists might play a more active role in helping educate patients, especially since a large number of people do not pay attention to written information provided with medicines. The role of the pharmacists is mainly seen as that of a drug salesman rather than that of a healthcare provider.

Therefore, patient education and awareness campaigns are necessary to promote the role of the pharmacist, particularly since pharmacists can play an active role in the provision of drug information. In view of the wide spectrum of drugs that are available over the counter, it is vital that pharmacists assume this role after appropriate training and with continuing professional development programs.

The poor contribution of physicians in the provision of health education on proper self-medication and self-care has been explained by Alghanim, who found that doctors were the least persuasive source of information about self-medication since many people have the strong impression that doctors do not approve of self-medication (13).

Our study revealed that 70.7% of participants' condition improved after self-medication. However, the condition deteriorated in 7% while there was no change in 22.3%. This finding reveals two important points. The first is that self-medication is a type of self-care, if properly practiced improvement of the health condition can occur. The second is that those who practice self-medication should be fully aware of their medication condition and the action as well as the expected side effects of the medication they take. Hence, health education of the public is an important preliminary strategy to avoid the possible hazards of self-medication.

This study revealed that self-medication was significantly more practiced by older participants and significantly more by males than females. Self-medication was significantly more practiced by Saudi than non-Saudi patients. It was significantly more practiced by both illiterate and university-educated participants than others. Self-medication

practices were also significantly influenced by participants' occupations, being highest among retired participants.

Differences in self-medication practices according to nationality may be explained by differences in socioeconomic levels. The fact that non-Saudis working in Saudi Arabia have lower incomes than Saudis explains the significantly lower practices of self-medication among non-Saudis.

Wazaify et al. (27) stated that self-care choices vary according to gender, age, and socioeconomic status. In Ireland, females report buying OTC medicines more often than males, and younger more often than older adults do.

In Kuwait, Abahussain et al.(12) reported that self-medication increased with age. This may be due to children becoming more aware of their health needs as they grow older. Males also use more products for muscular pain, which may be explained by the fact that they tend to do more physical activities, which often result in sprains and injuries. Shankar et al. (24) added that the better socioeconomic status of men, their better earning power, and their higher educational level are probably among the reasons. Also in Khartoum, Sudan, Awad et al. (25) reported that the level of education of patients has an impact on the practice of self-medication.

In Jordan, Yousef et al. (19) reported that patients' age was the only factor that influenced the extent of self-medication, where patients younger than 16 years and those older than 60 years were less likely to self-treat. This may be because children and the elderly were perceived as more liable to the adversity of self-medication.

In Germany, Du and Knopf found that the higher the socioeconomic status of the family, or the higher the educational level of participants, the more the practice of self-medication (28). However, in Japan, Aoyama et al.(29) found interesting age differences in practicing self-medication. Younger adults were less likely to see a doctor because of the high medical costs, while elderly adults were less likely to see a doctor due to the lack of transportation.

Alghanim(13) stated that gender had a significant independent association with self-medication practices. Until recently, women in Saudi Arabia were not permitted to drive a car and many do not leave home without a male escort. Accordingly, they were less likely to seek medicine from sources, such as private pharmacies. He added that satisfaction with the quality of provided healthcare services is an important determinant of health resource utilization. Patients who were dissatisfied with the quality of PHC services were more likely to practice self-medication. An individual's decision to use a particular source of healthcare involves many factors related to sociodemographic characteristics, illness type, and severity, perceived health status, the range and accessibility of therapeutic options available, and their perceived efficacy (13).

Study limitations

Several limitations should be considered while probing the results of this study. Respondents were asked to report on their self-medication practices over a period of the past 12 months. So, the problems associated with recall bias should be taken into consideration. Moreover, the findings of this study were based on self-reported data and therefore are totally subjective.

Conclusions

Based on findings of the present study it is concluded that self-medication is commonly practiced in Abha City. The main reason for practicing self-medication is having a prior personal experience with the medication. Self-medication is mainly practiced when complaining of a minor ailment, with analgesics being the most frequently bought drugs. Pharmacists are the main source of advice for self-medication and information about medications. Some cases deteriorate after self-medication. The determinants of more practice of self-medication include older age, male gender, Saudi nationality, illiteracy or high literacy.

Therefore, it is recommended that physicians at primary health care facilities should provide health education on proper self-medication and self-care to attendants. The Ministry of Health should focus on ensuring that people have adequate and easy access to primary health care facilities. The working hours of the primary health care facilities should be organized to suit their clients. Waiting times at health care facilities should be minimized. The perception of patients toward provided quality of health services should be improved. Enforcement of regulations regarding drug handling and dispensing. To conduct more research about the prevalence, determinants, effectiveness and side-effects of self-medication in Saudi Arabia.

References

1- Abraham N, Jewkes R, Mvo Z. Indigenous healing practices and self-medication among pregnant women in Cape Town, South Africa. Afr J Reprod Health.2002; 6:79-86.

2- Hughes CM, McElnay JC, Fleming GF. Benefits and risks of self-medication. Drug Saf 2001; 24:1027–37. doi: 10.2165/00002018-200124140-00002.

3- Alhomoud F, Aljamea Z, Almahasnah R, Alkhalifah K, Basalelah L, Alhomoud FK. Self-medication and self-prescription with antibiotics in the Middle East - do they really happen? A systematic review of the prevalence, possible reasons, and outcomes. International Journal of Infectious Diseases, 2017; 57: 3–12. doi: 10.1016/j.ijid.2017.01.014.

4- Mahzari YI, Aldhfyan YM, Aldossary AM, Alghamdi EA, Alsubaie ML, Aldossari MA. Self-Medication in Saudi Arabia-A Cross Sectional Study. International Journal of Medical Research & Health Sciences, 2019; 8(2):79-85.

5- Major C, Vincze Z, Mesko A, Balogh J, Zelkó R, Németh E. Medicating outside the consulting room. Orv Hetil.2007; 148:291-8. DOI: 10.1556/OH.2007.27754

6- Al-Qahtani MA, Amin HS, Al-Qahtani AA, Alshahrani AM, Alghamdi HA, Althwayee MS, Alzahrani AA. Self-medication with antibiotics in a primary care setting in King Khalid University Hospital, Riyadh, Saudi Arabia. J Fam Community Med 2018; 25:95-101. doi: 10.4103/jfcm.JFCM_124_17.

7- Sawalha AF. A descriptive study of self-medication practices among Palestinian medical and nonmedical university students. Research in Social and Administrative Pharmacy, 2008; 4:164–72. DOI: 10.1016/j.sapharm.2007.04.004

8- Bang S, Sontakke S, Thawani V. Pre and post-interventional pattern of self-medication in three common illnesses in staff of a tertiary hospital. Indian J Pharmacol.2011; 43(3): 275–7. doi: 10.4103/0253-7613.81517.

9- Bennadi D. Self-medication: A current challenge. J Basic Clin Pharm 2014; 5(1): 19–23. doi: 10.4103/0976-0105.128253.

10- Covington T. Self-care and non-prescription pharmacotherapy. In: Popovich NG, Allen LV Jr, Berardi RR, DeSimone EM II, et al (eds): Handbook of Nonprescription Drugs, ed 12. Washington, American Pharmaceutical Association, 2000, pp 1–14.

11- Al-Freihi, H, Ballal SG, Jaccarini, A, Young MS, Abdul-Cader Z, El-Mouzan M. Potential for drug misuse in the eastern province of Saudi Arabia. Anal. Saudi Med.1987; 7,301-5.

12- Azab AS. Public knowledge, attitude and practice towards antibiotics use in Riyadh city. Saudi Medical Journal, 2000, 21:784–5.

13- Alghanim SA. Self-medication practice among patients in a public health care system. Eastern Mediterranean Health Journal 2011;17(5):409-16.

14- Figueiras A, Caamano F, Gestal OJJ. Sociodemographic factors related to self-medication in Spain. Eur J Epidemiol 2000; 16(1):19-26. doi: 10.1023/a:1007608702063.

15- Bi P, Tong S, Parton KA. Family self-medication and antibiotic abuse for children and Juveniles in Chinese city. Soc Sci Med.2000;50(10):1445-50. DOI: 10.1016/s0277-9536(99)00304-4.

16- Shankar PR, Partha P, Shenoy N. Self-medication and non-doctor prescription practices in Pokhara valley, Western Nepal: a questionnaire-based study. BMC Fam Pract 2002;3:17. DOI: 10.1186/1471-2296-3-17.

17- Solomon W, Abebe GM. Practice of Self-medication in Jimma Town. Ethiop J Health Dev.2003;17(2):111-16

18- Omolase CO, Adeleke IOE, Afolabi AO, Afolabi OT. Self-medication amongst General Outpatients in a Nigerian Community Hospital. Annals of Ibadan Postgraduate Medicine.2007; 5(2):64-7. DOI: 10.4314/aipm.v5i2.64032.

19- Yousef AM, Al-Bakri AG, Bustanji Y, Wazaify M. Self-Medication Patterns in Amman, Jordan. Pharm World Sci, 2008; 30:24-30. DOI: 10.1007/s11096-007-9135-x.

20- Fuentes Albarran K, Villa Zapata L. Analysis and quantification of self-medication patterns of customers in community pharmacies in southern Chile. Pharmacy World and Science, 2008; 30:863–868.

21- Balbuena FR, Aranda AB, Figueras A. Self-medication in older urban Mexicans: an observational, descriptive, cross-sectional study. Drugs and Aging, 2009, 26:51–60. doi: 10.2165/0002512-200926010-00004.

22- Albarrán KF, Zapata LV. Analysis and quantification of self-medication patterns of customers in community pharmacies in southern Chile. Pharm World Sci.2008; 30:863–8. doi: 10.1007/s11096-008-9241-4.

23- Jaquier F, Buclin T, Diezi J. [Self-medication by the adolescent]. Schweiz med wochenschr.1998;128(6):203-7.

24- Abay SM, Amelo W. Assessment of Self-Medication Practices among Medical, Pharmacy and Health Science Students in Gondar University, Ethiopia. J Young Pharm.2010; 2(3): 306–10. DOI: 10.4103/0975-1483.66798

25- Awad A, Eltaved I, Matowe L, et al. Self-medication with antibiotics and antimalarials in the community of Khartoum State, Sudan. J Pharm Sci.2005; 8:326-31.

26- Raynor D, Blenkinsopp A, Knapp P, Grime J, Nicolson D, Pollock K, Spoor P. A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines. Health Tech Assess (Winchester, England) 2007;11:1–160. DOI: 10.3310/hta11050.

27- Wazaify M, Shields E, Hughes MC, McElnay CJ. Societal perspectives on over-the-counter (OTC) medicines. Fam Prac.2005; 22:170–6. DOI: 10.1093/fampra/cmh723.

28- Du Y, Knopf H. Self-medication among children and adolescents in Germany: results of the National Health Survey for Children and Adolescents (KiGGS) Brit J Clin Pharm.2009;68:599–608. doi: 10.1111/j.1365-2125.2009.03477.x.

29- Aoyama I, Koyama S, Hibino H. Self-medication behaviors among Japanese consumers: sex, age, and SES differences and caregivers' attitudes toward their children's health management. Asia Pac Fam Med.2012; 11(1):7. DOI: 10.1186/1447-056X-11-7.

Atherosclerotic background of cirrhosis in sickle cell diseases

Mehmet Rami Helvaci[1], Valeria Pappel[2], Kubra Piral[2], Asuman Caylar[3], Huseyin Sencan[1], Ramazan Davran[4], Mustafa Yaprak[1], Abdulrazak Abyad[5], Lesley Pocock[6]

(1)Specialist of Internal Medicine, MD, Turkey
(2) Manager of Writing and Statistics, Turkey
(3) Manager of Writing and Statistics, MD, Turkey
(4) Specialist of Radiology, MD, Turkey
(5) Middle-East Academy for Medicine of Aging, MD, Lebanon
(6) medi-WORLD International, Australia

Corresponding author:
Prof Dr Mehmet Rami Helvaci, MD
07400, ALANYA, Turkey
Phone: 00-90-506-4708759
Email: mramihelvaci@hotmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Helvaci MR et al. Atherosclerotic background of cirrhosis in sickle cell diseases. World Family Medicine. December 2023; 21(11): 26-39. DOI: 10.5742/MEWFM.2023.95256211

Abstract

Background: Sickle cell diseases (SCDs) are inborn and catastrophic processes on vascular endothelium, particularly at the capillaries.

Methods: All patients were included.

Results: We studied 222 males and 212 females with similar mean ages (30.8 vs 30.3 years, p>0.05, respectively). Beside cirrhosis (8.1% vs 1.8%, p<0.001), smoking (23.8% vs 6.1%, p<0.001), alcohol (4.9% vs 0.4%, p<0.001), transfused red blood cells (RBCs) in their lives (48.1 vs 28.5 units, p=0.000), disseminated teeth losses (5.4% vs 1.4%, p<0.001), ileus (7.2% vs 1.4%, p<0.001), chronic obstructive pulmonary disease (COPD) (25.2% vs 7.0%, p<0.001), leg ulcers (19.8% vs 7.0%, p<0.001), digital clubbing (14.8% vs 6.6%, p<0.001), coronary heart disease (CHD) (18.0% vs 13.2%, p<0.05), chronic renal disease (CRD) (9.9% vs 6.1%, p<0.05), and stroke (12.1% vs 7.5%, p<0.05) were all higher, and autosplenectomy (50.4% vs 53.3%, p<0.05) and mean age of mortality were lower in males, significantly (30.2 vs 33.3 years, p<0.05).

Conclusion: The hardened RBCs-induced capillary endothelial damage initiates at birth, and terminates with multiorgan failures even at childhood. Parallel to cirrhosis, all of the atherosclerotic risk factors or consequences including smoking, alcohol, disseminated teeth losses, ileus, COPD, leg ulcers, digital clubbing, CHD, CRD, and stroke were higher, and autosplenectomy and mean age of mortality were lower in males which can not be explained by effects of smoking and alcohol alone at the relatively younger mean age. So autosplenectomy may be a good whereas male gender alone may be a bad prognostic factor, and cirrhosis may have an atherosclerotic background in the SCDs.

Key words: Sickle cell diseases, hardened red blood cells, capillary endothelial damage, capillary endothelial edema, sudden deaths, atherosclerosis, cirrhosis

Introduction

Chronic endothelial damage may be the main underlying cause of aging and death by causing end-organ failures (1). Much higher blood pressures (BPs) of the afferent vasculature may be the chief accelerating factor by causing recurrent injuries on vascular endothelium. Probably, whole afferent vasculature including capillaries are mainly involved in the destructive process. Thus the term of venosclerosis is not as famous as atherosclerosis in the literature. Due to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic natures which eventually reduce blood flow to the terminal organs, and increase systolic and decrease diastolic BPs further. Some of the well-known accelerating factors of the harmful process are physical inactivity, sedentary lifestyle, animal-rich diet, smoking, alcohol, overweight, chronic inflammations, prolonged infections, and cancers for the development of terminal consequences including obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), chronic renal disease (CRD), stroke, peripheric artery disease (PAD), mesenteric ischemia, osteoporosis, dementia, early aging, and premature death (2, 3). Although early withdrawal of the accelerating factors can delay terminal consequences, after development of obesity, HT, DM, cirrhosis, COPD, CRD, CHD, stroke, PAD, mesenteric ischemia, osteoporosis, aging, and dementia-like end-organ insufficiencies, the endothelial changes can not be reversed due to their fibrotic natures, completely. The accelerating factors and terminal consequences of the harmful process are researched under the titles of metabolic syndrome, aging syndrome, and accelerated endothelial damage syndrome in the literature (4-6). Similarly, sickle cell diseases (SCDs) are highly destructive processes on vascular endothelium initiated at birth, and terminated with an advanced atherosclerosis-induced end-organ failures in much earlier ages of life (7, 8). Hemoglobin S causes loss of elastic and biconcave disc shaped structures of red blood cells (RBCs). Probably loss of elasticity instead of shape is the major problem because sickling is rare in peripheric blood samples of the patients with associated thalassemia minors (TMs), and human survival is not affected in hereditary spherocytosis or elliptocytosis. Loss of elasticity is present even at birth, but exaggerated with inflammations, infections, and emotional stress of the body. The sickled or just hardened RBCs-induced chronic endothelial damage, inflammation, edema, and fibrosis terminate with disseminated tissue hypoxia all over the body (9). As a difference from other causes of chronic endothelial damage, SCDs keep vascular endothelium particularly at the capillaries which are the actual distributors of the sickled or just hardened RBCs into the tissues (10, 11). The sickled or just hardened RBCs-induced chronic endothelial damage builds up an advanced atherosclerosis in much earlier ages of life. Vascular narrowings and occlusions-induced tissue ischemia and end-organ failures are the terminal results, so the life expectancy is decreased by 25 to 30 years for both genders in the SCDs (8).

Material and Methods

The clinical study was performed in Medical Faculty of the Mustafa Kemal University between March 2007 and June 2016. All patients of the SCDs were included. The SCDs are diagnosed with the hemoglobin electrophoresis performed by means of high performance liquid chromatography (HPLC). Smoking and alcohol habits, acute painful crises per year, transfused units of RBCs in their lives, leg ulcers, stroke, surgical operations, deep venous thrombosis (DVT), epilepsy, and priapism were learnt. Cases with a history of one pack-year were accepted as smokers, and one drink-year were accepted as drinkers. A complete physical examination was performed by the Same Internist, and patients with disseminated teeth losses (<20 teeth present) were detected. Patients with an acute painful crisis or any other inflammatory process were treated at first, and the laboratory tests and clinical measurements were performed on the silent phase. A check up procedure including serum iron, iron binding capacity, ferritin, creatinine, liver function tests, markers of hepatitis viruses A, B, and C, marker of human immunodeficiency virus, a posterior-anterior chest x-ray film, an electrocardiogram, a Doppler echocardiogram both to evaluate cardiac walls and valves, and to measure systolic BPs of pulmonary artery, an abdominal ultrasonography, a venous Doppler ultrasonography of the lower limbs, a computed tomography (CT) of brain, and a magnetic resonance imaging (MRI) of hips was performed. Other bones for avascular necrosis were scanned according to the patients' complaints. So avascular necrosis of bones was diagnosed via MRI (12). Associated TMs were detected with serum iron, iron binding capacity, ferritin, and hemoglobin electrophoresis performed via HPLC, becuase the SCDs with associated TMs show a milder clinic than the sickle cell anemia (SCA) (Hb SS) alone (13). Systolic BPs of the pulmonary artery of 40 mmHg or higher are accepted as pulmonary hypertension (PHT) (14). The criterion for diagnosis of COPD is a post-bronchodilator forced expiratory volume in one second/forced vital capacity of lower than 70% (15). Acute chest syndrome (ACS) is diagnosed clinically with the presence of new infiltrates on chest x-ray film, fever, cough, sputum, dyspnea, or hypoxia (16). An x-ray film of abdomen in upright position was taken in patients with abdominal distention or discomfort, vomiting, obstipation, or lack of bowel movement, and ileus is diagnosed with gaseous distention of isolated segments of bowel, vomiting, obstipation, cramps, and with the absence of peristaltic activity. CRD is diagnosed with a persistent serum creatinine level of 1.3 mg/dL or greater in males and 1.2 mg/dL or greater in females. Cirrhosis is diagnosed with physical examination, laboratory parameters, and ultrasonographic findings. Clubbing is diagnosed with the ratio of distal phalangeal diameter to interphalangeal diameter of greater than 1.0, and with the presence of Schamroth's sign (17, 18). An exercise electrocardiogram is performed in cases with an abnormal electrocardiogram and/or angina pectoris. Coronary angiography is performed for the cases with exercise electrocardiogram positivity. So CHD is diagnosed either angiographically or with the Doppler echocardiographic findings as movement

disorders in the cardiac walls. Rheumatic heart disease is diagnosed with the echocardiographic findings, too. Stroke is diagnosed by the CT. Sickle cell retinopathy is diagnosed with ophthalmologic examination in cases with visual complaints. Mann-Whitney U test, Independent-Samples t test, and comparison of proportions were the methods of statistical analyses.

Results

The study included 222 males and 212 females with similar ages (30.8 vs 30.3 years, p>0.05, respectively). Prevalences of associated TMs were similar in both genders, too (72.5% vs 67.9%, p>0.05, respectively). Smoking (23.8% vs 6.1%) and alcohol (4.9% vs 0.4%) were higher in males (p<0.001 for both) (Table 1). On the other hand, transfused RBCs in their lives (48.1 vs 28.5 units, p=0.000), disseminated teeth losses (5.4% vs 1.4%, p<0.001), COPD (25.2% vs 7.0%, p<0.001), ileus (7.2% vs 1.4%, p<0.001), cirrhosis (8.1% vs 1.8%, p<0.001), leg ulcers (19.8% vs 7.0%, p<0.001), digital clubbing (14.8% vs 6.6%, p<0.001), CHD (18.0% vs 13.2%, p<0.05), CRD (9.9% vs 6.1%, p<0.05), and stroke (12.1% vs 7.5%, p<0.05) were all higher, and autosplenectomy (50.4% vs 53.3%, p<0.05) and mean age of mortality were lower in males (30.2 vs 33.3 years, p<0.05) (Table 2). Beside that the mean ages of terminal consequences were shown in Table 3.

Table 1: Characteristic features of sickle cell patients

Variables	Males	*p*-value	Females
Prevalence	51.1% (222)	Ns*	48.8% (212)
Mean age (year)	30.8 ± 10.0 (5-58)	Ns	30.3 ± 9.9 (8-59)
Associated TMs†	72.5% (161)	Ns	67.9% (144)
Smoking	***23.8% (53)***	***<0.001***	***6.1% (13)***
Alcoholism	***4.9% (11)***	***<0.001***	***0.4% (1)***

*Nonsignificant (p>0.05) †Thalassemia minors

Table 2: Associated pathologies of sickle cell patients

Variables	Males	*p*-value	Females
Painful crises per year	5.0 ± 7.1 (0-36)	Ns*	4.9 ± 8.6 (0-52)
Transfused units of RBCs†	***48.1 ± 61.8 (0-434)***	***0.000***	***28.5 ± 35.8 (0-206)***
Disseminated teeth losses (<20 teeth present)	***5.4% (12)***	***<0.001***	***1.4% (3)***
COPD‡	***25.2% (56)***	***<0.001***	***7.0% (15)***
Ileus	***7.2% (16)***	***<0.001***	***1.4% (3)***
Cirrhosis	***8.1% (18)***	***<0.001***	***1.8% (4)***
Leg ulcers	***19.8% (44)***	***<0.001***	***7.0% (15)***
Digital clubbing	***14.8% (33)***	***<0.001***	***6.6% (14)***
CHD§	***18.0% (40)***	***<0.05***	***13.2% (28)***
CRD¶	***9.9% (22)***	***<0.05***	***6.1% (13)***
Stroke	***12.1% (27)***	***<0.05***	***7.5% (16)***
PHT**	12.6% (28)	Ns	11.7% (25)
Autosplenectomy	***50.4% (112)***	***<0.05***	***53.3% (113)***
DVT*** and/or varices and/or telangiectasias	9.0% (20)	Ns	6.6% (14)
Rheumatic heart disease	6.7% (15)	Ns	5.6% (12)
Avascular necrosis of bones	24.3% (54)	Ns	25.4% (54)
Sickle cell retinopathy	0.9% (2)	Ns	0.9% (2)
Epilepsy	2.7% (6)	Ns	2.3% (5)
ACS****	2.7% (6)	Ns	3.7% (8)
Mortality	7.6% (17)	Ns	6.6% (14)
Mean age of mortality (year)	***30.2 ± 8.4 (19-50)***	***<0.05***	***33.3 ± 9.2 (19-47)***

*Nonsignificant (p>0.05) †Red blood cells ‡Chronic obstructive pulmonary disease §Coronary heart disease ¶Chronic renal disease **Pulmonary hypertension ***Deep venous thrombosis ****Acute chest syndrome

Table 3: Mean ages of consequences of sickle cell patients

Variables	Mean age (year)
Ileus	29.8 ± 9.8 (18-53)
Hepatomegaly	30.2 ± 9.5 (5-59)
ACS*	30.3 ± 10.0 (5-59)
Sickle cell retinopathy	31.5 ± 10.8 (21-46)
Rheumatic heart disease	31.9 ± 8.4 (20-49)
Autosplenectomy	32.5 ± 9.5 (15-59)
Disseminated teeth losses (<20 teeth present)	32.6 ± 12.7 (11-58)
Avascular necrosis of bones	32.8 ± 9.8 (13-58)
Epilepsy	33.2 ± 11.6 (18-54)
Priapism	33.4 ± 7.9 (18-51)
Left lobe hypertrophy of the liver	33.4 ± 10.7 (19-56)
Stroke	33.5 ± 11.9 (9-58)
COPD†	33.6 ± 9.2 (13-58)
PHT‡	34.0 ± 10.0 (18-56)
Leg ulcers	35.3 ± 8.8 (17-58)
Digital clubbing	35.4 ± 10.7 (18-56)
CHD§	35.7 ± 10.8 (17-59)
DVT¶ and/or varices and/or telangiectasias	37.0 ± 8.4 (17-50)
Cirrhosis	37.0 ± 11.5 (19-56)
CRD**	39.4 ± 9.7 (19-59)

*Acute chest syndrome †Chronic obstructive pulmonary disease ‡Pulmonary hypertension §Coronary heart disease ¶Deep venous thrombosis **Chronic renal disease

Discussion

Acute painful crises are the most disabling symptoms of the SCDs. Although some authors reported that pain itself may not be life threatening directly, infections, medical or surgical emergencies, or emotional stress are the most common precipitating factors of the crises (19). Although the sickled or just hardened RBCs-induced capillary endothelial damage, inflammation, and edema are present even at birth, the increased basal metabolic rate during such stresses aggravates the sickling and capillary endothelial damage, inflammation, and edema, and may terminate with disseminated tissue hypoxia and multiorgan failures-induced sudden deaths in the SCDs (20). So the risk of mortality is much higher during the crises. Actually, each crisis may complicate with the following crises by leaving some sequelaes on the capillary endothelial system all over the body. After a period of time, the sequelaes may terminate with sudden end-organ failures and death during a final acute painful crisis that may even be silent, clinically. Similarly, after a 20-year experience on such patients, the deaths seem sudden and unexpected events in the SCDs. Unfortunately, most of the deaths develop just after the hospital admission, and majority of such cases are without hydroxyurea therapy (21). Rapid RBCs supports are usually life-saving for such patients, although preparation of RBCs units for transfusion usually takes time. Beside that RBCs supports in emergencies become much more difficult in such terminal patients due to the repeated transfusions-induced blood group mismatch. Actually, transfusion of each unit of RBCs complicates the following transfusions by means of the blood subgroup mismacth. Due to the significant efficacy of hydroxyurea therapy, RBCs transfusions should be kept just for acute events and emergencies in the SCDs (22). According to our experiences, simple and repeated transfusions are superior to RBCs exchange in the SCDs (23). First of all, preparation of one or two units of RBCs suspensions in each time rather than preparation of six units or higher provides time to clinicians to prepare more units by preventing sudden death of such high-risk cases. Secondly, transfusions of one or two units of RBCs suspensions in each time decrease the severity of pain and relax anxiety of the patients and their relatives because RBCs transfusions probably have the strongest analgesic effects during such crises. Actually, the decreased severity of pain by transfusions also indicates the decreased severity of inflammation in whole body. Thirdly, transfusions of lesser units of RBCs suspensions in each time by means of the simple transfusions decrease transfusions-related complications including infections, iron overload, and blood group mismatch. Fourthly, transfusions of RBCs suspensions in the secondary health centers prevent some deaths developed during the transport to the tertiary centers for the exchange. Finally, cost of the simple and repeated transfusions on insurance system is much lower than the exchange that needs trained staff and additional devices. On the other hand, pain is the result of complex and poorly understood interactions between RBCs, white blood cells (WBCs), platelets (PLTs), and endothelial cells,

yet. Whether leukocytosis contributes to the pathogenesis by releasing cytotoxic enzymes is unknown. The adverse actions of WBCs on the capillary endothelium are of particular interest with regard to the cerebrovascular diseases in the SCDs. For instance, leukocytosis even in the absence of an infection was an independent predictor of the severity of the SCDs, and it was associated with the higher risk of stroke (24). Disseminated tissue hypoxia, releasing of inflammatory mediators, bone infarctions, and activation of afferent nerves may take role in the pathophysiology of the intolerable pain. Because of the severity of pain, narcotic analgesics are usually required to control them (25), but according to our long term experience, simple and repeated RBCs transfusions are much more effective than the narcotics to control the intolerable pain in the SCDs.

Hydroxyurea is the first drug that was approved by Food and Drug Administration in the SCDs (26). It is an orally-administered, cheap, safe, and effective drug, and it may be the only life-saving drug in the treatment of the SCDs (27, 28). It interferes with the cell division by blocking the formation of deoxyribonucleotides via inhibition of ribonucleotide reductase. The deoxyribonucleotides are the building blocks of DNA. Hydroxyurea mainly affects hyperproliferating cells. Although the action way of hydroxyurea is thought to be the increase in gamma-globin synthesis for fetal hemoglobin (Hb F), its main action may be the prevention of leukocytosis and thrombocytosis by blocking the DNA synthesis (29, 30). By this way, the inborn inflammatory and destructive process of the SCDs is suppressed with some extent. Due to the same action way, hydroxyurea is also used in moderate and severe psoriasis to suppress hyperproliferating skin cells. As also seen in the viral hepatitis cases, although presence of a continuous damage of sickled or just hardened RBCs on the capillary endothelium, the severity of destructive process may be exaggerated by the patients' own WBCs and PLTs. So suppression of proliferation of the WBCs and PLTs may limit the capillary endothelial damage, inflammation, edema, tissue ischemia, and end-organ failures in the body (31). Similarly, final Hb F levels in the hydroxyurea users did not differ from their pretreatment levels (32). The Multicenter Study of Hydroxyurea (MSH) studied 299 severely affected adults with the SCA, and compared the results of patients treated with hydroxyurea or placebo (33). The study particularly researched effects of hydroxyurea on the painful crises, ACS, and requirement of RBCs transfusion. The outcomes were so overwhelming in the favour of hydroxyurea that the study was terminated after 22 months, and hydroxyurea was started for all patients. The MSH also demonstrated that patients treated with hydroxyurea had a 44% decrease in hospitalizations (33). In multivariable analyses, there was a strong and independent association of lower neutrophil counts with the lower crisis rates (33). But this study was performed just in severe SCA cases alone, and the rate of painful crises was decreased from 4.5 to 2.5 per year (33). Whereas we used all subtypes of the SCDs with all clinical severity, and the rate of painful crises was decreased from 10.3 to 1.7 per year ($p<0.000$) with an additional decreased severity of them (7.8/10 vs 2.2/10, $p<0.000$) (28). Parallel to our results, adults using hydroxyurea therapy for frequent painful crises appear to have a reduced mortality rate after a 9-year follow-up period (34). The complications start to be seen even in infancy in the SCDs. For instance, infants with lower hemoglobin values were more likely to have higher incidences of clinical events such as ACS, acute painful crises, and lower neuropsychological scores, and hydroxyurea reduced the incidences of them (35). Hydroxyurea therapy in early years of life may improve growth, and prevent end-organ failures. Transfusion programmes can also reduce all of the complications, but transfusions carry many risks including infections, iron overload, and development of allo-antibodies causing subsequent transfusions difficult. On the other hand, elevations of liver enzymes during some acute painful crises can not be reversed by withdrawing of the hydroxyurea therapy alone, instead withdrawal of all of the medications were highy effective in such cases during the 20-year experience on such patients. After normalization of the liver enzymes, the essential medications must be started one by one, instead of all of them at the same time, again. Thus hydroxyurea must even be used during the acute painful crises. Additionally, we observed mild, moderate, or even severe bone marrow suppressions and pancytopenia in some patients using high-dose hydroxyurea (35 mg/kg/day). Interestingly, such cases were completely silent other than some signs and symptoms of anemia, and all of them were resolved completely just by giving a few-day break for the hydroxyurea therapy and starting with smaller doses again.

Aspirin is a nonsteroidal anti-inflammatory drug (NSAID) used to reduce inflammation and acute thromboembolic events. Although aspirin has similar anti-inflammatory effects with the other NSAIDs, it also suppresses the normal functions of PLTs, irreversibly. This property causes aspirin being different from other NSAIDs, which are reversible inhibitors. Aspirin acts as an acetylating agent where an acetyl group is covalently attached to a serine residue in the active site of the cyclooxygenase (COX) enzyme. Aspirin's ability to suppress the production of prostaglandins (PGs) and thromboxanes (TXs) is due to its irreversible inactivation of the COX enzyme required for PGs and TXs synthesis. PGs are the locally produced hormones with some diverse effects, including the transmission of pain into the brain and modulation of the hypothalamic thermostat and inflammation. TXs are responsible for the aggregation of PLTs to form blood clots. In another definition, low-dose aspirin use irreversibly blocks the formation of TXA2 in the PLTs, producing an inhibitory effect on the PLT aggregation during whole lifespan of the affected PLTs (8-9 days). Since PLTs do not have nucleus and DNA, they are unable to synthesize new COX enzyme once aspirin inhibited the enzyme. The antithrombotic property of aspirin is useful to reduce the incidences of myocardial infarction, transient ischemic attack, and stroke (36). Heart attacks are caused primarily by blood clots, and low dose of aspirin is seen as an effective medical intervention to prevent a second myocardial infarction (37). According to the medical literature, aspirin may also

be effective in prevention of colorectal cancers (38). On the other hand, aspirin has some side effects including gastric ulcers, gastric bleeding, worsening of asthma, and Reye syndrome in childhood and adolescence. Reye syndrome is a rapidly worsening brain disease (39). The first detailed description of Reye syndrome was in 1963 by an Australian pathologist, Douglas Reye (40). The syndrome mostly affects children, but it can only affect fewer than one in a million children a year (40). It usually starts just after recovery from a viral infection, such as influenza or chicken pox (40). Symptoms of Reye syndrome may include personality changes, confusion, seizures, and loss of consciousness (39). Although the liver toxicity typically occurs in the syndrome and the liver is enlarged in most cases, jaundice is usually not seen with it (39). Early diagnosis improves outcomes, and treatment is supportive. Mannitol may be used in cases with the brain swelling (40). Although the death occurs in 20-40% of patients, about one third of survivors get a significant degree of brain damage (39). Interestingly, about 90% of cases in children are associated with an aspirin use (41). Due to the risk of Reye syndrome, the US Food and Drug Administration recommends that aspirin or aspirin-containing products should not be prescribed for febrile patients under the age of 16 years (42). Eventually, the general recommendation to use aspirin in children has been withdrawn, and it was only recommended for Kawasaki disease (39). When aspirin use was withdrawn for children in the US and UK in the 1980s, a decrease of more than 90% of Reye syndrome was seen (40). Due to the higher side effects of corticosteroids in long term, and due to the very low risk of Reye syndrome but much higher risk of death due to the SCDs even in children, aspirin should be added with an anti-inflammatory dose even in childhood into the acute and chronic phase treatments of the SCDs (43).

ACS is a significant cause of mortality in the SCDs (44). It occurs most often as a single episode, and a past history is associated with a higher mortality rate (44). Similarly, all of 14 patients with ACS had just a single episode, and two of them were fatal in spite of the immediate RBCs and ventilation supports and antibiotic therapy in the present study. The remaining 12 patients are still alive without a recurrence at the end of the 10-year follow up period. ACS is the most common between two to four years of age, and its incidence decreases with aging (45). As a difference from atherosclerotic consequences, the incidence of ACS did not show an increase with aging in the present study, and the mean ages of the patients with ACS and SCDs were similar (30.3 vs 30.5 years, $p>0.05$, respectively). The decreased incidence with aging may be due to the high mortality rate during the first episode and/or an acquired immunity against various antigens, and/or decreased strength of immune response by aging. Probably, ACS shows an inborn severity of the SCDs, and the incidence of ACS is higher in severe patients such as patients with the SCA and higher WBCs counts (44, 45). According to our long term experiences on the SCDs, the increased metabolic rate during infections accelerates sickling, thrombocytosis, leukocytosis, and capillary endothelial damage and edema, and terminates with end-organ failures-induced sudden deaths. ACS may also be a collapse of the pulmonary vasculature during such infections, and the exaggerated immune response against the sickled or just hardened RBCs-induced diffuse capillary endothelial damage may be important in the high mortality rate. A preliminary result from the Multi-Institutional Study of Hydroxyurea in the SCDs indicating a significant reduction of episodes of ACS with hydroxyurea therapy suggests that a considerable number of episodes are exaggerated with the increased numbers of WBCs and PLTs (46). Similarly, we strongly recommend hydroxyurea for all patients that may also be the cause of low incidence of ACS in our follow up cases (2.7% in males and 3.7% in females). Additionally, ACS did not show an infectious etiology in 66% (44, 45), and 12 of 27 cases with ACS had evidence of fat embolism in the other study (47). Beside that some authors indicated that antibiotics did not shorten the clinical course (48). RBCs support must be given as earliest as possible. RBCs support has the obvious benefits of decreasing sickle cell concentration directly, and suppressing bone marrow for the production of abnormal RBCs and excessive WBCs and PLTs. So they prevent further sickling-induced exaggerated capillary endothelial edema, disseminated tissue hypoxia, and end-organ failures-induced sudden deaths in the SCDs.

PHT is a condition of increased BPs within the arteries of the lungs. Shortness of breath, fatigue, chest pain, palpitation, swelling of legs and ankles, and cyanosis are common symptoms of PHT. Actually, it is not a diagnosis itself, instead solely a hemodynamic state characterized by resting mean pulmonary artery pressure of 25 mmHg or higher. An increase in pulmonary artery systolic pressure, estimated noninvasively by the echocardiography, helps to identify patients with PHT (49). The cause is often unknown. The underlying mechanism typically involves inflammation, fibrosis, and subsequent remodelling of the arteries. According to World Health Organization (WHO), there are five groups of PHT including pulmonary arterial hypertension, PHT secondary to left heart diseases, PHT secondary to lung diseases, chronic thromboembolic PHT, and PHT with unknown mechanisms (50). PHT affects about 1% of the world population, and its prevalence may reach 10% above the age of 65 years (51). Onset is typically seen between 20 and 60 years of age (50). The most common causes are CHD and COPD (50, 52). The cause of PHT in COPD is generally assumed to be hypoxic pulmonary vasoconstriction leading to permanent medial hypertrophy (53). But the pulmonary vascular remodeling in the COPD may have a much more complex mechanism than just being the medial hypertrophy secondary to the long-lasting hypoxic vasoconstriction alone (53). In fact, all layers of the vessel wall appear to be involved with prominent intimal changes (53). The specific pathological picture could be explained by the combined effects of hypoxia, prolonged stretching of hyperinflated lungs-induced mechanical stress and inflammatory reaction, and the toxic effects of cigarette smoke (53). On the other hand, PHT is also a common consequence, and its prevalence was detected between 20% and 40% in the SCDs (54, 55). Whereas we detected the ratio as 12.2%

in the present study. The relatively younger mean ages of the study cases (30.8 years of males and 30.3 years of females) may be the cause of the lower prevalence of PHT in the present study. Although the higher prevalences of smoking and alcohol-like atherosclerotic risk factors in male gender, and although the higher prevalences of disseminated teeth losses, ileus, cirrhosis, leg ulcers, digital clubbing, CRD, COPD, and stroke-like atherosclerotic consequences in male gender, and the male gender alone is being a risk factor for the systemic atherosclerosis, the similar prevalences of PHT and ACS in both genders also support nonatherosclerotic backgrounds of them in the SCDs in the present study. Similar to our result, women have up to four times of the risk of men for development of idiopathic PHT, and generally develop symptoms 10 years earlier than men in the literature with the unknown reasons, yet (56). Although COPD and CHD are the most common causes of PHT in the society (52, 57), and although COPD (25.2% vs 7.0%, $p<0.001$) and CHD (18.0% vs 13.2%, $p<0.05$) were higher in male gender in the present study, PHT was not higher in males, again. In another definition, PHT may have a sickled or just hardened RBCs-induced chronic thromboembolic whereas ACS may have an acute thromboembolic backgrounds in the SCDs (58, 59), because the mean age of ACS was lower than PHT (30.3 and 34.0 years, $p<0.05$) in the present study, but its mortality was much higher than PHT in the literature (44, 45, 50).

COPD is the third leading cause of death with various underlying etiologies all over the world (60, 61). Aging, physical inactivity, sedentary lifestyle, animal-rich diet, smoking, alcohol, male gender, excess weight, chronic inflammations, prolonged infections, and cancers may be the major underlying causes. Beside smoking, regular alcohol consumption is also an important risk factor for the pulmonary and systemic atherosclerotic processes, since COPD was one of the most common diagnoses in alcohol dependence (62). Furthermore, 30-day readmission rates were higher in the COPD patients with alcoholism (63). Probably an accelerated atherosclerotic process is the main structural background of functional changes seen with the COPD. The inflammatory process of vascular endothelium is enhanced by release of various chemicals by inflammatory cells, and it terminates with an advanced fibrosis, atherosclerosis, and pulmonary losses. COPD may just be the pulmonary consequence of the systemic atherosclerotic process. Since beside the accelerated atherosclerotic process of the pulmonary vasculature, there are several reports about coexistence of associated endothelial inflammation all over the body in COPD (64, 65). For example, there may be close relationships between COPD, CHD, PAD, and stroke (66), and CHD was the most common cause of deaths in the COPD in a multi-center study of 5.887 smokers (67). When the hospitalizations were researched, the most common causes were the cardiovascular diseases, again (67). In another study, 27% of mortality cases were due to the cardiovascular diseases in the moderate and severe COPD (68). Similarly, COPD may just be the pulmonary consequence of the systemic atherosclerotic process caused by the sickled or just hardened RBCs in the SCDs (60). Digital clubbing is characterized by the increased normal angle of 165° between nailbed and fold, increased convexity of the nail fold, and thickening of the whole distal finger (69). Although the exact cause and significance is unknown, the chronic tissue hypoxia is highly suspected (70). In the previous study, only 40% of clubbing cases turned out to have significant underlying diseases while 60% remained well over the subsequent years (18). But according to our experiences, digital clubbing is frequently associated with the pulmonary, cardiac, renal, or hepatic diseases or smoking which are characterized by chronic tissue hypoxia (5). As an explanation for that hypothesis, lungs, heart, kidneys, and liver are closely related organs which affect each other's functions in a short period of time. Similarly, digital clubbing is also common in the SCDs, and its prevalence was 10.8% in the present study. It probably shows chronic tissue hypoxia caused by disseminated endothelial damage, inflammation, edema, and fibrosis at the capillaries in the SCDs. Beside the effects of SCDs, smoking, alcohol, cirrhosis, CRD, CHD, and COPD, the higher prevalence of digital clubbing in males (14.8% vs 6.6%, $p<0.001$) may also show some additional risks of male gender in the systemic atherosclerosis.

Leg ulcers are seen in 10% to 20% of the SCDs, and the ratio was 13.5% in the present study (71). Its prevalence increases with aging, male gender, and SCA (72). Similarly, its ratio was higher in males (19.8% vs 7.0%, $p<0.001$), and mean age of the leg ulcer patients was higher than the remaining ones in the present study (35.3 vs 29.8 years, $p<0.000$). The leg ulcers have an intractable nature, and around 97% of them relapse in a period of one year (71). As an evidence of their atherosclerotic background, the leg ulcers occur in the distal segments of the body with a lesser collateral blood supply (71). The sickled or just hardened RBCs-induced chronic endothelial damage, inflammation, edema, and fibrosis at the capillaries may be the major causes, again (72). Prolonged exposure to the sickled or just hardened bodies due to the pooling of blood in the lower extremities may also explain the leg but not arm ulcers in the SCDs. The sickled or just hardened RBCs-induced venous insufficiencies may also accelerate the highly destructive process by pooling of causative bodies in the legs, and vice versa. Pooling of blood may also have some effects on development of venous ulcers, diabetic ulcers, Buerger's disease, digital clubbing, and onychomycosis in the lower extremities. Furthermore, pooling of blood may be the main cause of delayed wound and fracture healings in the lower extremities. Smoking and alcohol may also have some additional atherosclerotic effects on the leg ulcers in males. Although presence of a continuous damage of hardened RBCs on vascular endothelium, severity of the destructive process is probably exaggerated by the patients' own immune systems. Similarly, lower WBCs counts were associated with lower crises rates, and if a tissue infarct occurs, lower WBCs counts may decrease severity of pain and tissue damage (32). Because the main action of hydroxyurea may be the suppression of hyperproliferative WBCs and PLTs in the SCDs (31), prolonged resolution of leg ulcers with hydroxyurea may also suggest that the ulcers

may be secondary to increased WBCs and PLTs counts-induced exaggerated capillary endothelial inflammation and edema.

Cirrhosis was the 10th leading cause of death for men and the 12th for women in the United States (6). Although the improvements of health services worldwide, the increased morbidity and mortality of cirrhosis may be explained by prolonged survival of the human being, and increased prevalence of excess weight all over the world. For example, nonalcoholic fatty liver disease (NAFLD) affects up to one third of the world population, and it became the most common cause of chronic liver disease even at childhood, nowadays (73). NAFLD is a marker of pathological fat deposition combined with a low-grade inflammation which results with hypercoagulability, endothelial dysfunction, and an accelerated atherosclerosis (73). Beside terminating with cirrhosis, NAFLD is associated with higher overall mortality rates as well as increased prevalences of cardiovascular diseases (74). Authors reported independent associations between NAFLD and impaired flow-mediated vasodilation and increased mean carotid artery intima-media thickness (CIMT) (75). NAFLD may be considered as one of the hepatic consequences of the metabolic syndrome and SCDs (76). Probably smoking also takes role in the inflammatory process of the capillary endothelium in liver, since the systemic inflammatory effects of smoking on endothelial cells is well-known with Buerger's disease and COPD (77). Increased oxidative stress, inactivation of antiproteases, and release of proinflammatory mediators may terminate with the systemic atherosclerosis in smokers. The atherosclerotic effects of alcohol is much more prominent in hepatic endothelium probably due to the highest concentrations of its metabolites there. Chronic infectious or inflammatory processes and cancers may also terminate with an accelerated atherosclerosis in whole body (78). For example, chronic hepatitis C virus (HCV) infection raised CIMT, and normalization of hepatic function with HCV clearance may be secondary to reversal of favourable lipids observed with the chronic infection (78, 79). As a result, cirrhosis may also be another atherosclerotic consequence of the SCDs.

The increased frequency of CRD can also be explained by aging of the human being, and increased prevalence of excess weight all over the world (80, 81). Aging, physical inactivity, sedentary lifestyle, animal-rich diet, excess weight, smoking, alcohol, inflammatory or infectious processes, and cancers may be the main underlying causes of the renal endothelial inflammation. The inflammatory process is enhanced by release of various chemicals by lymphocytes to repair the damaged endothelial cells of the renal arteriols. Due to the continuous irritation of the vascular endothelial cells, prominent changes develop in the architecture of the renal tissues with advanced atherosclerosis, tissue hypoxia, and infarcts. Excess weight-induced hyperglycemia, dyslipidemia, elevated BPs, and insulin resistance may cause tissue inflammation and immune cell activation (82). For example, age ($p= 0.04$), high-sensitivity C-reactive protein ($p= 0.01$), mean arterial BPs ($p= 0.003$), and DM ($p= 0.02$) had significant correlations with the CIMT (81). Increased renal tubular sodium reabsorption, impaired pressure natriuresis, volume expansion due to the activations of sympathetic nervous system and renin-angiotensin system, and physical compression of kidneys by visceral fat tissue may be some mechanisms of the increased BPs with excess weight (83). Excess weight also causes renal vasodilation and glomerular hyperfiltration which initially serve as compensatory mechanisms to maintain sodium balance due to the increased tubular reabsorption (83). However, along with the increased BPs, these changes cause a hemodynamic burden on the kidneys in long term that causes chronic endothelial damage (84). With prolonged weight excess, there are increased urinary protein excretion, loss of nephron function, and exacerbated HT. With the development of dyslipidemia and DM in cases with excess weight, CRD progresses much faster (83). On the other hand, the systemic inflammatory effects of smoking on endothelial cells may also be important in the CRD (85). Although some authors reported that alcohol was not related with the CRD (85), various metabolites of alcohol circulate even in the renal capillaries, and give harm to the renal capillary endothelium. Chronic inflammatory or infectious processes may also terminate with the accelerated atherosclerosis in the renal vasculature (78). Although CRD is due to the atherosclerotic process of the renal vasculature, there are close relationships between CRD and other atherosclerotic consequences of the metabolic syndrome including CHD, COPD, PAD, cirrhosis, and stroke (86), and the most common cause of death was the cardiovascular diseases in the CRD again (87). The sickled or just hardened RBCs-induced capillary endothelial damage may be the main cause of CRD in the SCDs, again (88).

CHD is the most common of the cardiovascular diseases (89). In adults who go to the emergency department with an unclear cause of pain, about 30% have pain due to CHD (90). Although half of cases are linked to genetics, physical inactivity, sedentary lifestyle, animal-rich diet, excess weight, high BP, high blood glucose, dyslipidemia, smoking, alcohol, chronic inflammations, prolonged infections, and cancers may be the most common causes (91). It is the reduction of blood flow to the heart muscle due to build-up of atherosclerotic plaques secondary to the chronic inflammation of the arteries. It can present with stable angina, unstable angina, myocardial infarction, and sudden cardiac death (89). It is usually symptomatic with increased basal metabolic rate and emotional stress (92). It is the cause of deaths in 15.6% of all deaths, globally (92). So it is the most common cause of death in the world, nowadays (92). In the United States in 2010, about 20% of those over the age of 65 years had CHD, while it was present in 7% of those between the ages of 45 to 64 years, and 1.3% of those between 18 and 45 years of age, and the rates were higher among men (93). On average, women experience symptoms 10 years later than men, and women are less likely to recognize symptoms and seek treatment (91). Women who are free of stress from work life show an increase in the diameter of their blood vessels, leading to decreased progression of

atherosclerosis (94). Similarly, CHD was detected as 18.0% vs 13.2% in men and women in the present study , respectively ($p<0.05$).

Stroke is an important cause of death, and usually develops as an acute thromboembolic event on the chronic atherosclerotic background. Aging, male gender, smoking, alcohol, and excess weight may be the major underlying causes. Stroke is a common complication of the SCDs, too (95, 96). We detected prevalences of stroke as 12.1% vs 7.5% in males and females in the present study, respectively ($p<0.05$). Similar to the leg ulcers, stroke is particularly higher with the SCA and higher WBCs counts (97). Sickling-induced capillary endothelial damage, activations of WBCs, PLTs, and coagulation system, and hemolysis may cause inborn and severe capillary endothelial inflammation, edema, and fibrosis in the SCDs (98). Probably, stroke may not have a macrovascular origin in the SCDs, and diffuse capillary endothelial edema may be much more important (99). Infections, inflammations, medical or surgical emergencies, and emotional stress may precipitate stroke by increasing basal metabolic rate, sickling, and capillary endothelial edema. A significant reduction of stroke with hydroxyurea may also suggest that a significant proportion of cases is developed secondary to the increased WBCs and PLTs-induced exaggerated capillary endothelial inflammation and edema in the absence of prominent fibrosis, yet (46).

The venous capillary endothelium may also be involved in the SCDs (100). Normally, leg muscles pump veins against the gravity, and the veins have pairs of leaflets of valves to prevent blood from flowing backwards. When the leaflets are damaged, varices and telangiectasias develop. DVT may also cause varicose veins and telangiectasias. Varicose veins are the most common in superficial veins of the legs, which are subject to higher pressure when standing up, thus physical examination must be performed in the upright position. Although the relatively younger mean ages and significantly lower body mass index of the SCDs cases in the literature (10), the prevalences of DVT and/or varices and/or telangiectasias of the lower limbs were relatively higher in the present study (9.0% vs 6.6% in males and females, $p>0.05$, respectively), indicating an additional venous involvement of the SCDs. Similarly, priapism is the painful erection of penis that can not return to its flaccid state within four hours in the absence of any stimulation (101). It is an emergency because repeated damaging of the blood vessels may terminate with fibrosis of the corpus cavernosa, a consecutive erectile dysfunction, and eventually a shortened, indurated, and non-erectile penis (101). It is mainly seen with SCDs, spinal cord lesions (hanging victims), and glucose-6-phosphate dehydrogenase deficiency (102, 103). Ischemic (veno-occlusive), stuttering (recurrent ischemic), and nonischemic priapisms (arterial) are the three types (104). Ninety-five percent of clinically presented priapisms are the ischemic (veno-occlusive) disorders in which blood can not return adequately from the penis as in the SCDs, and they are very painful (101, 104). RBCs support is the treatment of choice in acute whereas hydroxyurea should be the treatment of choice in chronic phases (105). According to our experiences, hydroxyurea is highly effective for prevention of attacks and consequences of priapism if iniatiated in early years of life, but it may be difficult due to the excessive fibrosis around the capillaries if initiated later in life.

Warfarin is an anticoagulant, and first came into large-scale commercial use in 1948 as a rat poison. It was formally approved as a medication to treat blood clots in human being by the U.S. Food and Drug Administration in 1954. In 1955, warfarin's reputation as a safe and acceptable treatment was bolstred when President Dwight David Eisenhower was treated with warfarin following a massive and highly publicized heart attack. Eisenhower's treatment kickstarted a transformation in medicine whereby CHD, arterial plaques, and ischemic strokes were treated and protected against by using anticoagulants such as warfarin. Warfarin is found in the List of Essential Medicines of WHO. In 2020, it was the 58th most commonly prescribed medication in the United States. It does not reduce blood viscosity but inhibits blood coagulation. Warfarin is used to decrease the tendency for thrombosis, and it can prevent formation of future blood clots and reduce the risk of embolism. Warfarin is the best suited for anticoagulation in areas of slowly running blood such as in veins and the pooled blood behind artificial and natural valves, and in blood pooled in dysfunctional cardiac atria. It is commonly used to prevent blood clots in the circulatory system such as DVT and pulmonary embolism, and to protect against stroke in people who have atrial fibrillation (AF), valvular heart disease, or artificial heart valves. Less commonly, it is used following ST-segment elevation myocardial infarction and orthopedic surgery. The warfarin initiation regimens are simple, safe, and suitable to be used in ambulatory and in patient settings (106). Warfarin should be initiated with a 5 mg dose, or 2 to 4 mg in the very elderly. In the protocol of low-dose warfarin, the target INR value is between 2.0 and 2.5, whereas in the protocol of standard-dose warfarin, the target INR value is between 2.5 and 3.5 (107). When warfarin is used and international normalised ratio (INR) is in therapeutic range, simple discontinuation of the drug for five days is usually enough to reverse the effect, and causes INR to drop below 1.5 (108). Its effects can be reversed with phytomenadione (vitamin K1), fresh frozen plasma, or prothrombin complex concentrate, rapidly. Blood products should not be routinely used to reverse warfarin overdose, when vitamin K1 could work alone. Warfarin decreases blood clotting by blocking vitamin K epoxide reductase, an ezyme that reactivates vitamin K1. Without sufficient active vitamin K1, clotting factors II, VII, IX, and X have decreased clotting ability. The anticlotting protein C and protein S are also inhibited, but to a lesser degree. A few days are required for full effect to occur, and these effects can last for up to five days. The consensus agrees that patient self-testing and patient self-management are effective methods of monitoring oral anticoagulation therapy, providing outcomes at least as good as, and possibly better than, those achieved with an anticoagulation clinic. Currently available self-testing/self-management devices give INR results that are comparable

with those obtained in laboratory testing. The only common side effect of warfarin is hemorrhage. The risk of severe bleeding is low with a yearly rate of 1-3% (109). All types of bleeding may occur, but the most severe ones are those involving the brain and spinal cord (109). The risk is particularly increased once the INR exceeds 4.5 (109). The risk of bleeding is increased further when warfarin is combined with antiplatelet drugs such as clopidogrel or aspirin (110). But thirteen publications from 11 cohorts including more than 48.500 total patients with more than 11.600 warfarin users were included in the meta-analysis (111). In patients with AF and non-end-stage CRD, warfarin resulted in a lower risk of ischemic stroke (p= 0.004) and mortality (p<0.00001), but had no effect on major bleeding (p>0.05) (111). Similarly, warfarin resumption is associated with significant reductions in ischemic stroke even in patients with warfarin-associated intracranial hemorrhage (ICH) (112). Death occured in 18.7% of patients who resumed warfarin and 32.3% who did not resume warfarin (p= 0.009) (112). Ischemic stroke occured in 3.5% of patients who resumed warfarin and 7.0% of patients who did not resume warfarin (p= 0.002) (112). Whereas recurrent ICH occured in 6.7% of patients who resumed warfarin and 7.7% of patients who did not resume warfarin without any significant difference in between (p>0.05) (112). On the other hand, patients with cerebral venous thrombosis (CVT) those were anticoagulated either with warfarin or dabigatran had low risk of recurrent venous thrombotic events (VTEs), and the risk of bleeding was similar in both regimens, suggesting that both warfarin and dabigatran are safe and effective for preventing recurrent VTEs in patients with CVT (113). Additionally, an INR value of about 1.5 achieved with an average daily dose of 4.6 mg warfarin, has resulted in no increase in the number of men ever reporting minor bleeding episodes, although rectal bleeding occurs more frequently in those men who report this symptom (114). Non-rheumatic AF increases the risk of stroke, presumably from atrial thromboemboli, and long-term low-dose warfarin therapy is highly effective and safe in preventing stroke in such patients (115). There were just two strokes in the warfarin group (0.41% per year) as compared with 13 strokes in the control group (2.98% per year) with a reduction of 86% in the risk of stroke (p= 0.0022) (115). The mortality was markedly lower in the warfarin group, too (p= 0.005) (115). The warfarin group had a higher rate of minor hemorrhage (38 vs 21 patients) but the frequency of bleedings that required hospitalization or transfusion was the same in both group (p>0.05) (115). Additionally, very-low-dose warfarin was a safe and effective method for prevention of thromboembolism in patients with metastatic breast cancer (116). The warfarin dose was 1 mg daily for 6 weeks, and was adjusted to maintain the INR value of 1.3 to 1.9 (116). The average daily dose was 2.6 mg, and the mean INR was 1.5 (116). On the other hand, new oral anticoagulants had a favourable risk-benefit profile with significant reductions in stroke, ICH, and mortality, and with similar major bleeding as for warfarin, but increased gastrointestinal bleeding (117). Interestingly, rivaroxaban and low dose apixaban were associated with increased risks of all cause mortality compared with warfarin (118). The mortality rate was 4.1% per year in the warfarin group, as compared with 3.7% per year with 110 mg of dabigatran and 3.6% per year with 150 mg of dabigatran (p>0.05 for both) in patients with AF in another study (119). On the other hand, infections, medical or surgical emergencies, or emotional stress-induced increased basal metabolic rate accelerates sickling, and an exaggerated capillary endothelial edema-induced myocardial infarction or stroke may cause sudden deaths in the SCDs. So lifelong aspirin with an anti-inflammatory dose plus low-dose warfarin may be a life-saving treatment regimen even at childhood both to decrease severity of capillary endothelial inflammation and to prevent thromboembolic complications in the SCDs (120).

The spleen is found in all vertebrates with a similar structure to the lymph nodes. It acts primarily as a blood filter, and removes old and abnormal RBCs and recycles the iron. Additionally, it synthesizes antibodies and removes antibody-coated bacteria and blood cells from the circulation. Like the thymus, the spleen has only efferent lymphatic vessels, and it is the major lymphatic organ of the body. It has a central role in the reticuloendothelial system, and retains the ability to produce lymphocytes after birth. The spleen acts as a pool of peripheral blood cells which are released in case of a need. For example, it stores half of the body's monocytes in mice (121). In case of an injury, the monocytes migrate to the injured tissues and transform into dendritic cells and macrophages, and assist tissue healing (122). It was detected in the present study that 56.2% of cases of the first and 45.6% of cases of the second groups (p<0.05) had autosplenectomy, and these ratios were the highest ones among all other affected tissues of the body. So the spleen is probably the primarily affected organ in the SCDs, and it may act as a chronic inflammatory focus, particularly due to the high WBCs content (123). Although, a 28-year follow-up study of 740 veterans of World War II with surgical removal of spleen on the battlefield found that they showed significant excesses of mortality from pneumonia and CHD (124), the prevalence of CHD was lower in females with the higher prevalence of autosplenectomy in the present study.

As a conclusion, the hardened RBCs-induced capillary endothelial damage initiates at birth, and terminates with multiorgan failures even at childhood. Parallel to cirrhosis, all of the atherosclerotic risk factors or consequences including smoking, alcohol, disseminated teeth losses, ileus, COPD, leg ulcers, digital clubbing, CHD, CRD, and stroke were higher, and autosplenectomy and mean age of mortality were lower in males which can not be explained by effects of smoking and alcohol alone at the relatively younger mean age. So autosplenectomy may be a good whereas male gender alone may be a bad prognostic factor, and cirrhosis may have an atherosclerotic background in the SCDs.

References

1. Widlansky ME, Gokce N, Keaney JF Jr, Vita JA. The clinical implications of endothelial dysfunction. J Am Coll Cardiol 2003; 42(7): 1149-60.
2. Helvaci MR, Tuncsezen UK, Seckin K, Piral K, Seyhan S, Karabacak AD, Camlibel M, Abyad A, Pocock L. Fasting plasma glucose may behave as a positive in mild but as a negative acute phase reactant in moderate and severe inflammatory disorders. World Family Med 2023; 21(6): 36-45.
3. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. Lancet 2005; 365(9468): 1415-28.
4. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. Circulation 2002; 106(25): 3143-421.
5. Helvaci MR, Aydin LY, Aydin Y. Digital clubbing may be an indicator of systemic atherosclerosis even at microvascular level. HealthMED 2012; 6(12): 3977-81.
6. Anderson RN, Smith BL. Deaths: leading causes for 2001. Natl Vital Stat Rep 2003; 52(9): 1-85.
7. Helvaci MR, Gokce C, Davran R, Akkucuk S, Ugur M, Oruc C. Mortal quintet of sickle cell diseases. Int J Clin Exp Med 2015; 8(7): 11442-8.
8. Platt OS, Brambilla DJ, Rosse WF, Milner PF, Castro O, Steinberg MH, et al. Mortality in sickle cell disease. Life expectancy and risk factors for early death. N Engl J Med 1994; 330(23): 1639-44.
9. Helvaci MR, Yaprak M, Abyad A, Pocock L. Atherosclerotic background of hepatosteatosis in sickle cell diseases. World Family Med 2018; 16(3): 12-8.
10. Helvaci MR, Kaya H. Effect of sickle cell diseases on height and weight. Pak J Med Sci 2011; 27(2): 361-4.
11. Helvaci MR, Aydin Y, Ayyildiz O. Hydroxyurea may prolong survival of sickle cell patients by decreasing frequency of painful crises. HealthMED 2013; 7(8): 2327-32.
12. Mankad VN, Williams JP, Harpen MD, Manci E, Longenecker G, Moore RB, et al. Magnetic resonance imaging of bone marrow in sickle cell disease: clinical, hematologic, and pathologic correlations. Blood 1990; 75(1): 274-83.
13. Helvaci MR, Aydin Y, Ayyildiz O. Clinical severity of sickle cell anemia alone and sickle cell diseases with thalassemias. HealthMED 2013; 7(7): 2028-33.
14. Fisher MR, Forfia PR, Chamera E, Housten-Harris T, Champion HC, Girgis RE, et al. Accuracy of Doppler echocardiography in the hemodynamic assessment of pulmonary hypertension. Am J Respir Crit Care Med 2009; 179(7): 615-21.
15. Vestbo J, Hurd SS, Agustí AG, Jones PW, Vogelmeier C, Anzueto A, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. Am J Respir Crit Care Med 2013; 187(4): 347-65.
16. Davies SC, Luce PJ, Win AA, Riordan JF, Brozovic M. Acute chest syndrome in sickle-cell disease. Lancet 1984; 1(8367): 36-8.
17. Vandemergel X, Renneboog B. Prevalence, aetiologies and significance of clubbing in a department of general internal medicine. Eur J Intern Med 2008; 19(5): 325-9.
18. Schamroth L. Personal experience. S Afr Med J 1976; 50(9): 297-300.
19. Parfrey NA, Moore W, Hutchins GM. Is pain crisis a cause of death in sickle cell disease? Am J Clin Pathol 1985; 84: 209-12.
20. Helvaci MR, Camlibel M, Yuksek B, Sevinc A, Camci C, Abyad A, Pocock L. Acute painful crises may be causes of sudden deaths in sickle cell diseases. World Family Med 2023; 21(5): 37-49.
21. Helvaci MR, Ayyildiz O, Gundogdu M. Red blood cell transfusions and survival of sickle cell patients. HealthMED 2013; 7(11): 2907-12.
22. Miller ST, Sleeper LA, Pegelow CH, Enos LE, Wang WC, Weiner SJ, et al. Prediction of adverse outcomes in children with sickle cell disease. N Engl J Med 2000; 342: 83-9.
23. Helvaci MR, Atci N, Ayyildiz O, Muftuoglu OE, Pocock L. Red blood cell supports in severe clinical conditions in sickle cell diseases. World Family Med 2016; 14(5): 11-8.
24. Balkaran B, Char G, Morris JS, Thomas PW, Serjeant BE, Serjeant GR. Stroke in a cohort of patients with homozygous sickle cell disease. J Pediatr 1992; 120: 360-6.
25. Cole TB, Sprinkle RH, Smith SJ, Buchanan GR. Intravenous narcotic therapy for children with severe sickle cell pain crisis. Am J Dis Child 1986; 140: 1255-9.
26. Yawn BPs, Buchanan GR, Afenyi-Annan AN, Ballas SK, Hassell KL, James AH, et al. Management of sickle cell disease: summary of the 2014 evidence-based report by expert panel members. JAMA 2014; 312(10): 1033-48.
27. Helvaci MR, Ayyildiz O, Gundogdu M. Hydroxyurea therapy and parameters of health in sickle cell patients. HealthMED 2014; 8(4): 451-6.
28. Helvaci MR, Tonyali O, Yaprak M, Abyad A, Pocock L. Increased sexual performance of sickle cell patients with hydroxyurea. World Family Med 2019; 17(4): 28-33.
29. Miller BA, Platt O, Hope S, Dover G, Nathan DG. Influence of hydroxyurea on fetal hemoglobin production in vitro. Blood 1987; 70(6): 1824-9.
30. Platt OS. Is there treatment for sickle cell anemia? N Engl J Med 1988; 319(22): 1479-80.
31. Helvaci MR, Aydogan F, Sevinc A, Camci C, Dilek I. Platelet and white blood cell counts in severity of sickle cell diseases. HealthMED 2014; 8(4): 477-82.
32. Charache S. Mechanism of action of hydroxyurea in the management of sickle cell anemia in adults. Semin Hematol 1997; 34(3): 15-21.
33. Charache S, Barton FB, Moore RD, Terrin ML, Steinberg MH, Dover GJ, et al. Hydroxyurea and sickle cell anemia. Clinical utility of a myelosuppressive "switching" agent. The Multicenter Study of Hydroxyurea in Sickle Cell Anemia. Medicine (Baltimore) 1996; 75(6): 300-26.
34. Steinberg MH, Barton F, Castro O, Pegelow CH, Ballas SK, Kutlar A, et al. Effect of hydroxyurea on mortality and morbidity in adult sickle cell anemia: risks and benefits

up to 9 years of treatment. JAMA 2003; 289(13): 1645-51.
35. Lebensburger JD, Miller ST, Howard TH, Casella JF, Brown RC, Lu M, et al; BABY HUG Investigators. Influence of severity of anemia on clinical findings in infants with sickle cell anemia: analyses from the BABY HUG study. Pediatr Blood Cancer 2012; 59(4): 675-8.
36. Toghi H, Konno S, Tamura K, Kimura B, Kawano K. Effects of low-to-high doses of aspirin on platelet aggregability and metabolites of thromboxane A2 and prostacyclin. Stroke 1992; 23(10): 1400-3.
37. Baigent C, Blackwell L, Collins R, Emberson J, Godwin J, Peto R, et al. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials. Lancet 2009; 373(9678): 1849-60.
38. Algra AM, Rothwell PM. Effects of regular aspirin on long-term cancer incidence and metastasis: a systematic comparison of evidence from observational studies versus randomised trials. Lancet Oncol 2012; 13(5): 518-27.
39. Schrör K. Aspirin and Reye syndrome: a review of the evidence. Paediatr Drugs 2007; 9(3): 195-204.
40. Pugliese A, Beltramo T, Torre D. Reye's and Reye's-like syndromes. Cell Biochem Funct 2008; 26(7): 741-6.
41. Hurwitz ES. Reye's syndrome. Epidemiol Rev 1989; 11: 249-53.
42. Macdonald S. Aspirin use to be banned in under 16 year olds. BMJ 2002; 325(7371): 988.
43. Meremikwu MM, Okomo U. Sickle cell disease. BMJ Clin Evid 2011; 2011: 2402.
44. Poncz M, Kane E, Gill FM. Acute chest syndrome in sickle cell disease: etiology and clinical correlates. J Pediatr 1985; 107(6): 861-6.
45. Sprinkle RH, Cole T, Smith S, Buchanan GR. Acute chest syndrome in children with sickle cell disease. A retrospective analysis of 100 hospitalized cases. Am J Pediatr Hematol Oncol 1986; 8(2): 105-10.
46. Charache S, Terrin ML, Moore RD, Dover GJ, Barton FB, Eckert SV, et al. Effect of hydroxyurea on the frequency of painful crises in sickle cell anemia. Investigators of the Multicenter Study of Hydroxyurea in Sickle Cell Anemia. N Engl J Med 1995; 332(20): 1317-22.
47. Vichinsky E, Williams R, Das M, Earles AN, Lewis N, Adler A, et al. Pulmonary fat embolism: a distinct cause of severe acute chest syndrome in sickle cell anemia. Blood 1994; 83(11): 3107-12.
48. Charache S, Scott JC, Charache P. ''Acute chest syndrome'' in adults with sickle cell anemia. Microbiology, treatment, and prevention. Arch Intern Med 1979; 139(1): 67-9.
49. Gordeuk VR, Castro OL, Machado RF. Pathophysiology and treatment of pulmonary hypertension in sickle cell disease. Blood 2016; 127(7): 820-8.
50. Simonneau G, Gatzoulis MA, Adantia I, Celermajer D, Denton C, Ghofrani A, et al. Updated clinical classification of pulmonary hypertension. J American College Cardiol 2013; 62(25): 34-41.
51. Hoeper MM, Humbert M, Souza R, Idrees M, Kawut SM, Sliwa-Hahnle K, et al. A global view of pulmonary hypertension. Lancet Respir Med 2016; 4(4): 306-22.
52. Naeije R, Barbera JA. Pulmonary hypertension associated with COPD. Crit Care 2001; 5(6): 286-9.
53. Peinado VI, Barbera JA, Abate P, Ramirez J, Roca J, Santos S, et al. Inflammatory reaction in pulmonary muscular arteries of patients with mild chronic obstructive pulmonary disease. Am J Respir Crit Care Med 1999; 59: 1605-11.
54. Helvaci MR, Arslanoglu Z, Celikel A, Abyad A, Pocock L. Pathophysiology of pulmonary hypertension in sickle cell diseases. Middle East J Intern Med 2018; 11(2): 14-21.
55. Castro O. Systemic fat embolism and pulmonary hypertension in sickle cell disease. Hematol Oncol Clin North Am 1996; 10(6): 1289-303.
56. Cunningham CM, Li M, Ruffenach G, Doshi M, Aryan L, Hong J, et al. Y-chromosome gene, Uty, protects against pulmonary hypertension by reducing proinflammatory chemokines. Am J Respir Crit Care Med 2022; 206(2): 186-96.
57. Duffels MG, Engelfriet PM, Berger RM, van Loon RL, Hoendermis E, Vriend JW, et al. Pulmonary arterial hypertension in congenital heart disease: an epidemiologic perspective from a Dutch registry. Int J Cardiol 2007; 120(2): 198-204.
58. Oudiz RJ. Classification of pulmonary hypertension. Cardiol Clin 2016; 34(3): 359-61.
59. Gladwin MT, Sachdev V, Jison ML, Shizukuda Y, Plehn JF, Minter K, et al. Pulmonary hypertension as a risk factor for death in patients with sickle cell disease. N Engl J Med 2004; 350(9): 886-95.
60. Helvaci MR, Erden ES, Aydin LY. Atherosclerotic background of chronic obstructive pulmonary disease in sickle cell patients. HealthMED 2013; 7(2): 484-8.
61. Rennard SI, Drummond MB. Early chronic obstructive pulmonary disease: definition, assessment, and prevention. Lancet 2015; 385(9979): 1778-88.
62. Schoepf D, Heun R. Alcohol dependence and physical comorbidity: Increased prevalence but reduced relevance of individual comorbidities for hospital-based mortality during a 12.5-year observation period in general hospital admissions in urban North-West England. Eur Psychiatry 2015; 30(4): 459-68.
63. Singh G, Zhang W, Kuo YF, Sharma G. Association of Psychological Disorders With 30-Day Readmission Rates in Patients With COPD. Chest 2016; 149(4): 905-15.
64. Danesh J, Collins R, Appleby P, Peto R. Association of fibrinogen, C-reactive protein, albumin, or leukocyte count with coronary heart disease: meta-analyses of prospective studies. JAMA 1998; 279(18): 1477-82.
65. Mannino DM, Watt G, Hole D, Gillis C, Hart C, McConnachie A, et al. The natural history of chronic obstructive pulmonary disease. Eur Respir J 2006; 27(3): 627-43.
66. Mapel DW, Hurley JS, Frost FJ, Petersen HV, Picchi MA, Coultas DB. Health care utilization in chronic obstructive pulmonary disease. A case-control study in a health maintenance organization. Arch Intern Med 2000; 160(17): 2653-58.

67. Anthonisen NR, Connett JE, Enright PL, Manfreda J; Lung Health Study Research Group. Hospitalizations and mortality in the Lung Health Study. Am J Respir Crit Care Med 2002; 166(3): 333-9.
68. McGarvey LP, John M, Anderson JA, Zvarich M, Wise RA; TORCH Clinical Endpoint Committee. Ascertainment of cause-specific mortality in COPD: operations of the TORCH Clinical Endpoint Committee. Thorax 2007; 62(5): 411-5.
69. Myers KA, Farquhar DR. The rational clinical examination. Does this patient have clubbing? JAMA 2001; 286(3): 341-7.
70. Toovey OT, Eisenhauer HJ. A new hypothesis on the mechanism of digital clubbing secondary to pulmonary pathologies. Med Hypotheses 2010; 75(6): 511-3.
71. Trent JT, Kirsner RS. Leg ulcers in sickle cell disease. Adv Skin Wound Care 2004: 17(8); 410-6.
72. Minniti CP, Eckman J, Sebastiani P, Steinberg MH, Ballas SK. Leg ulcers in sickle cell disease. Am J Hematol 2010; 85(10): 831-3.
73. Bhatia LS, Curzen NP, Calder PC, Byrne CD. Non-alcoholic fatty liver disease: a new and important cardiovascular risk factor? Eur Heart J 2012; 33(10): 1190-1200.
74. Pacifico L, Nobili V, Anania C, Verdecchia P, Chiesa C. Pediatric nonalcoholic fatty liver disease, metabolic syndrome and cardiovascular risk. World J Gastroenterol 2011; 17(26): 3082-91.
75. Mawatari S, Uto H, Tsubouchi H. Chronic liver disease and arteriosclerosis. Nihon Rinsho 2011; 69(1): 153-7.
76. Bugianesi E, Moscatiello S, Ciaravella MF, Marchesini G. Insulin resistance in nonalcoholic fatty liver disease. Curr Pharm Des 2010; 16(17): 1941-51.
77. Helvaci MR, Aydin LY, Aydin Y. Chronic obstructive pulmonary disease may be one of the terminal end points of metabolic syndrome. Pak J Med Sci 2012; 28(3): 376-9.
78. Mostafa A, Mohamed MK, Saeed M, Hasan A, Fontanet A, Godsland I, et al. Hepatitis C infection and clearance: impact on atherosclerosis and cardiometabolic risk factors. Gut 2010; 59(8): 1135-40.
79. Helvaci MR, Ayyildiz O, Gundogdu M, Aydin Y, Abyad A, Pocock L. Hyperlipoproteinemias may actually be acute phase reactants in the plasma. World Family Med 2018; 16(1): 7-10.
80. Levin A, Hemmelgarn B, Culleton B, Tobe S, McFarlane P, Ruzicka M, et al. Guidelines for the management of chronic kidney disease. CMAJ 2008; 179(11): 1154-62.
81. Nassiri AA, Hakemi MS, Asadzadeh R, Faizei AM, Alatab S, Miri R, et al. Differences in cardiovascular disease risk factors associated with maximum and mean carotid intima-media thickness among hemodialysis patients. Iran J Kidney Dis 2012; 6(3): 203-8.
82. Xia M, Guerra N, Sukhova GK, Yang K, Miller CK, Shi GP, et al. Immune activation resulting from NKG2D/ligand interaction promotes atherosclerosis. Circulation 2011; 124(25): 2933-43.
83. Hall JE, Henegar JR, Dwyer TM, Liu J, da Silva AA, Kuo JJ, et al. Is obesity a major cause of chronic kidney disease? Adv Ren Replace Ther 2004; 11(1): 41-54.
84. Nerpin E, Ingelsson E, Risérus U, Helmersson-Karlqvist J, Sundström J, Jobs E, et al. Association between glomerular filtration rate and endothelial function in an elderly community cohort. Atherosclerosis 2012; 224(1): 242-6.
85. Stengel B, Tarver-Carr ME, Powe NR, Eberhardt MS, Brancati FL. Lifestyle factors, obesity and the risk of chronic kidney disease. Epidemiology 2003; 14(4): 479-87.
86. Bonora E, Targher G. Increased risk of cardiovascular disease and chronic kidney disease in NAFLD. Nat Rev Gastroenterol Hepatol 2012; 9(7): 372-81.
87. Tonelli M, Wiebe N, Culleton B, House A, Rabbat C, Fok M, et al. Chronic kidney disease and mortality risk: a systematic review. J Am Soc Nephrol 2006; 17(7): 2034-47.
88. Helvaci MR, Aydin Y, Aydin LY. Atherosclerotic background of chronic kidney disease in sickle cell patients. HealthMED 2013; 7(9): 2532-7.
89. Wong ND. Epidemiological studies of CHD and the evolution of preventive cardiology. Nat Rev Cardiol 2014; 11(5): 276-89.
90. Kontos MC, Diercks DB, Kirk JD. Emergency department and office-based evaluation of patients with chest pain. Mayo Clin Proc 2010; 85(3): 284-99.
91. Dai X, Wiernek S, Evans JP, Runge MS. Genetics of coronary artery disease and myocardial infarction. World J Cardiol 2016; 8(1): 1-23.
92. Wang H, Naghavi M, Allen C, Barber RM, Bhutta ZA, Carter A, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet 2016; 388(10053): 1459-544.
93. Prevalence of coronary heart disease--United States, 2006-2010. MMWR Morb Mortal Wkly Rep 2011; 60(40): 1377-81.
94. Wang HX, Leineweber C, Kirkeeide R, Svane B, Schenck-Gustafsson K, Theorell T, et al. Psychosocial stress and atherosclerosis: family and work stress accelerate progression of coronary disease in women. The Stockholm Female Coronary Angiography Study. J Intern Med 2007; 261(3): 245-54.
95. DeBaun MR, Gordon M, McKinstry RC, Noetzel MJ, White DA, Sarnaik SA, et al. Controlled trial of transfusions for silent cerebral infarcts in sickle cell anemia. N Engl J Med 2014; 371(8): 699-710.
96. Gueguen A, Mahevas M, Nzouakou R, Hosseini H, Habibi A, Bachir D, et al. Sickle-cell disease stroke throughout life: a retrospective study in an adult referral center. Am J Hematol 2014; 89(3): 267-72.
97. Majumdar S, Miller M, Khan M, Gordon C, Forsythe A, Smith MG, et al. Outcome of overt stroke in sickle cell anaemia, a single institution's experience. Br J Haematol 2014; 165(5): 707-13.
98. Kossorotoff M, Grevent D, de Montalembert M. Cerebral vasculopathy in pediatric sickle-cell anemia. Arch Pediatr 2014; 21(4): 404-14.

99. Helvaci MR, Tuncsezen UK, Seckin K, Piral K, Seyhan S, Karabacak AD, Camlibel M, Abyad A, Pocock L. An exaggerated capillary endothelial edema may be the cause of sudden deaths in sickle cell diseases. World Family Med 2023; 21(6): 23-35.
100. Helvaci MR, Gokce C, Sahan M, Hakimoglu S, Coskun M, Gozukara KH. Venous involvement in sickle cell diseases. Int J Clin Exp Med 2016; 9(6): 11950-7.
101. Kaminsky A, Sperling H. Diagnosis and management of priapism. Urologe A 2015; 54(5): 654-61.
102. Anele UA, Le BV, Resar LM, Burnett AL. How I treat priapism. Blood 2015; 125(23): 3551-8.
103. Bartolucci P, Lionnet F. Chronic complications of sickle cell disease. Rev Prat 2014; 64(8): 1120-6.
104. Broderick GA. Priapism and sickle-cell anemia: diagnosis and nonsurgical therapy. J Sex Med 2012; 9(1): 88-103.
105. Ballas SK, Lyon D. Safety and efficacy of blood exchange transfusion for priapism complicating sickle cell disease. J Clin Apher 2016; 31(1): 5-10.
106. Mohamed S, Fong CM, Ming YJ, Kori AN, Wahab SA, Ali ZM. Evaluation of an initiation regimen of warfarin for international normalized ratio target 2.0 to 3.0. J Pharm Technol 2021; 37(6): 286-92.
107. Chu MWA, Ruel M, Graeve A, Gerdisch MW, Ralph J, Damiano Jr RJ, Smith RL. Low-dose vs standard warfarin after mechanical mitral valve replacement: A randomized trial. Ann Thorac Surg 2023; 115(4): 929-38.
108. Crowther MA, Douketis JD, Schnurr T, Steidl L, Mera V, Ultori C, et al. Oral vitamin K lowers the international normalized ratio more rapidly than subcutaneously vitamin K in the treatment of warfarin-associated coagulopathy. A randomized, controlled trial. Ann Intern Med 2002; 137(4): 251-4.
109. Brown DG, Wilkerson EC, Love WE. A review of traditional and novel oral anticoagulant and antiplatelet therapy for dermatologists and dermatologic surgeons. J Am Acad Dermatol 2015; 72(3): 524-34.
110. Delaney JA, Opatrny L, Brophy JM, Suissa S. Drug drug interactions between antithrombotic medications and the risk of gastrointestinal bleeding. CMAJ 2007; 177(4): 347-51.
111. Dahal K, Kunwar S, Rijal J, Schulman P, Lee J. Stroke, major bleeding, and mortality outcomes in warfarin users with atrial fibrillation and chronic kidney disease: a meta-analysis of observational studies. Chest 2016; 149(4): 951-9.
112. Chai-Adisaksopha C, Lorio A, Hillis C, Siegal D, Witt DM, Schulman S, et al. Warfarin resumption following anticoagulant-associated intracranial hemorrhage: A systematic review and meta-analysis. Thromb Res 2017; 160: 97-104.
113. Ferro JM, Coutinho JM, Dentali F, Kobayashi A, Alasheev A, Canhao P, et al. Safety and efficacy of dabigatran etexilate vs dose-adjusted warfarin in patients with cerebral venous thrombosis: A randomized clinical trial. JAMA Neurol 2019; 76(12): 1457-65.
114. Meade TW. Low-dose warfarin and low-dose aspirin in the primary prevention of ischemic heart disease. Am J Cardiol 1990; 65(6): 7C-11C.
115. Singer DE, Hughes RA, Gress DR, Sheehan MA, Oertel LB, Maraventano SW, et al. The effect of low-dose warfarin on the risk of stroke in patients with nonrheumatic atrial fibrillation. N Engl J Med 1990; 323(22): 1505-11.
116. Levine M, Hirsh J, Gent M, Arnold A, Warr D, Falanya A, et al. Double-blind randomised trial of a very-low-dose warfarin for prevention of thromboembolism in stage IV breast cancer. Lancet 1994; 343(8902): 886-9.
117. Ruff CT, Giugliano RP, Braunwald E, Hoffman EB, Deenadayalu N, Ezekowitz MD, et al. Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis of randomised trials. Lancet 2014; 383(9921): 955-62.
118. Vinogradova Y, Coupland C, Hill T, Hippisley-Cox J. Risks and benefits of direct oral anticoagulants versus warfarin in a real world setting: cohort study in primary care. BMJ 2018; 362: k2505.
119. Connolly SJ, Ezekowitz MD, Yusuf S, Eikelboom J, Oldgren J, Parekh A, et al. Dabigatran versus warfarin in patients with atrial fibrillation. N Engl J Med 2009; 361(12): 1139-51.
120. Helvaci MR, Vural A, Onay K, Abyad A, Pocock L. Low-dose warfarin may be a life-saving treatment regimen in sickle cell diseases. World Family Med 2023; 21(7): 21-35.
121. Swirski FK, Nahrendorf M, Etzrodt M, Wildgruber M, Cortez-Retamozo V, Panizzi P, et al. Identification of splenic reservoir monocytes and their deployment to inflammatory sites. Science 2009; 325(5940): 612-6.
122. Jia T, Pamer EG. Immunology. Dispensable but not irrelevant. Science 2009; 325(5940): 549-50.
123. Helvaci MR, Tuncsezen UK, Vural A, Onay K, Davran R, Yaprak M, Abyad A, Pocock L. Autosplenectomy may be a good prognostic sign in sickle cell diseases. World Family Med 2023; 21(8): 19-32.
124. Robinette CD, Fraumeni Jr JF. Splenectomy and subsequent mortality in veterans of the 1939-45 war. Lancet 1977; 2(8029): 127-9.

Pleomorphic Adenoma Review of Surgical Management with a focus on histopathological aspects

Mohammed A. Alghamdi

Assistant Professor of Otolaryngology, Unit of Otolaryngology, Department of Surgery, Faculty of Medicine, Al-Baha University, Saudi Arabia
ORCID ID: 0000-0003-2161-7395; https://orcid.org/0000-0003-2161-7395

Correspondence:
Professor Mohammed A. Alghamdi
Email: maaburas@bu.edu.sa

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Mohammed A. Alghamdi. Pleomorphic Adenoma Review of Surgical Management with a focus on histopathological aspects. World Family Medicine. December 2023; 21(11): 40-43. DOI: 10.5742/MEWFM.2023.95256216

Abstract

Salivary Gland Tumors arise in the Parotid gland in about 80% of cases[2, 3]. Benign parotid gland tumors account for 80% of cases [3]. Around 80 percent of all benign salivary glands' tumors are pleomorphic adenomas, which are the most frequent salivary gland tumor overall (between 50 and 70 percent) [2-4]. Despite their benign nature, Pleomorphic Adenomas can occasionally result in benign metastases and carry the potential to evolve into malignancy [1, 5–9]. The main course of treatment is surgical excision, where the optimal extent of surgery has been an area for debate. The Pleomorphic adenoma is known for hard-to-treat multilocular recurrences, hence it is widely advocated to remove the whole or at least the superficial part of the gland with the tumor as a standard treatment to avoid recurrences based on the evidence of histological presence of pseudopods and satellite nodule but other advocate minimal intervention removing only the tumor with cuff of normal tissue around it and presenting evidence of comparable recurrence rates to traditional approach and lower complications rate compared to it. They argue that the cuff of normal tissue will include satellite nodule and pseudopod based on histological measurements.

Keywords: Salivary Gland, Parotid, Parotid Gland, Pleomorphic Adenoma, Mixed Tumor, Complete Parotidectomy, Partial Parotidectomy, Superficial Parotidectomy, Lateral Parotidectomy, Extracapsular Dissection,

Introduction

Salivary gland tumors account for 6% of all head and neck tumors[1]. In about 80% of the cases, tumors arise in the Parotid gland[2, 3]. 80% of parotid gland tumors are benign [3]. Pleomorphic adenoma is the most common Salivary gland tumor overall (50-70 %) and accounts for about 80% of all benign tumors [2-4]. Though benign in nature, Pleomorphic Adenoma can in rare cases give benign metastasis and they harbor malignancy transformation [1, 5-9]. The primary treatment is surgical removal, but this can be extremely challenging in some cases because of unusual localization or extensive growth. [10-13].

Histopathology

Pleomorphic Adenoma is the most common Salivary gland tumor with an annual incidence of 3.5/100,000. Histologically the tumor is in 96% of the cases under 4 cm and is composed of epithelial and stromal components. Genetic events leading to the development of Salivary Glands Pleomorphic Adenomas are alterations involving Pleomorphic Adenoma Gene 1 (8q12) (PLAG1) encoding for cell cycle progression zinc finger protein, HMGA2 gene (12q13-15) encoding High-mobility group protein and sporadic, clonal changes [1, 15, 16]. Depending on the Stromal component of the tumor Pleomorphic Adenoma can be either Myxoid (Stroma rich with >80% Stromal component), Cellular (20-30% Stromal component), or Classical (Balanced with 30-50% Stromal component)[17]. In about 50 %, the tumor is Stroma rich variant where the Cellular variant makes up 35% of the cases, and the remaining 15% are Classical [4, 18]. Stroma has a spectrum of components ranging from Myxoid, Chondroid (the former two are present in >80% and usually with abundance), Lipomatous, and Osseous (only in 2% of the cases and up to only 5% of the stroma). Histologically there is a usual abundance of plasmacytoid and spindle cells whereas other cell types, oval, epithelioid, and clear, are less common and can be seen in an island form, where finding of Ductal atypia, diffuse fibrosis, and necrosis raise the suspicion level of malignant transformation [1, 4]. The tumor has a capsule ranging from 5-250 micrometers. Stennert et al. studied 100 cases of pleomorphic adenoma, where focal capsule absence was seen in 43% of the cases making up to 4% of the entire tumor capsule for all tumor variants. This finding was more prominent in myxoid tumors and involved 28% of the entire circumference. He defined an area with a thickness <20 micrometers as a thin capsule; with this definition, all tumors had a focally thin capsule for up to 20% of the entire tumor circumference[18]. Another aspect of the capsule is tumor ingrowth that is continuous with the main tumor in the fibrous; this finding is designated with different terms in the literature such as capsular herniation/penetration, tumor buds, or nodular protrusion, and this is present in 28% of the cases. Pseudopodia is defined as an island of tumor separated from the main tumor but still within the capsule whereas satellite nodules are separated from both the capsule and the main tumor. Pseudopodia was found in 40% of the cases while satellite nodules in only 13%[16].

Imaging

The hallmark of pleomorphic adenoma in ultrasound examination is a lobulated, well-defined contour; the tumor is usually homogenous with low vascularity. On Sonoelastography, it demonstrates the so-called “dense core” sign[19, 20]. MRI is the second choice, especially in difficult-to-assess deep tumors or extensive growth. In MRI, the tumor exhibits low to intermediate intensity on T1, and the cellular part will correspond to a high-intensity area, whereas the myxoid will give a higher intensity[21]. CT is rarely needed, but it can be useful in showing bony involvement. A well-defined sometimes lobulated mass with either heterogeneous or homogeneous contrast enhancement can be demonstrated[22].

Recurrence

At one historical point of time , recurrence rates were extremely high 25%-88.9%. This dropped down drastically after the abandonment of Enucleation which left the tumor capsule behind[23, 24]. A high-risk factor for recurrence includes young age at first diagnosis. Patients who have recurrences tend to be about ten years younger than those who do not [1, 14, 25]. Margin Status, Tumor Spillage is associated with 80% while capsule puncture has a 26.9% risk of recurrence. Uncertain margin status from the initial therapy also accounts for a risk factor[1, 14].

Recurrences are in most cases (90%) multinodular with a mean number of nodules 26-58 and nodule numbers ranging from 2-266[14, 26]. Multilocularity is a risk factor for the second recurrence. Pathological examination has revealed more nodules when compared to MRI findings. Nodules were constantly found in the first tumor resection bed, but in 80%, there were nodules observed outside the scar, impeded in healthy surrounding fat tissue or other parts of the gland[26].

In a nationwide study In the Netherlands, recurrences had a median interval of 7 years; there was a recurrence risk of 6.4% with a 1.1% risk of recurrence between 15-20 years after the first tumor. Second recurrences (16%) were encountered mainly in the first five years after the first recurrence. The risk of malignant transformation was 3.2% for all recurrence patients[14]. Another study showed thatrecurrence occurred from 1 to 16 years, but only 12% were diagnosed through regular follow-up [27]. In our Institute, we conduct a yearly ultrasound follow-up. MRI is rarely needed, and we believe that patients are more compliant with a quick ultrasound examination done by our ENT residents. The role of adjuvant radiotherapy is not well standardized; in one study group there were 34 patients with a different number of recurrences and multinodular disease and positive microscopic margins, but none had a gross residual of tumor, received 45-60 Gy Radiation therapy dose as adjuvant therapy. 94% local control was achieved; one patient developed mucoepidermoid carcinoma 14 years after therapy[28].

Current Opinion on Surgical Intervention

After the abandonment of Enucleation because of high recurrence rates, Total Parotidectomy (total resection of both superficial and deep lobe with preservation of facial nerve) was adopted as a surgical option. Many surgeons went for an even lesser variant like Superficial/ Lateral Parotidectomy (resection of the superficial lobe lateral to the facial nerve with nerve dissection) or a Partial superficial parotidectomy (resection of part of the lateral lobe with facial nerve main trunk preparation) or an Extracapsular Dissection (Tumor with a cuff of normal tissue without main trunk preparation)[29]. There is debate about if lesser variant especially Extracapsular Dissection pays enough respect to tumor histological features especially satellite nodule and pseudopodia[18]. On the other side, many studies show that EC, PSP, SP, and TP all have similar recurrence rates. The argument for extracapsular dissection is shorter operation time, less complication rate especially Frey syndrome, and better cosmetic satisfaction, as well as an easier revision if needed as the facial nerve is not in the resection bed [23, 29, 30]. It needs to be said that accumulation of experience as demonstrated in the institutional learning curve in a Reference center in Germany as reported by Mantsopoulos et al.[31] helps to refine and optimize surgical outcome and procedure for extracapsular dissection, which leaves lateral parotidectomy as a choice for a more standardized approach for centers that deal with a low number of cases.

References

1. Barnes, L., et al., World Health Organization classifications tumours. Pathology and genetics of head and neck tumours. Lyon: IARC, 2005.
2. Bradley, P.J. and M. McGurk, Incidence of salivary gland neoplasms in a defined UK population. Br J Oral Maxillofac Surg, 2013. 51(5): p. 399-403.
3. Arifullah, et al., Salivary Gland Tumours; Frequency of Salivary Gland Tumours. The Professional Medical Journal, 2017. 24(09): p. 1327-1330.
4. Ito, F.A., et al., Histopathological findings of pleomorphic adenomas of the salivary glands. Med Oral Patol Oral Cir Bucal, 2009. 14(2): p. E57-61.
5. Klijanienko, J., et al., Clinically aggressive metastasizing pleomorphic adenoma: report of two cases. Head Neck, 1997. 19(7): p. 629-33.
6. Knight, J. and K. Ratnasingham, Metastasising pleomorphic adenoma: Systematic review. Int J Surg, 2015. 19: p. 137-45.
7. Tarsitano, A., et al., Metastasizing "benign" pleomorphic salivary adenoma: a dramatic case-report and literature review. J Craniomaxillofac Surg, 2014. 42(8): p. 1562-5.
8. Weissferdt, A. and G. Langman, An intracapsular carcinoma ex pleomorphic adenoma with lung metastases composed exclusively of benign elements: histological evidence of a continuum between metastasizing pleomorphic adenoma and carcinoma ex pleomorphic adenoma. Pathol Res Pract, 2010. 206(7): p. 480-3.
9. Lewis, J.E., K.D. Olsen, and T.J. Sebo, Carcinoma ex pleomorphic adenoma: pathologic analysis of 73 cases. Human pathology, 2001. 32(6): p. 596-604.
10. El-Hadi, T., et al., Plemorphic adenoma of the infratemporal space: a new case report. Int J Otolaryngol, 2009. 2009: p. 529350.
11. Rodriguez-Ciurana, J., et al., Giant parotid pleomorphic adenoma involving the parapharyngeal space: report of a case. J Oral Maxillofac Surg, 2000. 58(10): p. 1184-7.
12. Sergi, B., et al., Giant deep lobe parotid gland pleomorphic adenoma involving the parapharyngeal space. Report of three cases and review of the diagnostic and therapeutic approaches. Acta Otorhinolaryngologica Italica, 2008. 28(5): p. 261.
13. Gierek, T., et al., Extensive pleomorphic adenoma of parapharyngeal space with pterygopalatine fossa and skull base penetration –. Współczesna Onkologia, 2010. 5: p. 340-343.
14. Valstar, M.H., et al., Salivary gland pleomorphic adenoma in the Netherlands: A nationwide observational study of primary tumor incidence, malignant transformation, recurrence, and risk factors for recurrence. Oral Oncol, 2017. 66: p. 93-99.
15. Bullerdiek, J., et al., Cytogenetic subtyping of 220 salivary gland pleomorphic adenomas: correlation to occurrence, histological subtype, and in vitro cellular behavior. Cancer genetics and cytogenetics, 1993. 65(1): p. 27-31.
16. Zbären, P. and E. Stauffer, Pleomorphic adenoma of the parotid gland: histopathologic analysis of the capsular characteristics of 218 tumors. Head & Neck, 2007. 29(8): p. 751-757.
17. Seifert, G., I. Langrock, and K. Donath, A pathological classification of pleomorphic adenoma of the salivary glands (author's transl). Hno, 1976. 24(12): p. 415-426.
18. Stennert, E., et al., Histopathology of pleomorphic adenoma in the parotid gland: a prospective unselected series of 100 cases. The Laryngoscope, 2001. 111(12): p. 2195-2200.
19. Klintworth, N., et al., Sonoelastography of parotid gland tumours: initial experience and identification of characteristic patterns. European radiology, 2012. 22(5): p. 947-956.
20. Dumitriu, D., et al., Ultrasonographic and sonoelastographic features of pleomorphic adenomas of the salivary glands. Medical ultrasonography, 2010. 12(3): p. 175-183.
21. Tsushima, Y., et al., Characteristic bright signal of parotid pleomorphic adenomas on T2-weighted MR images with pathological correlation. Clinical radiology, 1994. 49(7): p. 485-489.
22. Choi, D.S., et al., Salivary gland tumors: evaluation with two-phase helical CT. Radiology, 2000. 214(1): p. 231-236.
23. Witt, R.L., The significance of the margin in parotid surgery for pleomorphic adenoma. The Laryngoscope, 2002. 112(12): p. 2141-2154.

24. Causevic Vucak, M. and T. Masic, The incidence of recurrent pleomorphic adenoma of the parotid gland in relation to the choice of surgical procedure. Med Glas (Zenica), 2014. 11(1): p. 66-71.
25. Espinosa, C.A., et al., Clinicopathologic and Surgical Study of Pleomorphic Adenoma of the Parotid Gland: Analysis of Risk Factors for Recurrence and Facial Nerve Dysfunction. J Oral Maxillofac Surg, 2018. 76(2): p. 347-354.
26. Stennert, E., et al., Recurrent pleomorphic adenoma of the parotid gland: a prospective histopathological and immunohistochemical study. Laryngoscope, 2004. 114(1): p. 158-63.
27. Redaelli de Zinis, L.O., et al., Management and prognostic factors of recurrent pleomorphic adenoma of the parotid gland: personal experience and review of the literature. Eur Arch Otorhinolaryngol, 2008. 265(4): p. 447-52.
28. Chen, A.M., et al., Recurrent pleomorphic adenoma of the parotid gland: long-term outcome of patients treated with radiation therapy. International Journal of Radiation Oncology* Biology* Physics, 2006. 66(4): p. 1031-1035.
29. Koch, M., J. Zenk, and H. Iro, Long-term results of morbidity after parotid gland surgery in benign disease. Laryngoscope, 2010. 120(4): p. 724-30.
30. Zbaren, P., et al., Pleomorphic adenoma of the parotid: formal parotidectomy or limited surgery? Am J Surg, 2013. 205(1): p. 109-18.
31. Mantsopoulos, K., et al., Evolution and changing trends in surgery for benign parotid tumors. Laryngoscope, 2015. 125(1): p. 122-7.

Knowledge and attitude towards chronic musculoskeletal pain treated with osteopathy, a systematic review

Ali Abdullah Alshareef[1], Bandar Saeed Alqahtani[2], Thamer Yahya Alasiri[2], Alqahtani, Waleed Ali A[3], Mohaned Saeed Argan[3], Qaysi, Abdulaziz Atiah[3], Alshehri, Mohammed Abdullah[3], Saeed Ibrahim Alqahtani[4]

(1) Registrar Orthopedic Surgery, Orthopedic and Trauma Surgery department
Armed Forces Hospital in Southern Region, Kingdom of Saudi Arabia
(2) Consultant orthopedic surgery, Orthopedic and Trauma Surgery department
Armed Forces Hospital in Southern Region, Kingdom of Saudi Arabia
(3) Senior Registrar Orthopedic Surgery, Orthopedic and Trauma Surgery department
Armed Forces Hospital in Southern Region, Kingdom of Saudi Arabia
(4) Orthopedic Registrar, Orthopedic and Trauma Surgery department
Armed Forces Hospital in Southern Region, Kingdom of Saudi Arabia

Corresponding author:
Ali Abdullah Alshareef
Registrar Orthopedic Surgery
Orthopedic and Trauma Surgery department
Armed Forces Hospital in Southern Region, Kingdom of Saudi Arabia
Phone: 0564054994
Email: Dr.ali.alshareef47@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Ali Abdullah Alshareef et al. Knowledge and attitude towards chronic musculoskeletal pain treated with osteopathy, a systematic review. World Family Medicine. December 2023; 21(11): 44-49. DOI: 10.5742/MEWFM.2023.95256214

Abstract

Background: Chronic pain is a common clinical feature that accompanies osteopathy. Knowledge and attitudes of both patients and their treating clinicians would influence the patients' outcomes and pain control.

Objective: This systematic review will provide an understanding of the knowledge and attitudes of patients and clinicians towards musculoskeletal pain accompanying osteopathy.

Method: Different keywords were used to search the medical literature, including: "knowledge" OR "Attitude" AND "Osteopathy" AND "Pain" AND "patient" OR "clinician." The search databases included Medline, Embase PubMed, and SCOPUS. The following step was reviewing the results to ensure that they were original research articles that examined the knowledge and attitudes about chronic musculoskeletal pain with osteopathy. All the eligible studies needed to mention the type of participants examined (either patients or clinicians).

Result: A total of 89 studies were obtained. After removing review articles and choosing original research studies solely, 11 studies appeared from the filtration process. Eight research articles were eligible. All the included studies had a quantitative cross-sectional design. Only health care professionals were asked about osteopathy, where all the studies included osteopaths from different countries, except one study that included physiotherapists. Osteopaths knew about the benefits of osteopathy, particularly for lower back pain; however, their knowledge about biopsychosocial factors requires improvement.

Conclusion: Knowledge about osteopathy benefits for controlling chronic musculoskeletal pain should be improved even among osteopaths. Awareness campaigns about osteopathy are also needed for patients in orthopedic and physiotherapy clinics.

Keywords: Knowledge, Attitude, Chronic pain, Musculoskeletal, Osteopathy.

Introduction

Chronic pain is regarded as a common condition that challenges physiotherapists and orthopedics [1]. Managing chronic pain necessitates an understanding of different contributors that affect chronic pain sensation in osteopathy patients. This is particularly crucial for musculoskeletal pain [2]. The prevalence of chronic pain is relatively high, with more than five million patients suffering from chronic pain annually in Europe, with an estimation of 28 million patients living with chronic pain [3].

Osteopathic techniques can play a pivotal role in reducing chronic musculoskeletal pain [4]. They have a particular benefit in pain associated with the low back. However, the knowledge of patients about the availability of osteopathic techniques and the attitudes and perceptions of clinicians towards using these techniques could significantly influence the use of osteopathy [5]. Osteopathy can also supplement the effect of medication, as biochemical explanations may not always be sufficient to explain the etiology of chronic pain [6].

There are multiple factors to consider with the assessment of Musculoskeletal chronic pain and the potential benefit from osteopathy [7]. There are socio-economic as well as psychological factors, that influence the perceptions of patients towards chronic pain [8]. However, improving patients' knowledge about chronic pain and their options to control pain would improve their experience [9, 10]].

There have been some proposals that patients of clinicians who have positive attitudes towards using osteopathy to treat chronic pain have better clinical outcomes and more extended pain-free periods, compared to patients on pharmacological treatment solely. However, these data are still debatable and require further exploration [11].

Accordingly, this systematic review will determine what patients and clinicians know and how they behave towards chronic musculoskeletal pain managed with osteopathy.

Review

Methodology

This systematic review adhered to the PRISMA checklist forms for systematic review and meta-analysis [12]. This systematic review was done via reviewing electronic databases to select the eligible research studies between 2011 and 2021 through four databases: Medline, Embase, PubMed, and SCOPUS.

Search Strategy

The keywords used were: "knowledge" OR "Attitude" AND "Osteopathy" AND "Pain" AND "patient" OR "clinician". All the titles and abstracts resulting from this primary evaluation were assessed thoroughly to avoid losing any eligible research articles. The results were then evaluated to select only original research studies which examined the knowledge and attitudes about chronic musculoskeletal pain with osteopathy. All the included studies needed to mention the type of participants examined (either patients or clinicians). Only articles in English were considered studies of possible inclusion, which were then included in the second stage.

Eligibility Criteria

The following stage was identifying the inclusion criteria to select the eligible research articles. Abstracts were assessed manually to identify all the articles that were to be included for further review. We set inclusion criteria which comprised mentioning the participant population (patients or clinicians) as well as studies published during the last decade. The final stage was gathering the pre-defined extracted data from the pre-formed Excel sheet to collect data from eligible articles and arrange them. Reviews and articles that contained missing or overlapped data were removed.Additionally , unavailable full-text articles or poor study designs were removed. The full description of the search strategy is shown in Figure 1.

Data Review and Analysis

The initial stage in the data review process was a fundamental review that used a pre-formed Excel sheet to gather information. The selected information from eligible research studies was then revised via the Excel sheet. In the case of multiple research studies designed by one research group assessing similar variables, an evaluation for duplication possibility was carried out.

Results

After evaluating all abstracts and assessing them against the inclusion criteria to detect the abstracts for inclusion, eight research articles were eligible to be included [13-20]. All the included studies had a quantitative cross-sectional design, where surveys were used to evaluate the knowledge and attitudes towards osteopathy for chronic musculoskeletal pain.

Only health care professionals were asked about osteopathy, where all the studies included osteopaths from different countries, except one study that included physiotherapists [14]. It has been shown that osteopaths knew about the benefits of osteopathy for chronic musculoskeletal pain, particularly for lower back pain; however, their knowledge about biopsychosocial factors requires improvement. It has also been shown that patients' demographics could affect their acceptance to being treated by osteopathy to control their pain but at a minimal level, as detailed in Table 1.

Figure 1

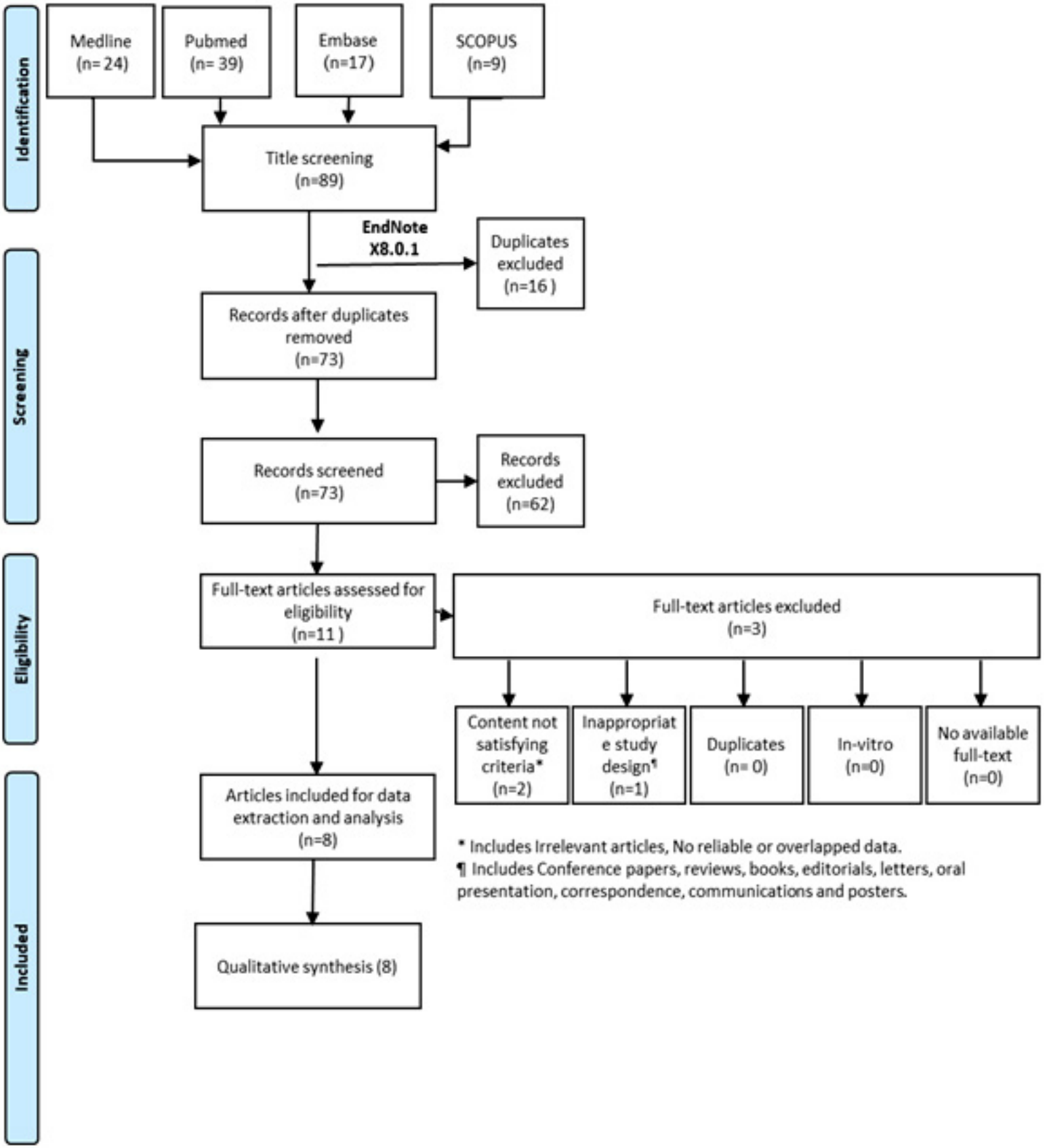

Identification
Medline (n= 24)
Pubmed (n= 39)
Embase (n=17)
SCOPUS (n=9)
Title screening (n=89)
EndNote X8.0.1
Duplicates excluded (n=16)
Screening
Records after duplicates removed (n=73)
Records screened (n=73)
Records excluded (n=62)
Eligibility
Full-text articles assessed for eligibility (n=11)
Full-text articles excluded (n=3)
Content not satisfying criteria* (n=2)
Inappropriate study design¶ (n=1)
Duplicates (n= 0)
In-vitro (n=0)
No available full-text (n=0)
Included
Articles included for data extraction and analysis (n=8)
Qualitative synthesis (8)
* Includes Irrelevant articles, No reliable or overlapped data.
¶ Includes Conference papers, reviews, books, editorials, letters, oral presentation, correspondence, communications and posters.

Table 1

Authors	Year	Study design	Sample size	Patients/ clinicians	Objective	Result
Van Biesen et al. [13]	2020	questionnaire.	70	osteopaths	To evaluate the attitudes of osteopaths towards using osteopathy to reduce chronic pain associated with chronic lower back pain.	The attitudes and knowledge of Spanish osteopaths were non-significantly different from other healthcare professionals towards using osteopathy. A quarter of the responders feared using osteopathy because of misconception, which influenced their management strategies.
Benny et al. [14]	2020	questionnaire.	99	Physio-therapists'	To understand the attitudes and knowledge of musculoskeletal physiotherapists practicing in Canada towards osteopathy for chronic lower back pain.	To understand the attitudes and knowledge of musculoskeletal physiotherapists practicing in Canada towards osteopathy for chronic lower back pain.
Abrosimoff et al. [15]	2020	qualitative study	17	osteopaths	To evaluate the attitude of osteopaths' for their use of osteopathy to treat lower back pain with the challenges facing its use.	The responders thought that osteopathy could improve a patient's experience of pain. They had good knowledge about factors causing chronic pain and how to manage these factors. However, there was great uncertainty about this treatment strategy, and physicians do not get enough training on osteopathy at their early career stages.
Fitzgerald et al. [16]	2020	questionnaire.	211	osteopaths	To assess Australian osteopaths' knowledge about the acceptance of osteopathy by patients as a treatment strategy for chronic pain.	Osteopaths believed that patients need psychological support besides osteopathy and that behaviors of patients towards osteopathy can be affected by demographic factors at a minimal level. They also thought that patients with lower back pain may need more treatment sessions than other patients. Osteopaths who had higher studies and certification in pain management had significantly higher knowledge about osteopathy ($p < 0.01$).
Bar-Zaccay et al. [17	2018	cross-sectional survey	107	osteopaths	To assess the attitudes and beliefs of osteopaths towards the management of low back pain (LBP) using osteopathy	Osteopaths' believe in the benefits of osteopathy for controlling pain with LBP, but some were doubtful if the biopsychosocial model can help their decision-making regarding pain control. Future studies should investigate the impact of osteopaths' beliefs on their clinical management of LBP
Formica et al. [18]	2018	qualitative study	11	osteopaths	Italian osteopaths' attitudes and beliefs towards chronic pain treatment.	Osteopaths displayed a more excellent orientation towards the benefit of osteopathy for chronic pain. Osteopaths had poor knowledge about the biopsychosocial model, which constitutes an integral part of the osteopathy treatment strategy. Osteopaths also lacked knowledge about how to evaluate psychosocial risk factors for chronic musculoskeletal pain evaluation.
Macdonald et al. [19]	2018	cross-sectional questionnaire	216	survey	To evaluate knowledge and attitudes of UK osteopaths towards chronic pain and the management of chronic musculoskeletal pain patients through osteopathy.	Osteopaths in the UK did not have significantly higher knowledge about the biopsychosocial strategies for the management of chronic pain patients compared to other healthcare professionals. Psychosocial factors of the patients' pain experience can be improved. Osteopaths need further training on osteopathy benefits in chronic pain patients, particularly the biopsychosocial approach.
Morin et al. [20]	2014	survey	277	osteeopaths	to examine the opinions of osteopaths about patient factors affecting osteopathy consultations for the management of chronic musculoskeletal pain.	Musculoskeletal pain located in the spine, thorax, pelvis, and limbs was the most common reason for patients seeking osteopath's consultation among more than half of the patients. Females seeking osteopathy were significantly higher than males.

Discussion

Patients with chronic musculoskeletal pain usually have an impaired quality of life and reduced productivity [16]. There are different methods for chronic pain; an effective approach is the use of osteopathy, particularly for chronic low back pain, though, evidence on its efficacy is still controversial for all patients with chronic pain [17]. Furthermore, knowledge and attitudes of patients and clinicians towards osteopathy for chronic musculoskeletal pain is unclear [7].

The present review examined the medical literature to identify the knowledge and attitudes of patients and clinicians from different specialities towards osteopathy. It has been shown that knowledge and attitudes of patients are understudied, and they were only examined from a clinicians' point of view. Additionally, only osteopaths and physiotherapists were considered.

The present review demonstrated that osteopaths and physiotherapists had inadequate knowledge and attitude about osteopathy, especially the biopsychosocial aspect of the strategy. It has been also revealed that female patients and those with lower back pain are the most common to seek medical advice for treating their chronic musculoskeletal pain with osteopathy. Also, socio-demographic factors of patients might have minimal influence on the decision to apply osteopathy strategies to control their chronic pain.

Interest in understanding the knowledge and attitudes towards osteopathy has dramatically increased in the past five years, as shown in this review. Four studies examined the knowledge and behaviours of osteopaths and physiotherapists during the last year [13-16]. Also, questionnaires were found to be the most used method for understanding the knowledge and attitudes about osteopathy.

Chronic low back pain was the most common type of chronic musculoskeletal pain which required osteopathy. Van Biesen et al. [13] showed that Spanish osteopaths' knowledge and attitudes about osteopathy for treatment of chronic low back pain did not differ significantly from other medical professionals. While Van Biesen et al. [13] highlighted that osteopaths may fear using osteopathy for controlling their patients' pain due to limited evidence on its use [13].

On the contrary, Benny et al. [14] showed that the knowledge and attitudes of osteopathy for chronic low back pain could vary based on the professional characters of the physiotherapists. Less experienced and physiotherapists working in public institutions had significantly higher knowledge compared to their peers (p-value<0.05). Benny et al. [14] also endorsed more studies to find associations between improving knowledge and improved patient outcomes in terms of pain control. These findings came compliant to the findings from Abrosimoff et al. [15] which involved osteopaths rather than physiotherapists.

Moreover, Fitzgerald et al. [16] highlighted that patients need psychological support in addition to the osteopathic strategy, and that demographic variations among patients may affect their attitude and acceptance of osteopathy. Two additions for Fitzgerald et al. [16] was that patients with low back pain would need more osteopathy sessions, and that patients with pain control certification were significantly more aware of osteopathy (p-value<0.01).

Insufficient knowledge about biopsychosocial strategies for osteopathy were identified among Italian osteopaths by Formica et al. [18] and among UK osteopaths by Macdonald et al. [19]. Also, Morin et al. [20] demonstrated patients with the best attitudes towards osteopathy, included females, patients with musculoskeletal pain in thorax, spine, limbs and pelvis [20].

However, this review is limited by some obstacles. All the included studies used a quantitative design using surveys. Responses to surveys usually depend on the subjective opinion of the responders, which can affect the reliability of the assessed knowledge level. Other objective methods would be endorsed for future studies.

Conclusion

Knowledge and attitudes of healthcare professionals, including physiotherapists and osteopaths, about osteopathy use for controlling chronic musculoskeletal pain should be improved through early training programs and courses starting from medical schools. Awareness campaigns and patient education sessions are also needed for patients who suffer from chronic musculoskeletal pain in orthopedic and physiotherapy clinics. Future studies should investigate the correlation between knowledge and attitudes towards osteopathy with patient outcomes.

References

1. Bill AS, Dubois J, Pasquier J, Burnand B, Rodondi PY. Osteopathy in the French-speaking part of Switzerland: Practitioners' profile and scope of back pain management. PloS one. 2020 May 1;15(5):e0232607.
2. Thomson OP, Petty NJ, Moore AP. A qualitative grounded theory study of the conceptions of clinical practice in osteopathy–a continuum from technical rationality to professional artistry. Manual therapy. 2014 Feb 1;19(1):37-43.
3. Bordoni B. The benefits and limitations of evidence-based practice in osteopathy. Cureus. 2019 Nov;11(11).
4. Vaughan B, Grant M, Moroz J, Ngawaka C, Mulcahy J. Self-management behaviour and knowledge of patients with musculoskeletal complaints attending an Australian osteopathy clinic: A consecutive sampling design. International Journal of Osteopathic Medicine. 2020 Sep 1;37:3-9.
5. Thomson OP, Petty NJ, Moore AP. Reconsidering the patient-centeredness of osteopathy. International Journal of Osteopathic Medicine. 2013 Mar 1;16(1):25-32.

6. Dubois J, Scala E, Faouzi M, Decosterd I, Burnand B, Rodondi PY. Chronic low back pain patients' use of, level of knowledge of and perceived benefits of complementary medicine: a cross-sectional study at an academic pain center. BMC complementary and alternative medicine. 2017 Dec;17(1):1-8.
7. Fitzgerald K, Devonshire E, Vaughan B. Pain Knowledge, Attitudes and Beliefs of Allied Health Learners Across Three Curricular Models. Health Professions Education. 2020 Dec 1;6(4):552-63.
8. Smith D. Reflecting on new models for osteopathy–it's time for change. International Journal of Osteopathic Medicine. 2019 Mar 1;31:15-20.
9. Rajendran D, Bright P, Bettles S, Carnes D, Mullinger B. What puts the adverse in 'adverse events'? Patients' perceptions of post-treatment experiences in osteopathy–a qualitative study using focus groups. Manual therapy. 2012 Aug 1;17(4):305-11.
10. D'alessandro G, Cerritelli F, Cortelli P. Sensitization and interoception as key neurological concepts in osteopathy and other manual medicines. Frontiers in neuroscience. 2016 Mar 10;10:100.
11. Thomson OP, Petty NJ, Moore AP. Clinical decision-making and therapeutic approaches in osteopathy–a qualitative grounded theory study. Manual therapy. 2014 Feb 1;19(1):44-51.
12. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. PLoS medicine. 2009;6(7):e1000100.
13. Van Biesen T, Alvarez G. Beliefs about chronic low back pain amongst osteopaths registered in Spain: A cross-sectional survey. International Journal of Osteopathic Medicine. 2020 Jun 1;36:3-10.
14. Benny E, Evans C. Ontario Musculoskeletal Physiotherapists' Attitudes toward and Beliefs about Managing Chronic Low Back Pain. Physiotherapy Canada. 2020 Nov 1;72(4):355-63.
15. Abrosimoff M, Rajendran D. 'Tell me your story'-How osteopaths apply the BPS model when managing low back pain-A qualitative study. International Journal of Osteopathic Medicine. 2020 Mar 1;35:13-21.
16. Fitzgerald K, Vaughan B, Fleischmann M, Austin P. Pain knowledge, attitudes and beliefs of Australian osteopaths drawn from a nationally representative sample of the profession. Journal of Bodywork and Movement Therapies. 2020 Oct 1;24(4):43-50.
17. Bar-Zaccay A, Bailey D. The attitudes and beliefs of UK osteopaths towards the management of low back pain: a cross-sectional study. International Journal of Osteopathic Medicine. 2018 Jun 1;28:42-7.
18. Formica A, Thomson OP, Esteves JE. 'I just don't have the tools'-Italian osteopaths' attitudes and beliefs about the management of patients with chronic pain: a qualitative study. International Journal of Osteopathic Medicine. 2018 Mar 1;27:6-13.

Paediatric Palliative Care: Challenges and Opportunities for Nurses: A Literature Review

Fatimah Khalid Alonazi, Ranyah Mohammed Almass, Intisar Ayed Alkhaldi

King Saud Medical City, Saudi Arabia

Correspondence:
Fatimah Khalid Alonazi
King Saud Medical City
Email: fatimahalonazi129@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Faisal Hussein Alkhaywani et al. Patient's Perspective for their Non-Urgent Presentations to the Emergency Department in Najran City. World Family Medicine. December 2023; 21(11): 50-52. DOI: 10.5742/MEWFM.2023.95256220

Abstract

Background: Paediatric palliative care is a specialized approach designed to improve the quality of life for children facing life-limiting illnesses, and their families. This comprehensive review explores the various interventions implemented within the realm of paediatric palliative care, encompassing physical, emotional, social, and spiritual dimensions.

Methods : A systematic literature search was conducted across major medical databases, identifying studies, reviews, and guidelines related to paediatric palliative care interventions. The selected articles were critically appraised to extract information on diverse aspects of care, including symptom management, psychosocial support, family-centred approaches, and ethical considerations.

Results: The review synthesizes evidence on the holistic nature of paediatric palliative care, highlighting the effectiveness of multidisciplinary teams in addressing the complex needs of children and their families. Physical symptom management, encompassing pain control and other symptom alleviation strategies, emerged as a crucial component. Psychosocial support interventions, including counselling and therapeutic approaches, were found to enhance emotional well-being for both children and their caregivers.

Discussion: Effective communication emerged as a fundamental aspect, fostering shared decision-making and open dialogue about the child's illness, prognosis, and treatment options. The family-centred approach recognized the pivotal role of families in the care continuum, emphasizing their needs and preferences. Ethical considerations surrounding end-of-life care were explored, emphasizing the importance of navigating complex decision-making processes with sensitivity and respect for cultural and religious beliefs.

Conclusion: Paediatric palliative care, as revealed through this comprehensive review, constitutes a multifaceted and evolving field. The integration of diverse interventions, coupled with ongoing research and advancements, underscores the commitment to enhancing the quality of life for children facing life-limiting illnesses and their families. Future directions include continued collaboration between healthcare professionals, increased awareness, and further research to optimize care practices and outcomes in paediatric palliative care.

Keywords: paediatric palliative care, multidisciplinary care, symptom management, psychosocial support, family-centred care, ethical considerations

Literature Review: Paediatric Palliative Care

Paediatric palliative care is a specialized and evolving field dedicated to enhancing the quality of life for children facing life-limiting illnesses and their families. This literature review explores key themes in paediatric palliative care, including holistic care approaches, symptom management, family-centred care, and ethical considerations.

Holistic Care in Paediatric Palliative Care
Holistic care is a fundamental principle in paediatric palliative care, aiming to address the physical, emotional, social, and spiritual needs of the child and their family (Davies et al., 2017; Himelstein et al., 2016). The integration of a multidisciplinary team is crucial, involving healthcare professionals such as physicians, nurses, social workers, psychologists, and chaplains (Feudtner et al., 2013; Wolfe et al., 2018).

Symptom Management
Effective symptom management is paramount in improving the child's comfort and overall well-being (Collins et al., 2015; Klick et al., 2019). Studies highlight advancements in pain control, nausea management, and innovative approaches to alleviate symptoms (Twycross et al., 2017; von Baeyer et al., 2018).

Family-Centred Approaches
Recognizing the family as a unit of care is a cornerstone of paediatric palliative care (Liben et al., 2015). Family-centred care interventions involve families in decision-making, care planning, and emotional support, promoting resilience within the family unit (Widger et al., 2016; Bluebond-Langner et al., 2018).

Communication in Paediatric Palliative Care
Effective communication is crucial for facilitating shared decision-making and providing support to families (Knapp et al., 2017; Wiener et al., 2015). Communication tools and training for healthcare professionals are essential components of paediatric palliative care interventions (Feraco et al., 2019; Kassam et al., 2016).

Ethical Considerations
Ethical considerations, particularly in end-of-life care, are explored in the literature (Lyon et al., 2014; Meert et al., 2018). Discussions on the withholding or withdrawing of treatment, respecting the autonomy of the child, and providing bereavement support are crucial aspects of ethical paediatric palliative care (Sisk et al., 2020; Hain et al., 2016).

This literature review highlights the multidimensional nature of paediatric palliative care interventions, emphasizing holistic and family-centred approaches. Ongoing research, collaboration, and advancements in symptom management and communication strategies contribute to the evolving landscape of paediatric palliative care, ultimately enhancing the quality of life for children and their families.

Methods

The literature review method was conducted in this research. Numerous articles were defined through searches of four electronic databases: CINAHL, Google Scholar, PubMed, and Web of Science. Key words during the search process included paediatric palliative care, multidisciplinary care, symptom management, psychosocial support, family-centred care, ethical considerations.

The literature search revealed 1500 topics for initial investigating. After reviewing the topics for their overall topics related to our research and discarding unrelated topics and repeated titles, 36 topics remained for literature review. Furthermore, 18 studies were excluded from research because they did not align with the inclusion criteria in our research or to the exclusion criteria.

Discussion

Holistic Approaches in Paediatric Palliative Care
Paediatric palliative care embodies a holistic approach, addressing the multifaceted needs of children facing life-limiting illnesses. Davies et al. (2017) emphasize the importance of holistic care, including physical, emotional, social, and spiritual dimensions. This approach recognizes the child as a whole being, necessitating a coordinated effort from a multidisciplinary team to optimize the child's quality of life (Wolfe et al., 2018).

Symptom Management Strategies
Efficient symptom management is paramount in paediatric palliative care to alleviate suffering and enhance the overall well-being of the child. Twycross et al. (2017) discuss advancements in pain control, emphasizing the use of tailored approaches to address individual needs. Collins et al. (2015) highlight the significance of comprehensive symptom management, extending beyond pain to encompass nausea, fatigue, and other symptoms.

Family-Centred Care
Family-centred care plays a pivotal role in pediatric palliative care, recognizing the interdependence between the child and their family. Liben et al. (2015) advocate for interventions that involve families in decision-making and care planning. The positive impact of family-centred approaches is evident in studies by Bluebond-Langner et al. (2018), emphasizing the importance of addressing not only the medical needs of the child but also the emotional and practical needs of the entire family unit.

Effective Communication Strategies
Open and effective communication is a linchpin in navigating the complexities of paediatric palliative care. Wiener et al. (2015) stress the importance of transparent communication about the child's condition, prognosis, and treatment options. Feraco et al. (2019) contribute to this discourse by highlighting the value of communication skills training for healthcare professionals, underscoring the need for tailored approaches in discussing sensitive topics with families.

Ethical Considerations in Paediatric Palliative Care

Navigating ethical considerations is an inherent part of paediatric palliative care, especially in end-of-life situations. Lyon et al. (2014) discuss the nuances of ethical decision-making, including the withholding or withdrawing of treatment. Meert et al. (2018) delve into the ethical aspects of bereavement support, emphasizing the need for compassionate and culturally sensitive care during the grieving process.

Emerging Trends and Innovations

The landscape of paediatric palliative care is continually evolving with emerging trends and innovations. Himelstein et al. (2016) explore the role of technology in enhancing care, while Knapp et al. (2017) discuss creative modalities such as play therapy and art therapy. These innovations contribute to a more personalized and comprehensive approach to address the unique needs of each child and family.

In conclusion, paediatric palliative care represents a comprehensive and evolving field that seeks to enhance the quality of life for children facing life-limiting illnesses, and their families. Holistic care, effective symptom management, family-centred approaches, communication strategies, and ethical considerations form the core pillars of this specialized care. Ongoing research and innovative interventions further propel the field forward, emphasizing a collective commitment to optimizing the well-being of children in palliative care.

References

- Bluebond-Langner M, et al. (2018). The Quality of Life of Children with Advanced Cancer: A Cross-Sectional Study. Palliative Medicine, 32(2), 376-385.
- Collins JJ, et al. (2015). Symptoms of Pain and Fatigue in Children with Cancer. The Journal of Pain, 16(1), S112.
- Davies B, et al. (2017). Opening Spaces of Possibility: The Enactment of Palliative Competence in Paediatric Care. Qualitative Health Research, 27(2), 207-218.
- Feraco AM, et al. (2019). Evaluation of Communication Skills Training for Pediatric Palliative Care Clinicians. Journal of Pain and Symptom Management, 57(2), 289-298.
- Feudtner C, et al. (2013). Paediatric Palliative Care Programs in Children's Hospitals: A Cross-Sectional National Survey. Paediatrics, 132(6), 1063–1070.
- Hain RDW, et al. (2016). Paediatric Palliative Medicine in the UK: Past, Present, Future. Archives of Disease in Childhood, 101(6), 591-597.
- Himelstein BP, et al. (2016). Paediatric Palliative Care. New England Journal of Medicine, 374(15), 1488-1495.
- Kassam A, et al. (2016). Bereaved Parents' Perspectives on Paediatric Palliative Care. Journal of Palliative Medicine, 19(5), 529-535.
- Knapp C, et al. (2017). Communication in Paediatric Oncology: State of the Field and Research Agenda. Paediatric Blood & Cancer, 64(5), e26370.
- Liben S, et al. (2015). Parental Perspectives on End-of-Life Care in the Pediatric Intensive Care Unit. Paediatric Critical Care Medicine, 16(3), e52-e58.
- Lyon ME, et al. (2014). Paediatric Palliative Care in Oncology: Experiences from the Field. American Journal of Hospice and Palliative Medicine, 31(5), 529-534.
- Meert KL, et al. (2018). Parental Bereavement Needs Assessment in a Paediatric Intensive Care Unit: A Multicenter Study. Paediatric Critical Care Medicine, 19(9), e457-e467.
- Sisk BA, et al. (2020). Parental Perspectives Regarding Communication About Palliative Care for Children with Cancer. JAMA Network Open, 3(4), e202324.
- Twycross A, et al. (2017). Pain in Children: A Brief Overview of the Literature. International Journal of Palliative Nursing, 23(8), 372-377.
- von Baeyer CL, et al. (2018). Systematic Review of Self-Report Measures of Pain Intensity in 3- and 4-Year-Old Children: Bridging a Period of Rapid Cognitive Development. The Journal of Pain, 19(4), 359-366.
- Widger K, et al. (2016). Development of a Paediatric Palliative Care Team in a Canadian Paediatric Oncology Centre. Journal of Paediatric Oncology Nursing, 33(5), 354-366.
- Wiener L, et al. (2015). International Psychosocial Standards for Children with Cancer and Their Families: An Introduction to the Field. Paediatric Blood & Cancer, 62(S5), S419-S424.
- Wolfe J, et al. (2018). A Framework for Psychosocial Support of Children with Serious Illnesses. Paediatrics, 141(2), e20180648.

Knowledge and Practices of Mothers' regarding Weaning of Children and their Relation with Socioeconomic Variables in Aseer Region, Saudi Arabia

Gamiyaha Salman M. Al-Qahtani[1]; Mohammad Abdullah S. Garnan[2]; Shahira Salman M. Al-Qahtani[3]; Maliha Salman M. Al-Qahtani[4]; Ahmed Ali A. Hamoud[5]; Fatmah Mohamed A. Alahmari[1]; Dhama Hussein A. Abdullah Faraj[1]; Kreemah Odah Yahya Al Ahmary[1]; Ghadi M. Ayed Asiri[6]; Abdullah Mohammed Qahtani[7]; Turki Ali Alyami[8]; Ahmed Eidhah S. Al Dogman[9], and Mesfer Obadi Mana Alrizq[10]

1. Med secretary Technician, General Directorate of Health, Aseer Region, Saudi Arabia
2. Deputy of General Director's Assistant for Public Health, Aseer Region, Saudi Arabia
3. Nursing technician, Khamis General Hospital, Saudi Arabia
4. Nursing specialist, Khamis General Hospital, Saudi Arabia
5. Specialist, Health Services and Hospitals Management, General Directorate of Health, Aseer Region, Saudi Arabia
6. Nurse specialist, Abha Maternity and Children Hospital, Saudi Arabia
7. Preventive Health Technician, Preventive Medicine Department, Armed Forces Hospital, Southern Region, Saudi Arabia
8. Dental hygienist, New Najran General Hospital, Saudi Arabia
9. Laboratory Specialist, Khobash General Hospital, Najran City, Saudi Arabia
10. Pharmacy Technician, Thar General Hospital, Najran City, Saudi Arabia

Corresponding Author
Ghamiyah Salman Mohammed
Email: Ghamiyaha@moh.gov.sa

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Gamiyaha Salman M. Al-Qahtani et al. Knowledge and Practices of Mothers' regarding Weaning of Children and their Relation with Socioeconomic Variables in Aseer Region, Saudi Arabia. World Family Medicine. December 2023; 21(11): 53-62.
DOI: 10.5742/MEWFM.2023.95256231

Abstract

Background: Weaning refers to transitioning an infant's diet from breast milk or formula to other foods and fluids. When the infant stops receiving breast milk, it is considered fully weaned.

Aims: To assess the knowledge, and practices of mothers on child weaning in the Aseer region.

Methods: A cross-sectional descriptive study was conducted among 189 mothers in Aseer Region, using a self-administered online questionnaire.

Results: Nearly two-thirds of the participants were aware of the terms: weaning, diet, or complementary food (65.1%). Most of the participants (87.3%) knew the nutritional requirements for weaning their infants. There was a non-significant relationship between knowledge of mothers and their sociodemographic characteristics (e.g., their level of education, and socioeconomic condition). More than two-thirds of the participants (71.4%) preferred breastfeeding their children associated with semi-solid food during the 6– 9-month period. The majority of the participants (74.6%) initiated weaning with thin-consistency food. There was a significant relationship between the reason for supplementary feeding before six months and mothers' socioeconomic condition (P <0.05).

Conclusions: Mothers' knowledge and practices were good. There were no significant relationships between mothers' knowledge level with weaning and socioeconomic characteristics. There was a significant relationship between the reason for supplementary feeding before six months and the socioeconomic condition.

Keywords: Knowledge, practice, mothers, weaning, Aseer region, Saudi Arabia.

Introduction

The word "weaning" is derived from the Anglo-Saxon verb "*wenian*", which means *"to become used to something new."* A child's growth includes the normal and unavoidable period of weaning from the breast. It is a multifaceted process including changes to one's diet, immune system, biochemistry, and mental state [1]. Weaning can mean the complete cessation of breastfeeding (an "abrupt" or definitive weaning) or, as described here, a gradual process of introducing complementary foods into the infant's diet while breastfeeding continues. Formula feeding, by definition, marks the beginning of weaning. Babies were generally breastfed longer in antiquity [2].

In 2002, the World Health Organization (WHO) modified toddlers' feeding guiding principles by extending the advocated length of distinct breastfeeding from 4–6 months to six months [3]. In turn, this intended that the advocated age for beginning complementary ingredients became additionally elevated to 6 months [4]. The WHO recommended a gradual weaning period from 6 months to 2 years to allow children to receive the benefits of breastfeeding, while also consuming the necessary nutrients from the complementary foods [5].

Both traditional, spoon-feeding and baby-led weaning methods are in agreement that children require the capacity to sit upright with very little support as a prerequisite to secure their feeding. In addition, the capacity to show readiness for feeding is a crucial developmental sign. Infants show readiness through awareness of their mouth , by bringing their hand to their mouth and imitating parents and through the use of cutlery... In addition to the advice to start solids at or around 6 months of age, signs and symptoms of toddler readiness have to be taken into consideration with the aid of the mother and father through first introducing strong foods, as stated in the United Kingdom toddler feeding recommendation and the Australian guidelines [6].

The weaning process can be divided into four stages, consistent with age and the kind of complementary food accepted by the child, starting at 4– 6 months. Initially, food should be pureed [7].

At 7–9 months, finger foods like bread, fruits, and clumps of different things are often introduced because the child will be able to eat larger lumps in their food. From the age of 9 months, the aim is to slowly move children onto similar meals as the remainder of the family. The baby must be encouraged to feed itself and be provided with different styles of tasty and healthy meals [7].

Factors affecting weaning children

Weaning age in which the child is fully weaned (or no longer breast fed), varies from mother to mother and can be prompted by many factors, such as the mother's physiology, endemic issues or willingness to breastfeed. Additional issues are the mothers' awareness (i.e., modernization), and the mother's monetary status (i.e., relative empowerment, poverty), sociocultural influences, and the child's willingness to surrender breastfeeding [8].

Less knowledge among mothers about weaning leads to poor quality of weaning and incorrect weaning practices predispose toddlers to malnutrition, increased retardation, infection, sicknesses, and excessive mortality [9]. Less knowledge also leads to excessive incidence of dietary contamination in babies and malnutrition because incorrect weaning will boost the mortality and morbidity rate. Hence, it is vital to enforce the right interventions to instillthe right weaning practices. There are mothers who are unaware of proper weaning practices or techniques, which require intervention[10].

Knowledge and practices of mothers regarding weaning their children in KSA has appeared in past research; additionally following the practice of other mothers does not necessarily provide effective methods. [11].

Doctors and fitness care educators provide better methods and inspire mothers to follow those rather than practices inside the community.

This study aimed to identify the knowledge and practices of mothers in Aseer Region regarding child weaning and to identify the relationship between mothers' socioeconomic level and their knowledge and practices of weaning children.

Methodology

This study followed a cross-sectional descriptive design in Aseer Region, Saudi Arabia. The study population included mothers of children aged between 6 to 12 months. A non-probability convenience sampling method was used to include 189 mothers.

Data were collected using an online self-administered questionnaire adapted from a similar study [9]. It was distributed using WhatsApp. The study questionnaire included three main parts, as follows:

- ***Sociodemographic Characteristics of Mothers:*** Age, working status, level of education, monthly income, number of children, and sources of information on knowledge and weaning practices.
- ***Knowledge on weaning:*** Eight knowledge statements concerning weaning, and diet.
- ***Weaning practices:*** 11 statements.

Scoring and grading

Participants' responses regarding their knowledge, and weaning practices were scored, with (0) for an incorrect knowledge response, or incorrect practice, and (1) for a correct knowledge response or correct practice. Therefore, the total knowledge score for participants ranged from 0 to 8.

Participants who attained a total knowledge score of >4, were considered to have a good knowledge grade about weaning, while those who attained knowledge scores <4 were considered to have a poor knowledge grade about weaning.

Participants who attained a total practice score of >6 were considered to have a good practice grade about weaning, while those who attained practice scores <5 were considered to have a poor practice grade about weaning.

Moreover, participants' socioeconomic conditions (i.e., level of education, and monthly family income) were adapted according to Wani [12], as follows

Socioeconomic score	Socioeconomic level
1	Lower
2	Upper lower
3	Lower middle
4	Upper middle
5	Upper

Statistical analysis

Collected data were analyzed using the Statistical Package for Social Sciences (IBM, SPSS, version 28). Descriptive statistics (frequency and percentage) were applied. Correlation coefficients between participants' scores were calculated. P-values less than 0.05 were considered statistically significant.

Results

Table (1) shows the distribution of Sociodemographic characteristics among the study participants. Almost half of the participants were aged between 20 to 30 years (47.6%). More than two-thirds of the participants (66.7%) were not employed. Around half of the participants (51.3%) had completed a bachelor's degree. Nearly two-thirds of the participants (61.9%) belonged to a family with a monthly income of 5000-7000 SR. Almost half of the participants (42.3%) had more than three children. The primary source of information for the participants was their experience (47.1%).

Table (2) indicates that nearly two-thirds of the participants were aware of the term "weaning diet" or "complementary food" (65.1%). Most of the participants (87.3%) had knowledge of the nutritional requirements, including energy, protein, vitamins, and other essential nutrients. More than two-thirds of the participants (72.0%) did not believe that feeding water, honey, and other semi-solid foods before 4 months enhances health. Additionally, around 70% of the participants (69.8%) were aware that introducing weaning foods before 6 months could cause diarrhea symptoms. More than half of the participants (52.4%) received health education programs on weaning. Nearly two-thirds of the participants (64.0%) fed their babies with eggs during the weaning period. The majority of the participants (66.7%) reported that education helped them choose appropriate weaning patterns. Around 67% of the participants continued breastfeeding along with complementary foods for up to 24 months. Finally, more than half of the participants (58.2%) believed that nutritious food was expensive.

Table (3) shows that around 46.6% of the participants reported not having enough milk to feed the baby as the main reason for introducing solid foods before 6 months. Additionally, more than two-thirds of the participants (71.4%) preferred feeding their children with breast milk along with solid food during the 6–9-month period. The majority of the participants (74.6%) initiated weaning with thin-consistency food. Almost half of the participants (48.1%) were unaware of how many food groups to offer their children. The data also showed that more than half of the participants (51.3%) introduced "Khichri" (a ish with a rice basis) as the first weaning food, and the majority (56.6%) preferred cooking weaning food using the same food that was prepared for the family. Finally, half of the participants (50.3%) preferred a particular utensil for a weaning spoon.

Figure (1) shows that almost two-thirds of participant mothers had a good knowledge level about weaning.

Figure (2) shows that more than half of participant mothers had a good practice level about weaning.

Table (4) shows that participants' knowledge scores did not correlate significantly with their educational level or monthly income.

Table (5) shows a significant correlation between the reason for feeding before six months and the family monthly income (P=0.013).

Table 1: Distribution of Socio-demographic characteristics among the participants in the study (n=189)

Socio-demographic characteristics		No.	%
Age	• 20 – 30 years	90	47.6
	• 31 – 40 years	59	31.2
	• 41 – 50 years	28	14.8
	• > 50 years	12	6.3
Employment status	• Employed	63	33.3
	• Unemployed/Housewife	126	66.7
Level of education	• School	64	33.9
	• University graduate	97	51.3
	• Postgraduate	12	6.3
	• Illiterate	16	8.5
Family monthly income (in SR)	• 5000 – 7999	117	61.9
	• 8000 – 10000	34	18.0
	• More than 10000	38	20.1
Number of children	• One	43	22.8
	• Two	43	22.8
	• Three	23	12.2
	• More than three	80	42.3
Main source of information	• The internet	32	16.9
	• Experience	89	47.1
	• Others	68	36.0

Table 2: Factors showing mother's knowledge concerning weaning diet

Factors	No.	%
I know the term weaning diet or complementary food	123	65.1
I am aware of the nutritional requirements (energy, protein, vitamins, etc.)	53	87.3
I believe that water, honey, and other foods before 4 months enhance health	132	28.0
Giving weaning food before 6 months causes diarrhea symptoms	99	69.8
Have 'take away' health education program on weaning	121	52.4
Feeding babies with eggs during the weaning period	126	64.0
Education helped you in choosing weaning patterns	127	66.7
Continued breastfeeding should continue with complementary food for up to 24 months	110	67.2
Believe nutritious food is expensive	123	58.2

Table 3: Participant mothers' practices

Practices	No.	%
Reason for feeding before 6 months		
• General pattern	59	31.2
• Does not have enough milk to feed.	88	46.6
• Illness	10	5.3
• Work	32	16.9
Preference during 6-9 months		
• Formula food only	15	7.9
• Breast milk only	38	20.1
• Breast milk with semi-solid food	135	71.4
• Solid food only	1	0.5
Frequency of feeding at the start of weaning		
• Random.	45	23.8
• When the baby cries	54	28.6
• After every 2-3 hours	47	24.9
• Twice daily	43	22.8
Frequency of feeding during 10-12 months of weaning		
• Random.	74	39.2
• When the baby cries	39	20.6
• After every 2-3 hours	41	21.7
• 2 times	35	18.5
Consistency of weaning food at the starting		
• Thick	26	13.8
• Thin	141	74.6
• Semi-solid	20	10.6
• Solid	2	1.1
Consistency of weaning food during 10-12 months		
• Thick	60	31.7
• Thin	64	33.9
• Semi-solid	65	34.4
Type of food group		
• Three food group	46	24.3
• Four food group	39	20.6
• Five food group	13	6.9
• Not aware	91	48.1
First weaning food		
• Rice, pulse water	29	15.3
• Soup	28	14.8
• Khichri	97	51.3
• Does not remember	35	18.5
Preference for cooking weaning diet		
• Ready-made food	6	3.2
• Separately homemade food	27	14.3
• Same food made for the family	107	56.6
• Not specific.	49	25.9
Utensil preferred for weaning		
• Bottle	4	2.1
• Cup	14	7.4
• Spoon	95	50.3
• Not specific	76	40.2

Figure 1: Participants' knowledge levels about weaning

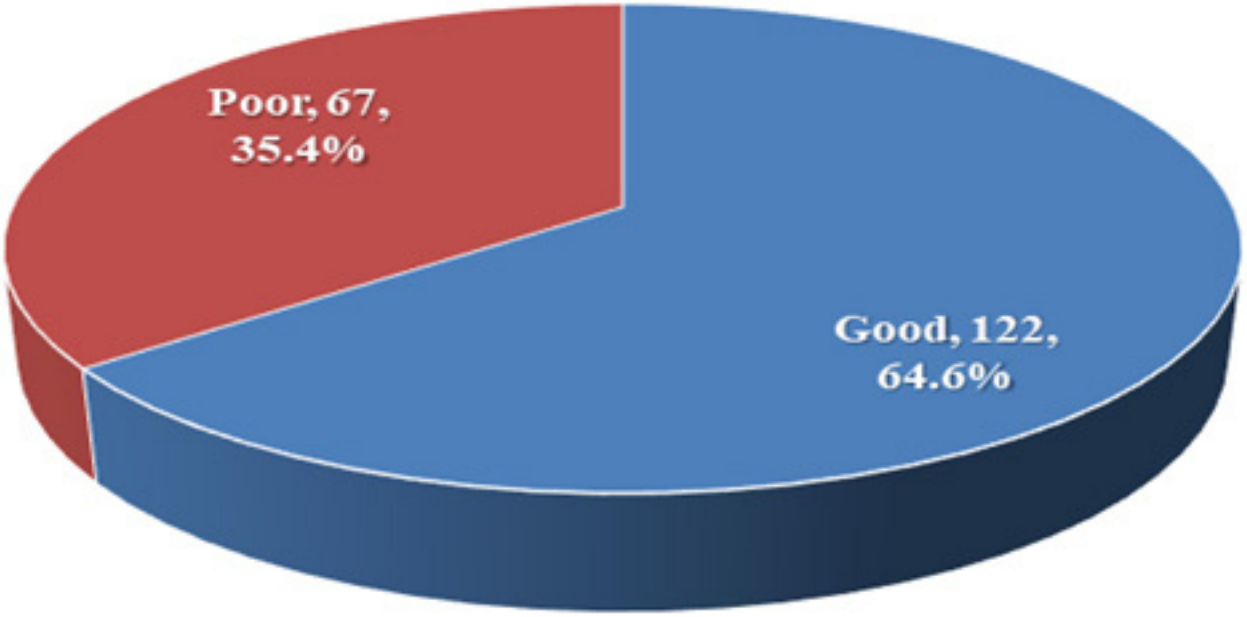


Figure 2: Participants' practice levels about weaning

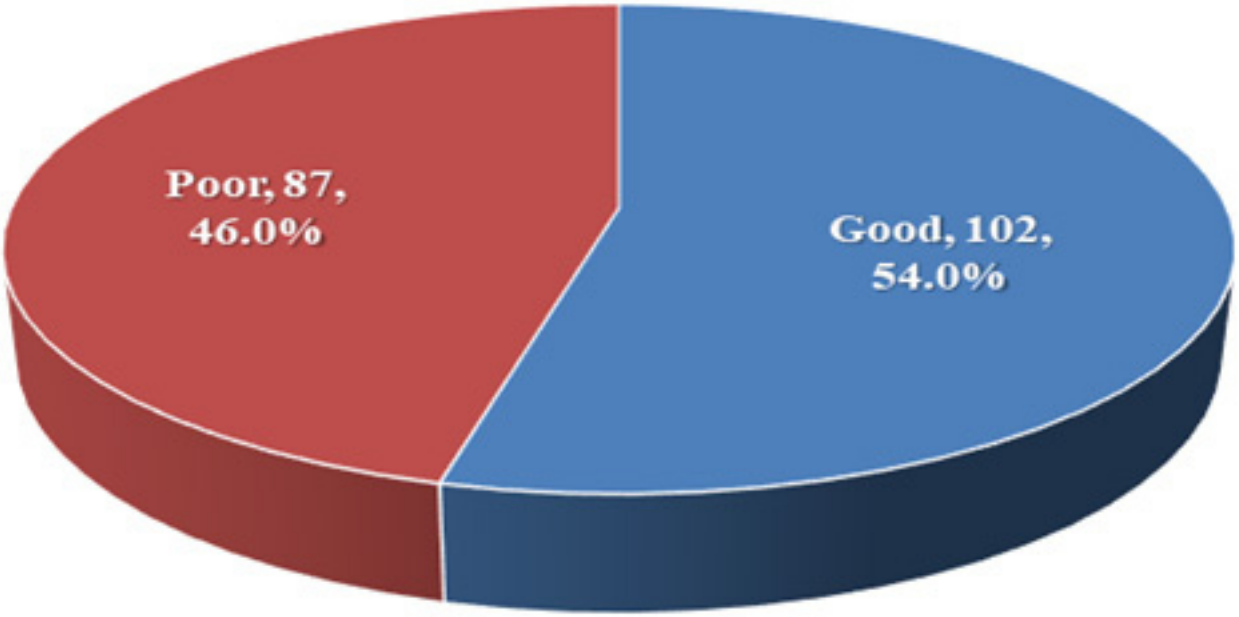


Table 4: Correlation between mothers' knowledge scores and their socioeconomic condition (Level of education, and monthly income)

Knowledge Factors	Level of education		Family Monthly income	
	r	P-value	r	P-value
Know the term weaning diet or complementary food	0.270	0.141	0.042	0.260
Source of information about weaning	0.207	0.055	0.400	0.538
Aware of the nutritional requirements (energy, protein, vitamins, etc.)	0.374	0.141	0.403	0.253
Believe that feeding water, honey, and other solid food before four months enhances health	0.910	0.024†	0.042	0.561
Giving weaning food before six months shows diarrhea symptoms	0.145	0.130	0.073	0.055
Take away health education program on weaning	0.110	0.302	0.440	0.560
Feed babies with eggs during the weaning period	0.230	0.825	0.470	0.511
Education helped you in choosing weaning patterns	0.172	0.592	0.125	0.795
Continued breastfeeding along with complementary food for up to 24 months	0.125	0.007	0.070	0.404
Believe nutritious food is expensive	0.154	0.310	0.397	0.183

† Statistically significant ($p<0.05$)

Table 5: Correlation between mothers' practice scores and their socioeconomic condition (Level of education, and monthly income)

Practice Factors	Level of education		Family Monthly income	
	r	P-value	r	P-value
Reason for feeding before 6 months	0.015	0.140	0.830	0.013†
Preference during 6-9 months	0.021	0.651	0.115	0.195
Frequency of feeding at the start of weaning	0.050	0.516	0.154	0.093
Frequency of feeding during 10-12 months of weaning	0.038	0.063	0.173	0.162
Consistency of weaning food at the starting	0.002	0.480	0.093	0.249
Consistency of weaning food during 10-12 months	0.073	0.645	0.004	0.617
Type of food group	0.006	0.149	0.042	0.151
First weaning food	0.089	0.398	0.010	0.509
Preference for cooking weaning diet	0.129	0.108	0.056	0.371
Utensil preferred for weaning	0.051	0.639	0.030	0.615

† Statistically significant ($p<0.05$)

Discussion

Our results showed that nearly two-thirds of the participants were aware of the terms: “weaning”, “diet”, or “complementary food”. Moreover, most participants knew the nutritional requirements, including energy, protein, vitamins, and other essential nutrients.

These results agreed with those of Alam Eldin et al. [13], who found that more than two-fifths of participant mothers said that weaning can start at the age of 4-6 months, and most of the mothers reported provision of nutrients needed in the first six months. Our results also matched with those of Rasheed et al. [35], who reported that most mothers knew about weaning and its starting time. Furthermore, the current study agreed with those of Tasrrufoon and Tulasi’s [15], who showed that the meaning of weaning was correctly reported by most participants.

However, our results contradict the findings of Manisha and Khan [9], who revealed that less than one-third of participants knew the meaning of weaning and were aware of the nutritional requirements (e.g., energy, protein, vitamins, etc.). Moreover, Maiti et al. [5] found that supplementary feeding has been started before the age of four months by almost two-fifths of mothers, and a minority had initiated feeding in infants after six months of age. These results may be due to the poor knowledge among the participants in the Manisha and Khan [9] and Maiti et al. [5] studies.

In the current study, more than two-thirds of the participants (72%) did not believe feeding water, honey, and semi-solid foods before four months enhances health. Parallel to these findings, Rasheed et al. [14] found that most mothers think cow milk is not good for infants during their 1st month. However, these findings disagreed with Manisha and Khan’s [9] study, which revealed that one-fifth of mothers believed that giving water, honey, and solid foods before the age of four months would enhance their health. Naher et al. [16] reported that most participants agreed to introduce foods other than breast milk before six months.

These differences may be attributed to decreased knowledge among the participants in the studies by Manisha and Khan [9] and Naher et al. [16].

The current study revealed that more than two-thirds believed that introducing weaning foods before six months could cause diarrheal symptoms. These results were in line with those of Manisha and Khan [9], who found that less than one-third of participants answered that giving their children weaning foods before the age of six months is frequently associated with diarrheal symptoms. These results also matched those of Alsufyani et al. [17], who found that most participants replied that weaning before three months of age will not make the infant healthy.

More than half of the participants in the current study received health education on weaning, and more than two-thirds reported that education helped them choose appropriate weaning patterns. These results were similar to those of Manisha and Khan [9], who revealed that about one-half of mothers said that receiving health education helped them choose weaning patterns properly.

In contrast, Rasheed et al. [14] noted that most mothers learned about weaning from their grandparents and got help from studying weaning-related books. These results may be due to the poor health education of the participants.

Results of the current study revealed that almost two-thirds of the participants fed their babies with eggs during the weaning period. These results matched those by Naher et al. [16], who found that most respondents agreed that a protein diet must be added to weaning, such as meat, fish, and eggs. However, these results contradicted those by Manisha and Khan [9], who reported that most participants replied that babies cannot have eggs at all during the weaning period. This may reflect the poor health educational levels of their participants.

Our study results found that more than two-thirds of the participants continued breastfeeding with complementary foods for up to 24 months. These results agreed with those by Manisha and Khan, 2021 [9], who reported that more than two-thirds continued breastfeeding with complementary food for up to 24 months. These results are also in accordance with those of Alsufyani et al. [17], who revealed that more than two-thirds of the participants replied that after beginning weaning, it is necessary to continue breastfeeding because the infant will not be satisfied with other foods. Similarly, Tasrrufoon and Tulasi [15] showed that more than one-half of the participants replied that continuation of breast milk should be given along with the weaning.

In contrast, Gohal et al. [18] reported that among those who continued breastfeeding, less than two-thirds eventually stopped after their infants were six months old. Moreover, Maiti et al. [5] found that less than one-fifth continued breastfeeding after the initiation of supplementary feeding. These may be attributed to the poor health education levels among the participants in both Gohal et al. [18] and Maiti et al. [5] studies.

The current study documented that more than half of the participants believed that nutritious food was expensive. These results were in line with the Manisha and Khan [9] study which revealed that two-fifths believed that highly nutritional foods are usually expensive.

It is to be noted that the knowledge level of almost two-thirds of participants in the present study about weaning was good. Similarly, Manisha and Khan [9], in India, revealed that about two-thirds of mothers had good knowledge regarding weaning. These results also matched with those of the study by Alsufyani et al. [17], in Makkah Al-Mokarramah, Saudi Arabia, which found that the knowledge regarding weaning was high in one-half of the participants. In contrast, Al-Gashanin and Ghazwani [11], in Najran, Saudi Arabia, revealed that knowledge levels about weaning were poor among most participants.

The current study documented that almost half of the participants reported not having sufficient milk to breastfeed their infants, hence, early start of solid foods before six months. Moreover, more than two-thirds of the participants preferred feeding their children breast milk with solid food during a 6 to 9-month period. These results were also in accordance with those of Manisha and Khan [9], who found that about one-half of the respondents started weaning at six months due to the lack of sufficient breast milk. Moreover, most participants preferred breast milk with solid food during 6-9 months.

The study found that almost three-quarters of the participants initiated weaning with thin-consistency foods. These results matched those of Manisha and Khan [9], in India, who showed that less than two-thirds of the mothers fed their infants thin food. The results also agreed with those of Alam Eldin et al. [13], in Aseer Region, Saudi Arabia, who found that most mothers reported feeding their infants crushed and easy-to-chew foods.

These results also agreed with those of Alsufyani et al., [17] in Makkah Al-Mokarramah, who reported that more than half of participants fed their children fortified foods, as a first food when they began the weaning, while less than one-third reported mashed foods, such as potatoes and bananas.

However, these results are incongruent with those of Kostecka et al. [19], in Poland, who reported that most respondents stated that the first solid foods introduced to their infants' diet at six months were vegetables, such as carrot puree, and fruits, followed by apple puree, gluten-free pudding, juice, and soup.

Gohal et al. [18], in Jazan, Saudi Arabia, reported that more than one-half of the participants started with liquid components and later switched to solid foods. Opposite to the study results, Rasheed et al. [14] showed that more than one-half introduced solid foods to their babies after six months and first introduced rice and cereals to babies. These results may be a return to the poor practice of the participants toward weaning.

Our study revealed that almost one-half of the participants were unaware of how many food groups to feed their children. This finding matches those of Manisha and Khan [9], who showed that almost one-third of mothers preferred five food groups, but one-half of mothers were unaware of how many food groups to feed their children.

The results showed that more than half of the participants introduced "Khichri" as the first weaning food. This finding agreed with that reported by Manisha and Khan [9], that rice/pulses water was the first weaning food chosen by one-half of the participants, while less than one-third chose Khichri. These results are in line with a study conducted by Alam Eldin et al. [13], which revealed that less than two-thirds of respondents listed crushed vegetables and fruits, in addition to fluids by more than one-half.

Al-Gashanin and Ghazwani [11] found that more than half of the participants used homemade foods, and more than two-thirds used mixed food. These results agreed with Tasrrufoon and Tulasi [15] who showed that regarding the foods selected for weaning preparations, one-half stated that they used easily digestible and palatable foods.

Our study found that more than half of the participants preferred cooking the weaning foods using the same foods prepared for the family members, and more than half of the participants preferred a particular utensil for weaning, such as a little spoon.

These results matched those by Manisha and Khan [9], who showed that about two-fifths preferred cooking weaning food using the same food prepared for the family, and all the participants preferred using special cups and spoons for providing the weaning foods to their children. Also, Alsufyani et al. [17] revealed that almost one-third of the participants used a cup and dish and a small spoon. Similarly, Al-Gashanin and Ghazwani [11] found that most mothers, including those well-educated, used to follow local customs in their choice of weaning methods. In contrast, Maiti et al. [5], in India, reported that most participants bought outside food. This difference may be attributed to their reluctance to cook or their decreased knowledge about weaning foods.

The present study revealed that mothers' knowledge and practices toward weaning among the participants were good. These results agreed with those by Manisha and Khan [9] and Alsufyani et al. [17], who revealed that mothers' knowledge and weaning practices were high in more than two-fifths of the participants.

Our study found that there were non-significant relationships between factors of knowledge regarding weaning and participants' socioeconomic characteristics. On the other hand, there was a significant correlation between the reason for feeding before six months and the family monthly income. However, there were non-significant correlations between other factors of mothers' practices with their socioeconomic characteristics.

These results are in accordance with those of Manisha and Khan [9], who also reported a non-significant relationship between participants' knowledge concerning weaning against their socioeconomic condition. However, these results are incongruent with those of Gohal et al. [18], who reported that married mothers, those belonging to middle-income families, and housewives were significantly likelier to have higher odds of good weaning practices. Also Manisha and Khan [9] showed that there were significant correlations between practice factors of weaning, (such as their preferences for foods during 6-9 months, frequency of feeding at the starting, and frequency of feeding during 10-12 months) with mothers' educational qualification. Moreover, Naher et al. [16] found significant relationships between older mothers, having more than one baby, and an older child, higher educated, and period of weaning with the weaning practices.

In conclusion, the present study indicated that mothers' knowledge and practice about weaning of their children are good. There are non-significant relationships between factors of knowledge regarding weaning and socioeconomic characteristics (mothers' levels of education monthly income). There is a significant relationship between the reason for feeding before six months and the mothers' monthly income.

The present study recommends conducting comprehensive educational programs about weaning practice. Moreover, health education about proper weaning practices should be included in the college education curricula to dispel any misconceptions about weaning. Detailed discussions of weaning practices with undergraduate students, is necessary to impart the correct knowledge and practices. Moreover, healthcare professionals should provide community-based health education to the public to enhance their knowledge and practices about weaning.

However, since this study was carried out in only one area, i.e., Aseer Region, on a limited sample of mothers, its results cannot be generalized to mothers in different regions in Saudi Arabia. Therefore, further studies on larger study groups are strongly suggested.

References

1- Lawrence RA, and Lawrence RM Breastfeeding: A Guide for the Medical Profession, 6th edn.Philadelphia, PA: Mosby, 2005:357–75.

2- Huggins K. and Ziedrich L. The Nursing Mother's Guide to Weaning How to bring breastfeeding to a gentle close and how to decide when the time is right, rev. edn. Boston: The Harvard Common Press, 2007.

3- World Health Organization. The Optimal Duration of Exclusive Breastfeeding: Report of an Expert Consultation; World Health Organization: Geneva, Switzerland, 2001.

4- World Health Organization. Guiding Principles for Complementary Feeding of the Breastfed Child; World Health Organization: Geneva, Switzerland, 2003.

5- Maiti A, Sarangi L, Sahu S K, and Mohanty S S. An assessment on breastfeeding and weaning practices in Odisha, India. Am J Public Health Res, 2015; 3(4A):49–52.

6- Sachs M. Baby-led weaning and current UK recommendations – are they compatible? Blackwell Publishing Ltd Maternal and Child Nutrition 2011; 7: 1–2. Doi: 10.1111/j.1740-8709.2010.00278.x.

7- Highton B. Weaning as a Natural Process. Leaven, Dec 2000–Jan 2001; 36(6): 112–114.

8-The British Dietetic Association. Complementary Feeding: Introduction of Solid Food to an Infants Diet. 2013.

9. Manisha and Khan S. Knowledge and practice of mothers on weaning food. IJCRT, 2021; 9: (11): 46 – 53.

10. Batra B. & Singh A. A study to assess the effectiveness of planned teaching program on knowledge regarding weaning among mothers of infants in a selected area of Rewa city. Int J Nurs Med Invest, 2019; 4(2), 28-30.

11. Al-Gashanin MA and Ghazwani EY. Knowledge, attitude, and practice of weaning among mothers in Najran Region, Saudi Arabia, 2021. Journal of Nutrition and Metabolism, 2022.

12. Wani RT. Socioeconomic status scales-modified Kuppuswamy and Udai Pareekh's scale updated for 2019. J Family Med Prim Care 2019; 8:1846-9.

13. Alam Eldin MM, Almutairi KH, Almujary FM, and et al. Awareness level of mothers regarding child weaning practice in Aseer region, Southern of Saudi Arabia. World Family Medicine. 2021; 19 (3): 65-73.

14. Rasheed Y, Rizwan B, Noor F, et al. Assessment of knowledge regarding weaning practices among mothers of Gulab Devi Educational Complex. Pakistan Journal of Health Sciences 2022; 3 (4): 140 -144.

15. Tasrrufoon K and Tulasi TV. A study to assess the effectiveness of planned health education on weaning among mothers in the selected urban slums, Hyderabad, Andhra Pradesh. Journal of Nursing and Health Science.2019; 8 (1): PP 31-42.

16. Naher K, Biswas HB, Hossain S and et al. Knowledge and practice of weaning among Bangladeshi lactating mother. International Conference of Kerta Cendekia Nursing Academy, 2019; 1: 232-240.

17. Alsufyani HMA, Algahtani AA, Aqeeli HJM, et al. Assessment level of knowledge about weaning and its practice among mothers attending primary health care centers, Makkah Al-Mokarramah, 2021. European Journal of Molecular & Clinical Medicine 2021; 8 (4): 3077- 3091.

18. Gohal GA, Eltyeb EE, Athwani Z, et al. Infant weaning practices among mothers in the Jazan Region, Saudi Arabia. Hail J Health Sci 2022; 4:57-62.

19. Kostecka M, Jackowska I, Kostecka J. Factors affecting complementary feeding of infants. A pilot study conducted after the introduction of new infant feeding guidelines in Poland. Nutrients 2021; 13(61): p: 1-13.

20. Okafoagu NC, Oche OM, Olayinka M, and et al. Factors influencing complementary and weaning practices among women in rural communities of Sokoto state, Nigeria. Pan African Medical Journal, 2017; 28:254.

Relationship between Shift Work Status, Eating Habits, and Body Mass Index among Nurses in Abha City, Saudi Arabia

Zahra Saad Ali Assiry[1]; Amani Alhazmi[2]; Saeed M. Al-Ahmari[3]; Fatimah Saad Asiri[4]; Ali A. Alshomrani[5]; Waleed S.H. Al Ahmary [6]; Sulaiman A. Jaber Alwadani[7]; Khalid A. Alshamrani[8]; Bandar F. Al-Shahrani[9]; Ali A. Almusa[10]

1. Nursing specialist, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia
2. Department of Public Health, College of Applied Medical Sciences, King Khalid University, Abha, Saudi Arabia
3. Family Medicine & Palliative Medicine Consultant, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia
4. Medical Secretarial Technician, Aseer Central Hospitals, Saudi Arabia
5. Senior Nurse Specialist, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia
6. Medical Laboratory Technician, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia
7. Dental hygienist, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia
8. Medical laboratory technologist, Saudi German Hospital, Saudi Arabia
9. Director of Mental Health Hospital, Abha, Saudi Arabia
10. Family Medicine Consultant, Academic & Training Affairs, General Directorate of Health, Aseer Region, Saudi Arabia

Corresponding author:
Zahra Saad Ali Assiry
Email: Zassiry@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Zahra Saad Ali Assiry et al. Relationship between Shift Work Status, Eating Habits, and Body Mass Index among Nurses in Abha City, Saudi Arabia. World Family Medicine. December 2023; 21(11): 63-74.
DOI: 10.5742/MEWFM.2023.952562441

Abstract

Aim of Study: To investigate the relationship between shift work status, eating habits, and body mass index among nurses.

Methods: This study followed a cross-sectional research design. It included all nurses with at least one year of experience in the nursing field, at all main governmental healthcare facilities in Abha City, Saudi Arabia. Eligible nurses were invited via e-mail to respond to a self-administered questionnaire in the English Language, which was generated using an online survey system (Google Form). The questionnaire consisted of an interface and three parts: sociodemographic characteristics, anthropometric measurements, and a validated food frequency questionnaire.

Results: The total number of participants was 403. The age of most participants (78.7%) was 30-40 years. They were mostly females (82.1%), Saudis (65%), and married (56.6%). Almost half of the participants (47.1%) had rotating work shifts, while 52.9% of them reported that they had fixed day work shifts. About one-third of nurses (32.5%) were overweight, while obesity and underweight were prevalent among 24.6%, and 3% of them, respectively. Chicken kabsa was the most commonly consumed type of meat (82.6%), while sausages were the least (18.1%). Biryani or red rice was the most commonly consumed type of bread and cereals food category (93.1%), while the least was maasoub (banana bread) (34%). Boiled egg sandwiches were the most commonly consumed (77.9%), while chicken sandwiches were the least (34.7%). White cheese was the most commonly consumed of dairy products (72.2%), while fat-free labneh was the least consumed (26.3%). Nuts were most commonly consumed in the sweets and snacks category (75.4%), while ice cream was the least (48.9%). Red tea was the most commonly consumed drink (85.4%), while caffeine-free coffee was the least consumed (34.2%). Dates were the most commonly consumed fruits (92.6%), while dried fruits were the least (41.9%). The green salad was the most commonly consumed type of vegetable (91.3%), while the mushroom was the least (30%). The prevalence of obesity among participants with rotating work shifts was significantly higher than those in the fixed-day work shift (31.6% and 18.3%, respectively, p=0.001). Moreover, means of consumed food categories were higher among participants with rotating work shifts than those with fixed days' work shifts. Significant differences were observed regarding participants' consumption of meat and fish (p=0.035), bread and cereals (p=0.044), and sandwiches and burgers (p=0.039).

Conclusions: Prevalence rates of obesity and overweight are high among nurses. Rotating work shift nurses have poor eating habits, which might lead to an imbalance in their diet. They consumed more food categories with high energy values than those with fixed day shifts. Moreover, rotating work shift nurses tend to consume more snacks than complete meals.

Key Words: Nurses, Shift work, Eating habits, Body mass index, Saudi Arabia

Introduction

Work shifts allow services to continue around the clock and help meet the demands of consumers in many businesses and industries, including health care (1). In most hospitals, nursing provides 24-hour patient care services on different shifts. They may prefer to work night shifts for various reasons, including family obligations, babysitting issues, returning to school, and night differential payment. However, they are often unaware of the likely negative health implications of night shifts (2).

Nutrition is a component of overall health, which could be influenced by the rotating shift work status of nursing staff. Changed dietary habits among them were frequently observed after starting shift work. These changes include increased incidence of overweight, poor dietary habits, and low physical activity. Moreover, shift-working nurses have increased their intake of sweet foods and other unhealthy dietary choices, with fast and fatty foods (3). During night shifts, nurses usually experience insufficient sleep, tiredness, and an inability to recover between shifts (4).

Insufficient sleep, even for one night, could cause metabolic imbalance and weight gain by creating a need to replace sleep loss and energy by consuming more food (5-7). In 2012, Nahm et al. (8) discovered that 53.8% of their participants missed meals because of busy work schedules. In addition, 72.2% of the respondents indicated that they felt they were not engaging in enough exercise (8). Moreover, Huth et al. (9) reported that 27.5% of night-shift nurses had a BMI of >30 kg/m2. Marqueze et al. (10) added that night shift work was associated with greater weight gain than working day shifts (10).

Researchers are focusing on the occupational-related weight gain associated with shift work. For example, Asaoka et al. (11) found connections between shift work and weight gain among female night shift nurses in Japan. A study conducted in Brazil concluded that the problems of shift work nursing were poor sleep quality and reduced access to quality food choices. Shift work could also lead to unhealthy weight gain and weight-related medical conditions among female nurses (10).

Since norms about food and body weight vary from culture to culture (12), it is important to investigate the Saudi cultural population concerning weight gain among shift nurses. Weight gain can lead to obesity. Obesity has become one of the most common health problems worldwide. Having a BMI of 25 kg/m2 or higher constitutes being overweight and having a BMI of 30 kg /m2 or higher constitutes obesity (13).

Because of the increased prevalence of unhealthy dietary patterns among shift work nurses, recent research on the occupational-related weight gain associated with shift work concluded that most shift work nurses have unhealthy dietary habits and are susceptible to health-related problems, such as overweight and obesity (10-11).

However, researchers have to focus on nurses and shift work as it relates to weight gain. Therefore, in this quantitative study, the researcher will examine the connections between shift work and weight gain among nurses to determine whether overweight/obesity and shift work are related in the nursing population.

Information on shift work and weight gain among nurses is lacking in the literature although it is needed to identify potential health problems associated with shift work and weight gain in the nursing population. Therefore, this study may lead to changes in policies and working conditions to promote the health and well-being of the nursing workforce. Promoting the health of nurses, especially those assigned for work shifts, is expected to prevent the development of numerous conditions associated with weight gain, such as heart diseases, hypertension, diabetes, stroke, and some forms of cancer (14-15).

In 1996, Costa (16) noted that shift work, especially night work, may negatively impact the health and well-being of workers. It is associated with disturbed circadian rhythms of workers' psychophysiological functions; interferes with their work performance and efficiency, with increased incidence of errors and accidents; facing difficulty with maintaining social relationships and negative influences on marital relations and child-care; disturbed sleeping and eating habits; and gastrointestinal and neuropsychiatric disorders, in addition to cardiovascular dysfunctions. More specific adverse effects can be associated with women's health, both in relation to their particular hormonal and reproductive function, and their social role.

Atkinson et al. (17) reviewed the behavioral and biological disturbances accompanied by shift work. They noted that meal frequencies were generally reduced while snacking increased during night shifts. They explained these findings by the unavailability of preferred foods at workplaces, lack of time, and reduced desire to eat at night. They added that 'normal' eating habits with the family become disrupted and the metabolic responses to food become altered by shift work.

In Turkey, Varli and Bilici (18) conducted their study to assess the nutritional status of 110 shift-working female nurses at a university hospital in Ankara, Turkey (56 nurses in the control group, and 54 nurses in the study group). Results showed that the mean daily energy intake of nurses in the study group was higher than that of the control group (1756±659 kcal and 1694±431 kcal, respectively), while the carbohydrate intake and fat intake were also higher in the study group, but the protein and iron intake were higher in the control group. The study recommended that to improve shift nurses' performance and nutritional status, it is essential to provide accessible, healthy, and quality food services.

In Poland, Nejman and Gotlib (19) conducted their cross-sectional study to assess the influence of 126 female nurses' shift work in Warsaw hospitals on their dietary habits. Participants were categorized into Group (A) which

included 87 nurses working in a 2-shift system for 12 hours, and Group (B) which included 39 nurses working in a single-shift system for 7.35 hours. The detailed analyses of participant nurses' dietary habits revealed that their everyday diet comprised several nutritional errors, but their diets were sufficient. There was a significant correlation between shift work and both regularity and variety of nurses' meals. Group B nurses ate more regularly compared with nurses in group A.

Persson and Mårtensson (20) conducted their study to describe situations with a remarkable effect on healthy diets among 27 community nurses working the night shift. They followed a qualitative descriptive design with a Critical Incident Technique. Results of 143 situations were identified and comprised 2 main areas, i.e., coping ability at work and during leisure hours. Coping ability at work showed that the nurses' diet and exercise habits were influenced by social interaction with colleagues at work. Coping ability during leisure hours showed that diet and exercise habits were influenced when the nurses recovered from the disruption to their circadian rhythm and when they took advantage of the freedom of action offered by night work. They recommended identifying factors that influence diet among nurses working the night shift.

Madide (21) conducted their cross-sectional study to evaluate the relationships between shift work, eating habits, and body mass index (BMI) among 307 Lebanese nurses. Results showed that 78.2% of participant nurses had irregular meal timing with a significant decrease in their number of completely consumed meals during the day and an increased number of snacks consumed during the night ($p < 0.05$). The most frequently consumed snacks during night shifts were sweets and potato chips. Moreover, BMI and waist circumference significantly increased with nurses' duration of work ($r=0.175$; $p < 0.05$) and the number of night shift hours over their work experience ($r=0.135$; $p < 0.05$). The study concluded that night shift work is positively associated with abnormal eating patterns and BMI, but the increase in BMI was not related to nurses' eating habits.

Although most nurses are expected to have adequate knowledge regarding health education, health promotion, and healthy nutritional habits, they may not be fully aware that they are at high risk for obesity (22). Moreover, nurses may be unaware of the negative effects of shift work on their health (23). Therefore, this study is expected to help nurses understand that shift work may be negatively associated with several health concerns.

This study aimed to investigate the relationship between shift work status, eating habits, and body mass index among nurses in Abha City.

Methods

This study followed a cross-sectional research design. The study settings consisted of all main governmental healthcare facilities in Abha City including Aseer Central Hospital, Abha Maternity and Children Hospital, Abha Mental Health Hospital, Prince Faisal bin Khalid Cardiac Center, and primary healthcare centers in the Abha sector.

This study included all nurses (i.e., males, females; Saudi and non-Saudi) at governmental healthcare facilities in Abha City, with at least one year of experience in the nursing fields.

The sample size for our study was calculated according to the formula (n= z2xpxq)/d2 (24), where (n) is the minimum sample size; (z) statistics = 1.96, assumed prevalence (p) of 50% for overweight/obesity among nurses, and an acceptable error level (d) of 5%, then the minimum sample size was calculated to be 382 participants. However, the sample size was increased to 400 to compensate for missing data. The data were collected during the period from April until May 2022.

The total number of nurses in the study setting is 1,650. Selecting participants that fulfill the necessary sample size was based on a simple random sampling technique, using the Excel program function "=RANDBETWEEN(1,1650)". This function was applied to obtain 450 random numbers.

Eligible participants were invited via e-mail to respond to a self-administered questionnaire in English, which was generated using an online survey system (Google Form). The questionnaire consisted of an interface and three parts including sociodemographic characteristics, anthropometric measurements, and a validated food frequency questionnaire. The interface of the questionnaire explained the aim of the study and additionally assured the participants on confidentiality grounds. Informed consent for participation was obtained on the interface of the questionnaire via a statement informing the respondents that their positive response was considered informed consent. The questionnaire was filled out anonymously.

- Sociodemographic characteristics: A total of nine items related to sociodemographic factors were assessed. They included age, gender, nationality (Saudi, or non-Saudi), qualification, experience in nursing, marital status, monthly income, type of work shift, and any associated comorbidity.
- Anthropometric measurements: Body mass index (BMI), which is the ratio of weight in kilogram to height in meter square, was used to assess body mass status. Participant nurses were asked to provide their own height and weight measurements. Hence, participants' BMI was calculated according to their reported weight (in kg) and height (in meters). According to the World Health Organization (WHO), participants were classified based on their BMI as underweight (BMI < 18.5), normal (BMI = 18.5- 24.9), overweight (BMI = 25-29.9), or obese (BMI ≥ 30). (25)

• Dietary habits were assessed using The Saudi Food Frequency Questionnaire (SFFQ) (See Annex) originally developed by Gosadi et al. (26) in Arabic language. It is a semi-quantitative food frequency questionnaire suitable for the Saudi population. It has a high reliability and reasonable validity and is suitable for use in large-scale nutritional epidemiological investigations. It was developed in the Arabic language with 140 food items included, where a closed-ended approach was used. Moreover, nine answering options are present for each question as follows: never or less than a month, 1 - 3 per month, once a week, 2 - 4 per week, 5 - 6 per week, once a day, 2 - 3 per day, 4 - 5 per day, 6+ per day. Open-ended questions were added at the end of the questionnaire to collect information about other food items that may not be listed. In addition, questions regarding the type of cooking fat, visible fat consumption, consumption of salt, and vitamins were added (27).

The SFFQ questionnaire was translated to English language by a certified translation office and back-translated into Arabic by another language expert to ensure accuracy. A pilot study was conducted using the bilingual copy of the questionnaire on 20 nurses, to assess the wording as well as clarity of the study tool.

Data were collected during the period from April to May 2022. Collected data were statistically analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 25). Descriptive statistics (i.e., frequency and percentage for categorical data; and mean and standard deviation for quantitative data) were calculated. Testing significance of differences was applied using the Chi-square (X^2) test for qualitative variables and the independent samples t-test for comparing quantitative variables. P-values less than 0.05 were considered statistically significant.

The Institutional Review Board (IRB) ethical approval was obtained from the Scientific Research Committee at King Khalid University (ECM #2022-1304), (Appendix 2), as well as the General Directorate of Health in Aseer Region (Appendix 3).

Results

A total of 450 nurses were invited to participate in the present study. However, after several communications through emails and phone calls, the researcher received only 403 responses (response rate = 89.6%).

Table (1) shows that the age of most participants (78.7%) was 30-40 years. They were mostly females (82.1%), Saudis (65%), and married (56.6%). More than half of the participants (53.1%) were Diploma-qualified, while 39.7% had BNS degrees and 7.2% had MNS degrees.

Table (2) shows that most participants were working at a hospital (67.5%). More than half of the participants (54.1%) were nurse assistants/technicians, while 39% were nursing specialists. The work experience was mainly 10-20 years (67.2%), and the monthly income of 54.6% of the studied subjects was 10,000-15,000 SR.

Figure (1) shows participants' type of work shifts during the last month. It is obvious that 47.1% of participants reported that they had rotating work shifts, while 52.9% of them reported that they had fixed day work shifts.

Table (3) and Figure (2) show that 40.0% of the studied subjects reported that they had normal body weight and 32.5% of them reported that they were overweight, while obesity and underweight were prevalent among 24.6%, and 0.3% of them respectively.

Table (4) shows that chicken kabsa was the most commonly consumed type of meat (82.6%), while sausages were the least (18.1%). Biryani or red rice was the most commonly consumed type of bread and cereals food category (93.1%), while the least was maasoub (34%). Boiled egg sandwiches were the most commonly consumed (77.9%), while chicken sandwiches were the least (34.7%). White cheese was the most commonly consumed of dairy products (72.2%), while fat-free labneh was the least consumed (26.3%). Nuts were most commonly consumed in the sweets and snacks category (75.4%), while ice cream was the least (48.9%). Red tea was the most commonly consumed drink (85.4%), while caffeine-free coffee was the least consumed (34.2%). Dates were the most commonly consumed fruits (92.6%), while dried fruits were the least (41.9%). Green salad was the most commonly consumed type of vegetable (91.3%), while mushroom was the least (30%).

Table (5) shows that participants' work shift type differed significantly according to their age groups, marital status, and qualification ($p<0.001$ each), with the highest frequencies of rotating work shifts among nurses who are younger, single, and BNS qualified.

Table (6) shows that participants' work shift type differed significantly according to their workplace, position, and monthly income ($p<0.001$, $p=0.008$, and $p<0.001$, respectively). Only those who worked at hospitals had rotating work shifts. Moreover, the highest frequencies of rotating work shifts were observed among senior nursing specialists and those with monthly incomes less than 10,000 SR.

Table (7) shows that the prevalence of obesity among participants with rotating work shifts was significantly higher than those in the fixed day work shift (31.6% and 18.3%, respectively), while the prevalence of overweight was almost equal between both groups (32.1% and 32.9%, respectively). Moreover, prevalence rates for underweight and normal weight were significantly higher among those in the fixed-day work shift group than among participants with rotating work shifts. The difference between participants' body mass index and their work shift group was statistically significant ($p=0.001$).

Table (8) shows that the means of consumed food categories were higher among participants with rotating work shifts than those with fixed days' work shifts. Significant differences were observed regarding participants' consumption of meat and fish ($p=0.035$), bread and cereals ($p=0.044$), and sandwiches and burgers ($p=0.039$).

Table 1: Participants' personal characteristics

Personal Characteristics	No.	%
Age groups		
• <30 years	52	12.9
• 30-40 years	317	78.7
• >40 years	34	8.4
Gender		
• Male	72	17.9
• Female	331	82.1
Nationality		
• Saudi	262	65.0
• Non-Saudi	141	35.0
Marital status		
• Single	151	37.5
• Married	228	56.6
• Widow/Divorced	24	6.0
Qualification		
• Diploma	214	53.1
• BNS	160	39.7
• MNS	29	7.2

Table 2: Participants' work characteristics

Work characteristics	No.	%
Workplace		
• Healthcare Center	131	32.5
• Hospital	272	67.5
Position		
• Midwife	10	2.5
• Nurse Assistant/Technician	218	54.1
• Nursing Specialist	157	39.0
• Senior Nursing Specialist	18	4.5
Years of experience		
• <10 years	125	31.0
• 10-20 years	271	67.2
• >20 years	7	1.7
Monthly income		
• <10,000 SR	108	26.8
• 10,000-15,000 SR	220	54.6
• >15,000 SR	75	18.6

Figure 1: Participants' type of work shift during the last month

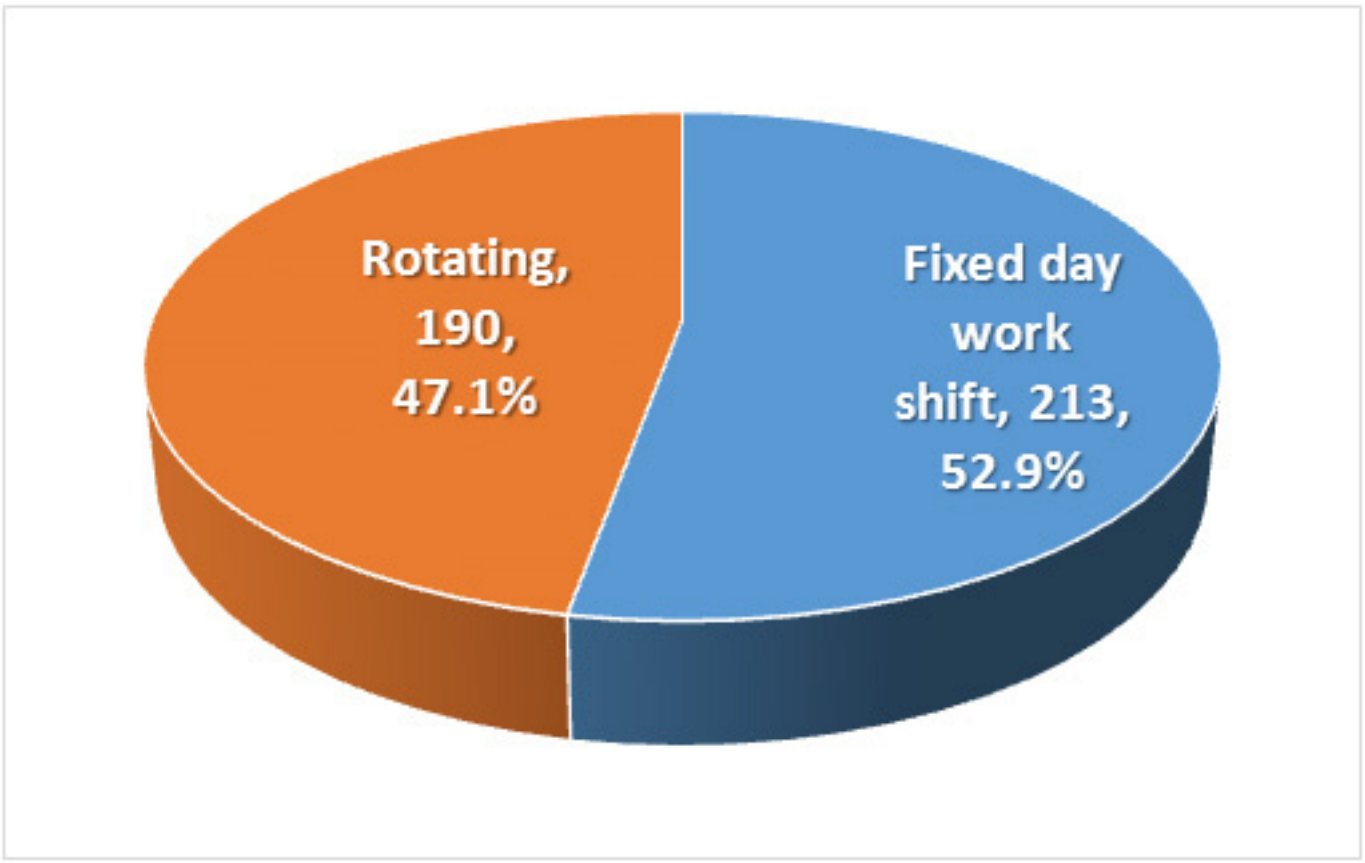


Table 3: Body mass index categories among participants

Body mass index categories	No.	%
Underweight	12	3.0
Normal weight	161	40.0
Overweight	131	32.5
Obese	99	24.6
Mean±SD	26.2±6.1 kg/m²	

Figure 2: Body mass index categories among participants

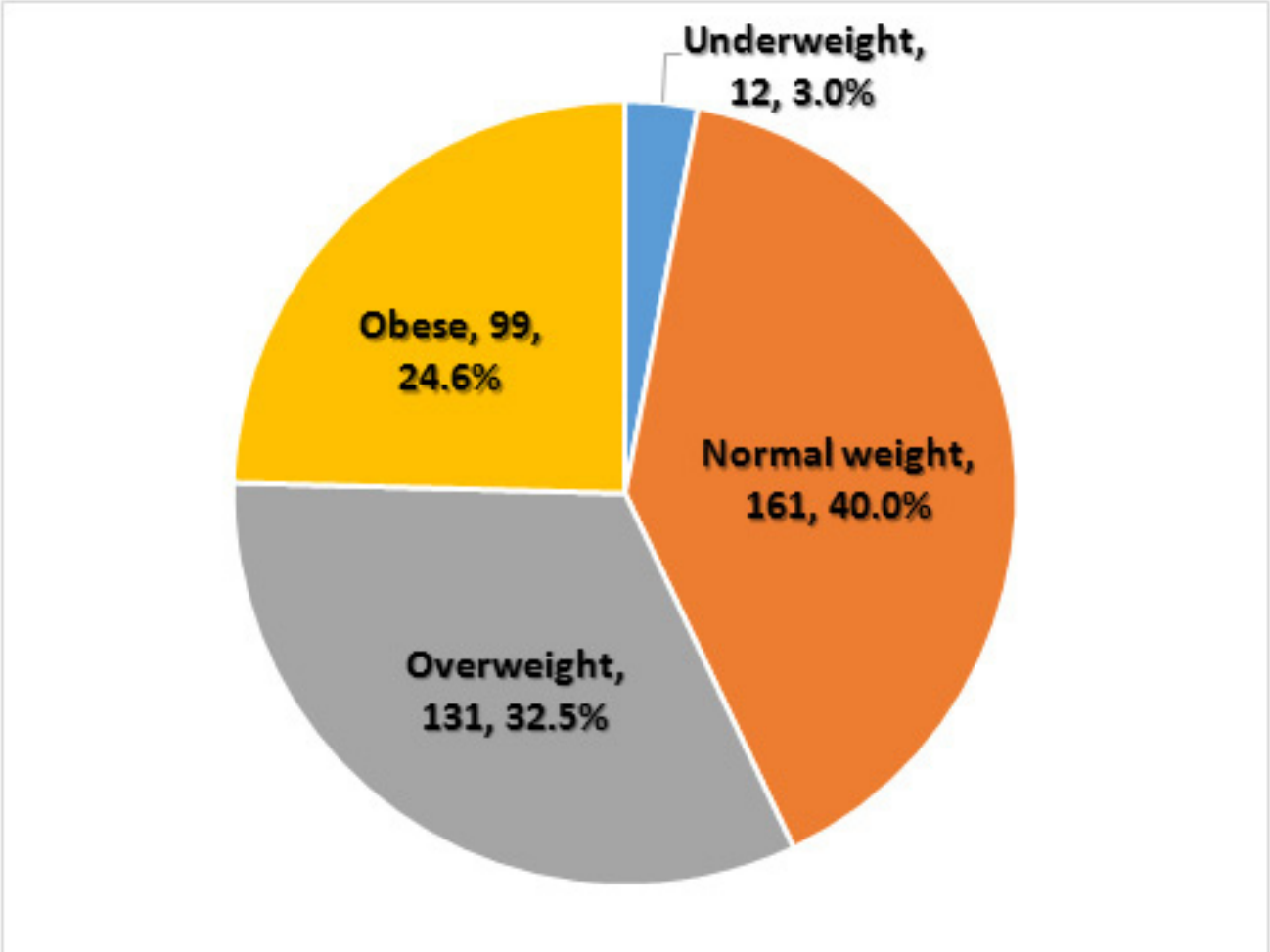


Table 4: Participants' consumptions of different food categories ‡

Food categories	Highest Consumption			Lowest Consumption		
	Food item	No.	%	Food item	No.	%
Meats	Chicken kabsa	333	82.6	Sausages	73	18.1
Bread & cereals	Biryani/red rice	375	93.1	Maasoub	137	34.0
Sandwiches	Boiled eggs	314	77.9	Chicken	140	34.7
Dairy products	White cheese	291	72.2	Fat-free labneh	106	26.3
Sweets & snacks	Nuts	304	75.4	Ice Cream	197	48.9
Drinks	Red tea	344	85.4	Caffeine-free coffee	138	34.2
Fruits	Dates	373	92.6	Dried fruits	169	41.9
Vegetables	Green salad	368	91.3	Mushroom	121	30.0

‡ Multiple food categories can be stated

Table 5: Participants' work shift type according to their personal characteristics

Personal Characteristics	Fixed Day		Rotating		χ^2 Statistic	P Value
	No.	%	No.	%		
Age groups						
• <30 years	6	11.5	46	88.5		
• 30-40 years	192	60.6	125	39.4	44.23	<0.001†
• >40 years	15	44.1	19	55.9		
Gender						
• Male	34	47.2	38	52.8		
• Female	179	54.1	152	45.9	1.12	0.291
Nationality						
• Saudi	142	54.2	120	45.8		
• Non-Saudi	71	50.4	70	49.6	0.54	0.461
Marital status						
• Single	60	39.7	91	60.3		
• Married	142	62.3	86	37.7	19.04	<0.001†
• Widow/Divorced	11	45.8	13	54.2		
Qualification						
• Diploma	129	60.3	85	39.7		
• BNS	63	39.4	97	60.6	20.86	<0.001†
• MNS	21	72.4	8	27.6		

† Statistically significant

Table 6: Participants' work shift type according to their work characteristics

Work Characteristics	Fixed Day		Rotating		χ^2 Statistic	P Value
	No.	%	No.	%		
Workplace						
• Healthcare Center	131	100.0	0	0.0		
• Hospital	82	30.1	190	69.9	173.13	<0.001†
Position						
• Midwife	6	60.0	4	40.0		
• Nurse Assistant/Technician	131	60.1	87	39.9		
• Nursing Specialist	70	44.6	87	55.4	11.85	0.008†
• Senior Nursing Specialist	6	33.3	12	66.7		
Years of experience						
• <10 years	58	46.4	67	53.6		
• 10-20 years	153	56.5	118	43.5	5.16	0.076
• >20 years	2	28.6	5	71.4		
Monthly income						
• <10,000 SR	38	35.2	70	64.8		
• 10,000-15,000 SR	124	56.4	96	43.6	21.52	<0.001†
>15,000 SR	51	68.0	24	32.0		

† Statistically significant

Table 7: Participants' body mass index according to their work shift type

Body Mass Index	Fixed days' work shift (n=213)		Rotating work shift (n=190)		χ^2	P value
	No.	%	No.	%		
Underweight	11	5.2	1	0.5		
Normal weight	93	43.7	68	35.8		
Overweight	70	32.9	61	32.1	16.03	0.001†
Obese	39	18.3	60	31.6		

† Statistically significant

Table 8: Means of food categories consumed during work among participants during the last year according to their work shift type

Food categories	Rotating work shift (n=190)		Fixed-day work shift (n=213)		t value	P Value
	Mean	SD	Mean	SD		
Meat and fish	23.9	11.7	21.8	11.3	2.42	0.035†
Bread and cereals	26.3	10.2	24.6	10.4	2.35	0.044†
Sandwiches & burgers	11.8	7.8	10.6	6.3	2.48	0.039†
Dairy and fat products	27.0	18.3	24.1	17.1	1.93	0.051
Sweets and snacks	30.6	23.1	29.6	19.3	0.85	0.330
Drinks	23.4	11.3	22.3	10.5	0.62	0.158
Fruits	26.8	18.0	24.3	16.6	1.83	0.072
Vegetables	35.4	20.9	32.7	21.7	1.76	0.097

† Statistically significant

Discussion

Due to the various factors related to the healthcare sectors, the patterns of work of nurses are an essential point for most clinical researchers (28). Shift work is common in several professional sectors, especially hospitals (29). Therefore, the present study aimed to investigate the relationship between shift work status, eating habits, and body mass index among nurses.

Results of the present study showed that almost half of the participants (47.1%) had rotating work shifts, while 52.1% had their work shifts as fixed day shifts. Participants' work shift type differed significantly according to their age groups, marital status, and qualification, with the highest frequencies of rotating work shifts among nurses who were younger, single, BNS-qualified, senior nursing specialists, and those with monthly income less than 10,000 SR.

Similarly, the multi-national study of Camerino et al. (30) found that types of work shifts differed significantly according to nurses' characteristics (e.g., age, gender, and seniority) in different European hospitals.

These findings indicate that differences in the distribution of work shifts among nurses significantly take into account the social and personal conditions of nurses, with rotating work shifts being carried out mostly by the younger, and non-married.

Results of the present study showed that almost one-third of participants were overweight, while almost one-quarter were obese.

In agreement with the current study findings, Elabd et al. (31) reported that about one-third of healthcare workers at King Faisal Specialist Hospital and Research Centre in Riyadh, Saudi Arabia were obese. However, the high prevalence of obesity among nurses is a part of the generally high prevalence among the whole population in the Kingdom of Saudi Arabia, which recently witnessed a dramatic increase in the prevalence of obesity (32).

The high prevalence of obesity among participants in the present study may be clearly explained by the main food categories consumed by participants, with high-calorie content being the main characteristic of most consumed food categories. Chicken kabsa (which is mainly composed of rice) was the most commonly consumed type of "meat", while Biryani or red rice was the most commonly consumed type of "bread and cereals". Moreover, fat-free labneh was the least consumed among the "dairy products". In addition, nuts were most commonly consumed in the "sweets & snacks" category.

Similarly, Gosadi et al. (26) reported that most of their participants consumed a high-frequency of food items with high calorific values. They found a high frequency of chicken kabsa and white bread consumption.

The means of all consumed food categories were higher among participants with rotating work shifts than those with fixed days' work shifts. Consequently, the prevalence of obesity among participants with rotatory work shifts was statistically significantly higher than that among day work shifts.

The reason why nurses with rotating work shifts consumed more food categories than those with fixed days' work shifts may be attributed to the fact that the hospital workload during evening and night shifts is usually less than that during the day (21). Therefore, nurses during their rotating work shifts may have more free time to eat and have several snacks.

Allan et al. (33) argued that, given the high prevalence of obesity and overweight among the nursing population, there has been increased interest in the development and implementation of weight management interventions for nurses. Since most nurses are active enough on work days, it is suggested that any workplace-based weight interventions aimed at nurses may be better focused on reducing their dietary intake than on increasing their activity levels while on shift. It is possible that nurses are more likely to engage in unhealthy behaviors during the hours of their shifts than during the fixed day work shift. Therefore, it is essential for the development and appropriate targeting of weight-management interventions for nurses that future research pinpoints when, where, and why nurses are most likely to consume unhealthy foods or be inactive.

Atkinson et al. (17) argued that during shift work, meal frequency may be generally reduced, but snacking usually increases during night shifts. The commonly unavailable preferred foods in the workplace, a lack of time, and a reduced desire to eat during the night may explain these findings. 'Normal' eating habits with the family are also disrupted. Moreover, the metabolic responses to food become frequently altered by shift work-mediated disruptions to sleep and circadian rhythms. Whether any interactions in human metabolism exist between the timing or content of food intake and physical activity during shift work is still not known.

Samhat et al. (29) added that weight gain associated with night shift work may be the result of an excess calorie intake and a lack of physical activity during the night. Their study has shown that night work leads to a perturbation of eating habits and to an increase in BMI, which can lead to overweight and obesity due to night shift nurses having irregular meal timing, snacking more, and having some preference for high fat and high sugar foods. Power et al. (34) explained that nurses may be particularly likely to eat unhealthy convenience foods during their shift work, especially during busy or stressful shifts.

In conclusion, prevalence rates of obesity and overweight are high among nurses. Rotating work shift nurses have poor eating habits, which might lead to an imbalance in their diet. They consumed more food categories with high-energy values than those with fixed day shifts. Moreover, rotating work shift nurses tend to consume more snacks than complete meals.

It is recommended that interventions such as educational programs should be provided at nurses' workplaces for weight control and stress management to reduce their caloric intake during their work shifts. Nurses are frequently at risk of eating unhealthy convenient foods during their shift work, especially during their busy or stressful shifts. Future studies should investigate the patterns of nurses' activities during their shift work and over multiple days to determine when and where nurses are most likely to be inactive. Moreover, it can be suggested to carry out more advanced prospective research in order to better understand the factors affecting overweight and obesity among rotating work shifts. It is also suggested that the hospital management could arrange healthy balanced food deliveries for night shift workers from a commercial supplier, to be delivered late on the day so the food would be fresh and nurses could be given menu choices.

References

1. Ramin C, Devore EE, Wang W, Pierre-Paul J, Wegrzyn LR, Schernhammer, EV. Night shift work at specific age ranges and chronic disease risk factors. Occupational Environmental Medicine, 2015; 72(2):100-107. doi: 10.1136/oemed-2014-102292
2. Boughattas W, El Maalel PA, Chikh RB, Maoua M, Houda H, Braham A, et al. Hospital night shift and its effects on the quality of sleep, the quality of life, and vigilance troubles among nurses. International Journal of Clinical Medicine, 2014; 5:572-583 doi: 10.4236/ijcm.2014.510079
3. Gifkins J, Johnston A, Loudoun R. The impact of shift work on eating patterns and self-care strategies utilised by experienced and inexperienced nurses, Chronobiology International 2018, DOI: 10.1080/07420528.2018.1466790
4. Patterson PD, Buysse DL, Weaver MD, Calloway CW, Yealy DM. Recovery between work shifts among emergency medical services clinicians. Prehospital Emergency Care, 2015; 19(3):365-375. DOI:10.3109/10903127.2014.995847.

5. Spaeth AM, Dinges DF, Goel N. Effects of experimental sleep restriction on weight gain, caloric intake, and meal timing in healthy adults. SLEEP, 2013; 36(7):981-990 doi:10.5665/sleep.2792.
6. Depner CM, Stothard ER, Wright KP. Metabolic consequences of sleep and circadian disorders. Current Diabetes Report, 2014; 14(7):1-9.
7. Kim TW, Jeong JH, Hong SC. The impact of sleep and circadian disturbance on hormones and metabolism. International Journal of Endocrinology, 2015; Doi: 10.1155/2015/591729.
8. Nahm ES, Warren J, Zhu S, An M, Brown J. Nurses' self-care behaviors related to weight gain and stress. Nursing Outlook, 2012; 60:E23-E31. Doi:10.1016/j/outlook.2012.04.005.

9. Huth JJ, Eliades A, Handwork C, Englehart JL, Messenger J. Shift work, quality of sleep, and elevated body mass index in pediatric nurses. Journal of Pediatric Nursing 2012; 28:e64-e73. Doi: 10.1016/j.pedn.2013.02.032.
10. Marqueze EC, Lemos LC, Soares N, Lorenzi-Filho G, Moreno CR. Weight gain in relation to night work among nurses. Work: A Journal of Prevention, Assessment and Rehabilitation, 2.12; 41:2043-2048. doi: 10.3233/WOR2012-0429-2043.
11. Asaoka S, Aritake S, Komada Y, Ozaki A, Odagiri Y, Inoue S, et al. Factors associated with shift work disorder in nurses working with rapid-rotation schedules in Japan: the nurses' sleep health project. Chronobiology International, 2013; 30(4): 628-36. Doi: 10.3109/07420528.2012.
12. Hawkes C, Smith TG, Jewell J, Wardle J, Hammond RA, Friel S, et al. Smart food policies for obesity prevention. Obesity 2015; 385(9985): P2410-2421.
13. WHO. Overweight and obesity. World Health Organization, 2015. Retrieved from www.who.int/mediacenter/fachseets/fs311/en/. Last accessed: November 10th, 2023.
14. Guo Y, Liu Y, Huang X, Rong Y, He M, Wang Y, et al. The effects of shift work on sleeping quality, hypertension, and diabetes in retired workers. PLOS One, 2013; 8(8): e71107. Doi: 10.1317/journal.pone.0071107.
15. CDC. Adult obesity facts. Centers for Disease Control and Prevention. 2015. Retrieved from https://www.cdc.gov/obesity/data/adult.html.
16. Costa G. The impact of shift and night work on health. Applied Ergonomics 1996; 27(1):9-l6.
17. Atkinson G, Fullick S, Grindey C, Maclaren D, Waterhouse J. Exercise, Energy Balance and the Shift Worker Sports Med 2008; 38(8): 671-685.
18. Varli SN, Bilici S. The nutritional status of nurses working shifts: A pilot study in Turkey. Rev. Nutr, Campinas, 2016; 29(4):589-596.
19. Nejman M, Gotlib J. Impact of nurses' shift work on their nutrition attitudes. Pielęgniarstwo Polskie NR 2017; 1(63): 13-19.
20. Persson M, Mårtensson J. Situations influencing habits in diet and exercise among nurses working night shift. Journal of Nursing Management 2006; 14(5): 414-423.
21. Madide S. Effects of Night Shift Schedules on Nurses Working in a Private Hospital in South Africa. Master of Science Programme, M.Sc. Programme in Ergonomics. Department of Human Work Sciences Division of Industrial Ergonomics. Luleå University of Technology Industrial Ergonomics Division, S-E 971 87, Sweden, February 2003.
22. Buss J. Associations between obesity and stress and shift work among nurses. Workplace Health Saf 2012; 60 (10):453-58.
23. Chung MH, Kuo TB, Hsu N, Chu H, Chou KR, Yang CC. Recovery after three-shift work: Relation to sleep related cardiac neuronal regulation in nurses. Industrial Health, 2012; 50:24-30.
24. Dahiru T, Aliyu A, Kene TS. Statistics in Medical Research: Misuse of Sampling and Sample Size Determination. Annals of African Medicine 2006; 5(3):158-161.
25. WHO. Physical Status: The Use and Interpretation of Anthropometry: Report of a World Health Organization (WHO) Expert Committee. Geneva, Switzerland: World Health Organization; 1995.
26. Gosadi IM, Alatar AA, Otayf MM, AlJahani DM, Ghabbani HM, AlRajban WA et al. Development of a Saudi Food Frequency Questionnaire and testing its reliability and validity. Saudi Med J 2017; 38 (6): 636-641.
27. Zitkus, B. The relationship among registered nurses' weight status, weight loss regimens, and successful or unsuccessful weight loss. Journal of the American Academy of Nurse Practitioners, 2011; 23: 110 - 116.
28. Shujaa AH, Shujaa SH. The Relationship between Work Shift, Satisfaction, and Intention to leave among Nurses. MECSJ 2019; 25:1-25.
29. Samhat Z, Attieh R, Sacre Y. Relationship between night shift work, eating habits and BMI among nurses in Lebanon. BMC Nursing 2020; 19:25.
30. Camerino D, Conway PM, Sartori S, Campanini P, Estryn-Behar M, van der Heijden BIJM, et al. Factors affecting work ability in day and shift-working nurses. Chronobiology International, 2008; 25(2&3): 425–442. DOI: 10.1080/07420520802118236.
31. Elabd K, Basudan L, Alabduljabbar K. The Prevalence of Obesity Among Employees of a Tertiary Healthcare Organization in Saudi Arabia and Its Impact on the Organization. Cureus 2022; 14(7): e26834. DOI 10.7759/cureus.26834.
32. Al Dawish MA, Robert AA, Braham R, Al Hayek AA, Al Saeed A, Ahmed RA, et al. Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev 2016; 12: 359-368.
33. Allan J, Sadko K, Bell C, Johnston D. How many calories do nurses burn at work? A real-time study of nurses' energy expenditure. Journal of Research in Nursing 2019; 24(7): 488 - 497. DOI: 10.1177/1744987119837586.
34. Power BT, Kiezebrink K, Allan JL and Campbell MK. Understanding perceived determinants of nurses' eating and physical activity behaviour: A theory-informed qualitative interview study. BMC 2017; Obesity 4:18. DOI 10.1186/s40608-017-0154-4.

Grief Unites Us

Safaa Bahjat

Correspondence:
Dr Safaa Bahjat
Email: dr.safaabahjat@hotmail.com

DOI: 10.5742/MEWFM.2023.95256232

While the bombing of Gaza and the resulting loss of civilians continues, I urge the international community to stop the war now, protect civilians (including health-care workers), lift the 16-year blockade on Gaza immediately, and allow international aid to enter Gaza to support the health-care system that has already collapsed.

I dedicate this simple article to the brave health workers in the Gaza strip. I share with you bereavement for doctors who devoted themselves to the patients and even more they gave their lives. I know you are comrades, brodies and fathers to those wounded and dying children, women and old men. I can see everyone of you hovering over sores and festering wounds, witnessing amputations, standing by vomit and diarrhea. When necessary you held and kiss the poor, poor children. I know for sure how your presence has saved many lives, that the magnetic flood of sympathy and friendship provide more benefits than all the medicine in the world. I know you loved die rank and file , their individual stories were death stories that mattered most, death stories that captured the essence of the war. Though you know words could never convey the experience in hospitals of the dying, could never convey multiple meanings in a wounded soldier's smile. The voices touches of thousands of children live inside you, their words and agonies all are yours .You will carry them to your graves and beyond. I know all because I am an Iraqi physician.

I just cannot see myself living like this anymore. I peek at the breaking news on my phone fearing the worst with each breaking news. I read headlines on the television screen and watch the collective punishment of Palestinians of the Gaza strip every minute with disappointment and slowly sinking to the floor. It is nearly two months and the huge toll of deaths among children ground us to a nub and it is still unclear whether there will be a ceasefire. But what is definitively gone is the hope that I clung to, that the crisis will slow down. By a cruel twist of fate the suffering of the civilians in Gaza is progressing shockingly fast. Civilians find themselves barely able to stay alive. They have to fight so hard to live only a version of life which is worse than death.

Moreover, the long-standing blockade of Gaza and repeated cycles of violence over the years have led to a critical nutritional crisis among Palestine refugees in Gaza, particularly affecting vulnerable groups, including children, women, and older people. Anaemia rates have become alarming despite preventive and curative measures. Even before the current conflict, Gaza was grappling with a dire need for mental health and psychosocial support services. In 2022, 26•4% of the population required such assistance, the highest among all areas of UNRWA operation.

Children have inherent rights, regardless of their race, ethnicity, religion, nationality, geography, or any other aspect of identity. Silence kills. History will judge us for how we respond today—and the world's children are watching.

Globally, armed conflict has been repeatedly shown to cause pervasive harm to children directly and indirectly, causing physical injury, a range of illnesses and infections, malnutrition, psychological distress, disability, and death. Conflict has even been shown to harm children living far from the areas where combat is taking place. Both direct and indirect exposure to conflict are associated with multiple forms of severe adversity, which in turn is known to cause altered stress physiology, altered development, multiple physical and psychological morbidities, and early mortality. In short, exposure to armed conflict greatly alters a child's life course. That is what happened to my people in Iraq, does anyone remember?

What is happening now reminds me about the American Bison tragedy because of the same brutal mentality leading the world. In 1860,an estimated 60 million bison roamed the American West. Two decades later the Bison population plunged to fewer than 300. Palestinians are not disposable, they are Human Beings and it is ironic that if the news came out that 7000 whales were killed the world would stand still!

When we entered the field of medicine, little did we know how prevalent grief would be, or the toll it can take- both professionally and personally. Medical education spends little time normalizing grief as part of practicing medicine. There are programs addressing suffering in all its dimensions for patients and patient's families, but not for physicians or other members of care teams.

Since the mass displacement and dispossession of Palestinians (also referred to as the Nakba) in 1948, health-care workers have been killed, and health-care facilities have been destroyed. Since October 7, 2023,

Israeli military bombing of the Gaza Strip (or Gaza) has resulted in 73 health-care workers being killed, with 57 health-care facilities attacked as of Oct 24, 2023. Of these healthcare workers, 16 were killed while on duty. Some of the prominent healthcare workers who were killed include Omar Ferwana, former Dean of the Islamic University of Gaza School of Medicine, and Medhat Sedim, one of the very few board-certified plastic and burn surgeons in Gaza. Other health-care workers killed include nurses, paramedics, and others, many of whom were killed with their families while asleep at home. On Oct 17, 2023, the world witnessed the targeting of Al Ahli Arab hospital (the only Anglican mission hospital in Gaza and the oldest in Palestine) by a strike that is still under investigation. At that time, the hospital was partially operational, with patients, health-care workers, and hundreds of internally displaced civilians sheltering there.

The mounting losses and the unprocessed grief can contribute to emotional exhaustion and ultimately burnout.

Grief is the anguish experienced after significant loss (the loss of a loved one, a relationship, a self-image, or a dream) and in Palestine and many Middle East countries all the above!

This experience includes physiological distress, separation anxiety, confusion, yearning, obsessive dwelling on the past, and apprehension about the future.

Grief can manifest in multiple ways:
• Acute grief is defined as tearfulness, sadness, and insomnia as a response to loss, and typically lasts for less than a year,
• Anticipatory grief involves feelings of loss experienced prior to the expected loss.
• Complicated or prolonged grief manifests as intense and persistent grief that causes problems and interferes with daily life.
• Ambiguous grief refers to loss that does not allow for the possibility of closure (many of us experienced this during the pandemic).
• Disenfranchised grief involves a loss that is not openly acknowledged as legitimate by society and is often accompanied by feelings of shame, guilt, and further isolation (this can be a contributing factor to physician burnout).

Many of us are familiar with the five stages of grief — denial, anger, bargaining, depression, and acceptance — which psychiatrist Elisabeth Kübler-Ross introduced in 1969.

Her work marked a shift in how we communicated with patients nearing the end of their lives. In 2004, she and counselor David Kessler proposed that the five stages of grief can also apply to those who have lost a loved one, though the stages are not inherently linear nor all necessary for healthy grieving.

In 2019, Kessler suggested that moving beyond the five stages and finding meaning in our losses can be transformative.

Finally I quote what Hazel Grace said when August died in the novel titled The Fault in our stars by Gohn Green
"and then I realized there was no one else to call, which was the saddest thing. The only person I really wanted to talk to about Augustus Water's death was Augustus Water." I realized then that funerals are not held for the dead, but for the living"

References

1- APA Dictionary of Psychology. American Psychological Association. Accessed July 24, 2023. https://dictionary.apa.org.
2- Mughal S, Azhar Y, Mahon MM, Siddiqui WJ. Grief reaction. In: StatPearls. StatPearls Publishing; January 2023. Accessed July 24, 2023. https://www.ncbi.nlm.nih.gov/books/NBK507832
3- Oswald R. Unnamed pain: coping with ambiguous loss. Mayo Clinic Health System blog. April 10, 2023. Accessed July 24, 2023. https://www.mayoclinichealthsys-tem.org/hometown-health/speaking-of-health/coping-with-ambiguous-grief
4- Kübler-Ross E, Kessler D. On Grief and Grieving: Finding the Meaning of Grief Through the Five Stages of Loss. Simon and Schuster; 2004.
5- Kessler D. Finding Meaning: The Sixth Stage of Grief. Scribner; 2019.
6- UN. The question of Palestine: about the Nakba. https://www.un.org/unispal/aboutthe-nakba/ (accessed Oct 27, 2023). 2 Palestinian Ministry of Health. Detailed cumulative statistic: Israeli aggression against Gaza Strip. Oct 24, 2023. https://www.moh. gov.ps/portal/ احصائيات-قطاع-على-الى-اسرائيلي-العدوان/)accessed Oct 26, 2023). 3 @ WHOoPt. Oct 25, 2023. https://twitter.com/ WHOoPt/status/1717130515533176846?s=20 (accessed Oct 26, 2023).
7- Woods A. The dead doctors of Gaza: at a time when they're most needed, many perish in Israel's bombing campaign. The Toronto Star, Oct 21, 2023. https://www.thestar.com/news/ world/the-dead-doctors-of-gaza-at-a-timewhen-they-re-most-needed-many-perish/ article_341fc98f-11e4-54a6-8630af104556753c.html (accessed Oct 27, 2023
8- Al Jazeera. Video investigation: what hit al-Ahli hospital in Gaza? Oct 19, 2023. https://www. aljazeera.com/news/2023/10/19/what-hitahli-hospital-in-gaza (accessed Oct 19, 2023)
9-Kampalath V, Tarakji A, Hamze M, Loutfi R, Cohn K, Abbara A. The impacts of the Syrian conflict on child and adolescent health: a scoping review. J Public Health 2023; 45: 621–30. 4 Kadir A, Shenoda S, Goldhagen J. Effects of armed conflict on child health and development: a systematic review. PLoS One 2019; 14: e0210071. 5 Kadir A, Shenoda S, Goldhagen J, Pitterman S, Section on International Child Health. The effects of armed conflict on children. Pediatrics 2018; 142: e20182586
10-UN Relief and Works Agency for Palestine Refugees in the Near East. Department of Health annual report 2022. May 23, 2023. https://www.unrwa.org/resources/reports/annual-report-2022-department-health (accessed Oct 24, 2023).

Prevalence and determinants of healthy dietary habits among hypertensive patients attending primary health care centers in Al-Baha City, Saudi Arabia: A cross-sectional study

Ahmad Abdullah Az-Zahrani [1]; Abdulrahman Al-Ghamdi [2]; Fahad Bakheet Mohammed [3]; Ali Abdullah Alzahrani [4]

(1) Family Medicine Consultant and trainer at the Saudi Board for Family Medicine, Al-Baha; and Vice president for medical services in Al-Baha Health Cluster, Saudi Arabia
(2) Population health management "PHM" manager in Al-Baha Health Cluster, Saudi Arabia
(3) Vice president for planning and transformation in Al-Baha Health Cluster, Saudi Arabia
(4) Associate University Degree of Nursing, Manager of Al-Gabal PHCC, Al-Baha, Saudi Arabia

Corresponding Author
Dr. Ahmad Abdullah Al-Zahrani
Email: aalzahrani467@moh.gov.sa

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Ahmad Abdullah Az-Zahrani et al. Prevalence and determinants of healthy dietary habits among hypertensive patients attending primary health care centers in Al-Baha City, Saudi Arabia: A cross-sectional study. World Family Medicine. December 2023; 21(11): 77-85. DOI: 10.5742/MEWFM.2023.95256234

Abstract

Background: Hypertension is a serious healthcare problem and a highly prevalent disease in Saudi Arabia. Dietary modification plays an important role in its management. This study aimed to evaluate the dietary habits among hypertensive patients.

Methods: This cross-sectional study was conducted among 116 hypertensive patients attending Bani Farwah Primary Healthcare Center (PHCC) in Al Baha City, Saudi Arabia. The dietary habits of the participants were evaluated using a self-administered questionnaire.

Results: Out of 116 participants, the number of male participants was 97 (83.6%). Almost half of the participants (50.9%) were on a low healthy diet index (HDI), 49.1% were on moderate HDI, and none were on high HDI. Almost one-fifth of the participants (20.7%) were avoiding salt in their meals, and 20.7% were avoiding adding sugar to hot drinks. Male and elderly patients had lower HDI (P = 0.008 and P = 0.004, respectively).

Conclusions: Most hypertensive patients do not follow healthy food. Healthcare providers need to increase patients' awareness through health education toward better control of their blood pressure. Further community-based studies, on a larger sample are needed.

Keywords: Diet, Hypertension, Cross-sectional study, Saudi Arabia

Introduction

Hypertension is one of the most critical public health problems worldwide, and a leading cause of morbidity and mortality (1). Uncontrolled hypertension is a significant risk factor for coronary artery disease, stroke, and renal failure (2–4). Hypertension was defined as a high blood pressure measurement of ≥ 135/85 mmHg, or ≥140/90 Hg (when measured by an electronic device), or ≥130/80 Hg in diabetic patients (5).

For the management of hypertension, lifestyle modifications, including the following Dietary Approach to Stop Hypertension (DASH) are recommended. The National Heart, Lung and Blood Institute (NHLBI) (6) described an example of DASH eating plans as follows:

- Daily 6-8 servings of grains, ≤ six servings of meats, poultry, and fish, 4-5 servings of fruits and the same amount for vegetables, 2-3 servings of low-fat or fat-free dairy products, and an equal amount for fats and oils.
- Daily sodium intake of less than 2300 mg (ideally 1500 mg).
- Weekly 4-5 servings of nuts, seeds, dry beans, and peas, and ≤ five servings of sweets.

On the other hand, according to the World Health Organization WHO (7), the healthy diet for adults consists of:
- Five portions of fruits and vegetables per day.
- Less than 10% of the daily calories from sugars (about 12 teaspoons) or 5% for additional benefits.
- Less than 30% of daily calories from unsaturated fats (fish, avocado, nuts, etc.) and to eliminate fats found in fast and processed foods.
- Less than 5 g of iodized salt per day (1 teaspoon).

In 2013, the Saudi Health Information Survey (SHIS) showed a total of 1,957,191 (15.2% of the population) had hypertension, of whom 57.8% were not previously diagnosed, 20.2% were uncontrolled, and 5.4% were untreated (8).

Hypertension is a serious healthcare problem and a highly prevalent disease in Saudi Arabia with a high percentage of uncontrolled, undiagnosed, and untreated cases. The Saudi Hypertension Management Society guidelines (SHMS) defined hypertension as a continuous elevation of systolic blood pressure of ≥ 140 mmHg, and the diastolic blood pressure of ≥ 90 mmHg. The SHMS guidelines also recommended lifestyle modification including DASH and low sodium diet as the first step to control hypertension (9).

This study was conducted to determine the prevalence of healthy dietary consumption by hypertensive patients and to identify the determinants associated with the healthy dietary habits consumption among hypertensive patients attending PHCCs in Al-Baha City.

Methodology

Following a cross-sectional study, a total of 116 adult hypertensive patients (aged 18-65 years) who were registered at Bani-Farwah PHCC were interviewed by the researchers. This PHCC was selected following a simple random method.

The self-administered standardized KomPAN® dietary habits and nutrition beliefs questionnaire (10) which was created by the Behavioral Nutrition Team, Human Nutrition Committee, Polish Academy of Sciences (evaluated and tested) was used for data collection after being translated into Arabic. The internal consistency of the translated version was high, being 0.8, as assessed by the Cronbach alpha coefficient.

The questionnaire includes the following parts:
.
- **Cover page:** Displayed the overall information about the purpose of the study and stated that the collected data were completely anonymous and confidential.
- **Patients' general data:** Age, gender, smoking status, income and educational level.
- **Hypertension data:** Duration of hypertension, and number of medications.
- **Healthy dietary habits**: It comprises two parts;
- **First Part:** General dietary habits, frequency of meals per day, and whether he/she consumes his/her meals regularly, etc.
- **Second Part:** Frequency of food items daily intake, e.g., junk food, fruits and vegetables, meat, fats, grains/whole grains, baked products, sugars, salt, and water.

Data collection and processing

The study questionnaire was distributed at the Chronic Diseases Clinic in the study PHCC. Using the recommended method of data processing, the quality of the diet was assessed using the healthy diet index (HDI). The calculated value of the HDI was based on the sum of frequencies of consuming the selected group of 10 healthy food components of the HDI. (Table A). According to the methodology of KomPAN® questionnaire analysis (10), the frequency of consuming the food products is listed in Table (A) in the form of frequency/day (Table B). The resultant values were summed up for each participant and the method of interpretation of these values is presented in Table (C).

Using the recommended interpretation method in the KomPAN® questionnaire made it possible to determine the intensity of the adherence to the healthy food components (low, moderate or high) for each participant.

Table (A): KomPAN® Questionnaire list of food products of healthy diet index HDI (10)

	Food components of the HDI in KomPAN® Questionnaire
1	*Whole meal (brown) bread/bread rolls*
2	*Buckwheat, oats, wholegrain pasta, or other coarse-ground groats*
3	*Milk (including flavored milk, hot chocolate, latte*
4	*Fermented milk drinks, e.g., yogurts, kefir (natural or flavored)*
5	*Fresh cheese curd products, e.g., cottage cheese, cream cheese, cheese-based puddings*
6	*White meat, e.g., chicken, turkey, rabbit*
7	*Fish*
8	*Legumes-based foods, e.g. beans, peas, soybeans, lentils*
9	*Fruit*
10	*Vegetables*

HDI = Sum of consumption frequency of 10 groups of food products (times/day)

Table (B): Recommended frequency of consuming food items in KomPAN® Questionnaire (10)

Consumption frequency	Daily frequency (times/day)
Never	0
1-3 times a month	0.06
Once a week	0.14
A few times a week	0.5
Once a day	1
A few times a day	2

Table (C): Recommended HDI interpretation method in KomPAN® Questionnaire

Intensity of dietary characteristics	Range (Times/Day)	Range (in points)
Low	0-6.66	0-33
Moderate	6.67-13.33	34-66
High	13.34-20	67-100

The general dietary habits of the patients were collected, e.g., how many meals or snacks a day, regularity of meal timing, salt, and water intake, type of drinking water, and type of oil used for frying, and analyzed by calculating frequency and percentage of each category. The general data collected, e.g., age, gender, smoking status, income, education level, and how the patient evaluates his/her knowledge about healthy foods. These data were then calculated and analyzed using the frequency and percentage of each category. The Chi-Square test was used to compare the resulting groups of patients (low, moderate, or high) and to test for the influence of these data on a healthy diet. P-values <0.05 were considered as statistically significant.

The ethical approval was fulfilled by the General Directorate for Health Affairs in Al-Baha City. Verbal consent was taken from all participants before the start of data collection. The researchers ensured the confidentiality of all collected data and privacy during data collection.

Results

The age group of more than half of participants was 46-65 years (60, 51.7%). Most participants were males (97, 83.6%). About one-quarter (33, 28.4%) were smokers. A large number of the responders were at 10,000 – 15,000 SR monthly income (75, 64.7%). Regarding their level of education, the results show that about 46 (39.7%) were at the university level of education, 26 (22.4%) finished high school, and 22 (19%) had secondary school (Table 1).

Figure (1) shows that 50.9% of the participants were on a low HDI grade, indicating low adherence to the healthy food components of the HDI. All other participants (49.1%) had moderate HDI grades, while none of the participants (0%) had a high HDI grade.

Figure (2) shows that most participants (56.9%) stated that they had insufficient knowledge about healthy foods, while 18.1% stated that they had sufficient knowledge, and 25% had good knowledge.

Table (2) shows that most participants consume 2 or 3 meals daily (48.3% and 37.7%, respectively). Consumption of meals at regular times was not performed by 41.4% of participants, while 33.6% sometimes performed it, and 25% always performed it. About one-third of participants (34.5%) have snacks once daily, and 12.9% have snacks a few times daily. Full-fat milk and dairy products were consumed by 42.3% of participants, while low fat was consumed by 42.2%, and 15.4% consumed no-fat milk. More than half of the participants (53.4%) sometimes add salt to their meals, while 25.9% add salt to most of their meals and 20.7% do not add salt to their meals. Almost half of the participants (46.6%) add one teaspoon of sugar (or honey) to their hot drinks, while 14.7% add two or more teaspoons and 18.1% use sweeteners.

Table (3) shows that the healthy diet index differed significantly according to participant gender (p=0.008), with males having lower HDI than females, and also according to participants' age groups (p=0.004), with older participants having significantly lower HDI than younger ones. However, participants' HDI did not differ according to their family monthly income, educational level, or their perceived knowledge about healthy diets.

Table (1): Participants' personal characteristics

Personal Characteristics	No.	%
Gender		
• Male	97	83.6
• Female	19	16.4
Age (in Years)		
• 18-35	17	14.7
• 36-45	39	33.6
• 46-65	60	51.7
Current smoking status		
• Smoker	33	28.4
• Non-smoker	83	71.6
Family monthly income		
• <10,000 SR	23	19.8
• 10,000 – 15,000 SR	75	64.7
• >15,000 SR	18	15.5
Education level		
• Illiterate	12	10.3
• Primary	10	8.6
• Secondary	22	19.0
• High school	26	22.4
• University	46	39.7

Figure 1: Distribution of the percentages of participants' healthy diet index grades

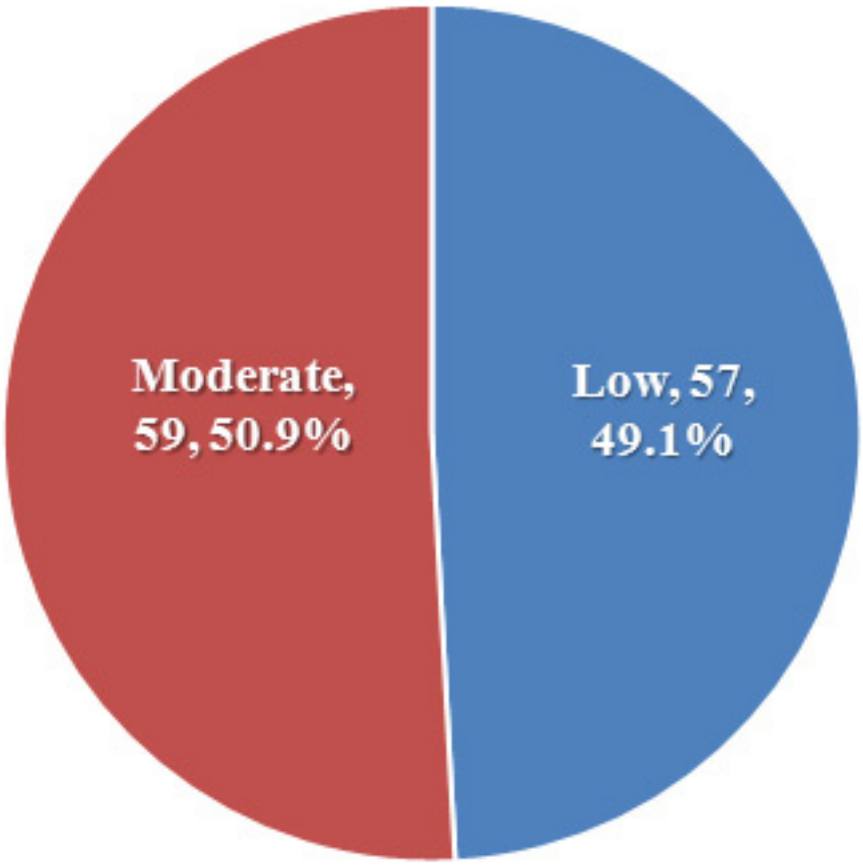


Figure 2: Participants perception regarding their knowledge level about healthy foods

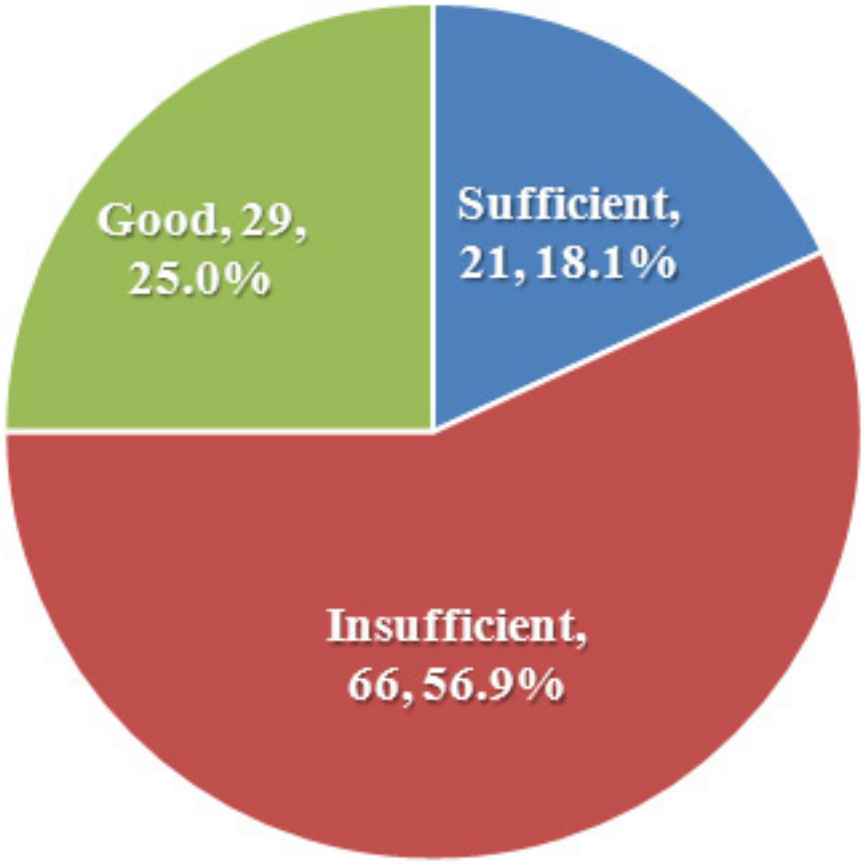


Table 2: Participants' consumption patterns of various food items

Consumed food items	No.	%
No. of daily meals		
• 1 meal	14	12.1
• 2 meals	56	48.3
• 3 meals	43	37.7
• 4 meals or more	3	2.6
Consuming meals at regular times		
• No	48	41.4
• Only sometimes	39	33.6
• Always	29	25.0
Having snacks between meals		
• Never	23	19.8
• 1-3 times a month	11	9.5
• Once a week	10	8.6
• A few times a week	17	14.7
• Once a day	40	34.5
• Few times a day	15	12.9
Type of consumed milk and dairy products		
• Full fat	50	42.3
• Low fat	49	42.2
• No fat	18	15.4
Adding salt to meals/sandwiches once prepared		
• No	24	20.7
• Yes, but only sometimes	62	53.4
• Yes, I add salt to most of my meals	30	25.9
Adding sugar to hot drinks		
• No	24	20.7
• Yes, I add one teaspoon of sugar (or honey)	54	46.6
• Yes, I add two or more teaspoons of sugar (or honey)	17	14.7
• Yes, I use sweeteners (low-caloric substitute for sugar)	21	18.1

Table 3: Distribution of participants' healthy diet index grades according to their characteristics

Characteristics	Low		Moderate		P-value
	No.	%	No.	%	
Gender					
• Male	53	54.64	44	45.36	
• Female	4	21.05	15	78.95	0.008†
Age groups					
• 18-35	4	23.53	13	76.47	
• 36-45	15	38.46	24	61.54	0.004†
• 46-65	38	63.33	22	36.67	
Family monthly income					
• <10,000 SR	7	30.43	16	69.57	
• 10,000 – 15,000 SR	38	50.67	37	49.33	0.065
• >15,000 SR	12	66.67	6	33.33	
Educational level					
• Illiterate	2	16.67	10	83.33	
• Primary	5	50.00	5	50.00	
• Secondary	10	45.45	12	54.55	0.138
• High school	16	61.54	10	38.46	
• University	24	52.17	22	47.83	
Smoking status					
• Smoker	17	51.52	16	48.48	
• Nonsmoker	40	48.19	43	51.81	0.747
Knowledge about healthy diet					
• Insufficient	35	53.03	31	46.97	
• Sufficient	12	57.14	9	42.86	0.181
• Good	10	34.48	19	65.52	

† Statistically significant

Discussion

Hypertension is one of the most critical public health problems worldwide, it is a leading cause of morbidity and mortality and is highly prevalent in Saudi Arabia (1;8). Uncontrolled hypertension is a causative factor for cardiovascular disease, stroke, and renal insufficiency (2–4).

The findings of the present study showed that most participants were above 44 years of age, with the age group of more than half of participants being 45-65 years (51.7%). Moreover, most participants were males (83.6%), and the prevalence of current smoking was high (28.4%). Regarding their level of education, about one-third of participants (39.7%) were highly educated (i.e., university graduates).

Most studies indicated that the majority of the participants were aged 50 years, in the USA (11); Egypt (12); and Nepal (13). In Ethiopia, Kebede et al. (14) reported that more than half of participant hypertensive patients were males (53.5%), with a mean age of 50 years. However, the study of Maharjan et al. (13) reported that the prevalence of hypertension was higher among females than males.

Rahimi and Nkombua (15) found that 18% of hypertensive patients were current smokers. Clinical guidelines for the management of hypertension indicate that stopping smoking reduces the risk of high blood pressure (16-17). A qualitative cross-sectional survey in Botswana reported that 96.4% of practices to control hypertension include prohibiting smoking (18).

Rahimi and Nkombua (15) noted that the majority of the participants in the study did not attain a level of high education. They stated that education empowers people to take care of their health issues. Rizvi et al. (19) and Veghari et al. (20) reported that a good level of education has a significant association with controlling hypertension, and described a relationship between the level of literacy of patients and control of hypertension. In addition, Powers (21) and Yilmazel (22) reported a significant relationship between the level of literacy of patients and the prevention, diagnosis, and control of hypertension.

Evaluating the dietary habits among hypertensive patients attending PHCCs, the present study showed that more than half of hypertensive patients (56.9%) had insufficient knowledge about healthy foods, while 50.9% had low HDI

grade, i.e., they did not follow a healthy and balanced diet. Adding salt to meals and adding sugar to hot drinks were stated by most participants. Males and older patients had significantly less HDI.

Several studies concluded that diet control is among the most important initial steps toward hypertension management (5). It has been reported that a healthy diet, is simply described as five servings of fruits and vegetables a day with less than 10% of the daily calorie intake from sugars, less than 30% of the daily calories from unsaturated fats with avoidance of trans fats, as well <5 g of salt per day (7).

In South Africa, Rahimi and Nkombua (15) reported that the majority of participant hypertensive patients had poor knowledge and practices of lifestyle modifications, with 50% of the participants being unable to maintain a balanced healthy diet, which included fruits and vegetables. Also, Maharjan et al. (13), in Nepal, found that more than half of participant hypertensive patients (53.3%) had poor knowledge regarding dietary control of hypertension.

This is similar to several other studies that also found poor knowledge and practices regarding healthy diets among hypertensive patients in India (23-24); Sri Lanka (25); Nigeria (26); and Botswana (18).

It is to be noted that the consumption of fruits and vegetables, grains, and legumes are essential constituents of a healthy diet. In Mozambique, Jessen et al. (27) reported that the majority of hypertensive patients had awareness about reducing salt intake. Moreover, males and older patients were less compliant with healthy diets than younger ones.

Similarly, several authors revealed some complacency in their hypertensive patients; Alawwa et al. (28), in Libya, and Wicaksana et al. (29) in Indonesia stressed that even with good awareness of reducing salt intake there was still a high rate of uncontrolled hypertension because of the low rate of practicing this behavior by patients. These findings concur with those findings of Rahimi and Nkombua (15), who indicated that dietary actions to control hypertension not only included salt reduction but also other measures, such as the consumption of fruits, vegetables, grains, and legumes.

DiNicolantonio et al. (30) noted that, while naturally occurring sugars, in the form of whole foods like fruit are of no concern, epidemiological and experimental evidence suggest that added sugars are a problem and should be targeted more explicitly in dietary guidelines to support general health. Added sugars probably matter more than dietary sodium for hypertension, and fructose in particular may uniquely increase cardiovascular risk by inciting metabolic dysfunction and increasing blood pressure, myocardial oxygen demand, and heart rate. Just as most dietary sodium does not come from the salt shaker, most dietary sugar does not come from the sugar bowl; reducing the consumption of added sugars by limiting processed foods containing them, made by corporations would be a good place to start. Reducing processed food consumption would be consistent with existing guidelines already in place that misguidedly focus more on the less-consequential white crystals (salt).

The evidence is clear that even moderate doses of added sugar for short durations may cause substantial harm. Therefore, dietary guidelines should advocate substituting highly refined processed foods (i.e., those coming from industrial manufacturing plants) for natural whole foods (i.e., those coming from living botanical plants) and be more explicitly restrictive in their allowances for added sugars.

In conclusion, adherence to a healthy diet (e.g., consumption of high fiber, low fat, sugar, and salt intake) by hypertensive patients in Baha City is suboptimal. Male and elderly patients show lower levels of adherence to a healthy diet than females. Therefore health education should be enforced, especially for these groups. Moreover, there is a pressing need to control diet. Healthcare providers need to maximize their efforts to provide health education and promote healthy dietary habits for hypertensive patients, especially for males and the elderly. It is necessary to conduct further community-based studies on larger samples.

Study limitations

The present study was conducted in one city only. Moreover, the study followed a cross-sectional research design, which is good for hypothesis generation rather than hypothesis testing. In addition, most collected data were subjective with a self-reported nature. Therefore, the generalizability of its findings should be cautiously considered.

References

1. Wang H, Dwyer-Lindgren L, Lofgren KT, Rajaratnam JK, Marcus JR, Levin-Rector A, et al. Age-specific and sex-specific mortality in 187 countries, 1970-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet (London, England) 2012; 380(9859):2071–94.
2. Kazancioğlu R. Risk factors for chronic kidney disease: an update. Kidney Int Suppl 2013; 3(4):368–71.
3. Turin TC, Okamura T, Afzal AR, Rumana N, Watanabe M, Higashiyama A, et al. Hypertension and lifetime risk of stroke. J Hypertens 2016; 34(1):116–22.
4. Špinar J. Hypertension and ischemic heart disease. Cor Vasa 2012; 54:433–8.
5. Leung AA, Daskalopoulou SS, Dasgupta K, McBrien K, Butalia S, Zarnke KB, et al. Hypertension Canada's 2017 Guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of Hypertension in Adults. Can J Cardiol 2017; 33(5):557–76.
6. NHLBI. Description of the DASH Eating Plan. National Heart, Lung and Blood Institute, NIH. Available from: https://www.nhlbi.nih.gov/health/health-topics/topics/dash.

7. WHO | Healthy diet. World Health Organization. 2017; Available from: http://www.who.int/mediacentre/factsheets/fs394/en/.
8. El Bcheraoui C, Memish ZA, Tuffaha M, Daoud F, Robinson M, Jaber S, et al. Hypertension and its associated risk factors in the kingdom of saudi arabia, 2013: a national survey. Int J Hypertens; 2014: 564679.
9. Alhabeeb W, Tash AA, Alshamiri M, Arafa M, Balghith MA, ALmasood A, et al. National Heart Center/Saudi Heart Association 2023 Guidelines on the Management of Hypertension. Journal of the Saudi Heart Association 2023;35:16e39.
10. Kowalkowska J, Wadolowska L, Czarnocinska J, Czlapka-matyasik M, Galinski G, Jezewska-zychowicz M. Reproducibility of a Questionnaire for Dietary Habits, Lifestyle and Nutrition Knowledge Assessment (KomPAN) in Polish Adolescents and Adults. Nutrients 2018; 10(12):1845. Doi: 10.3390/nu10121845.DOI: 10.3390/nu10121845
11. Wright JD, Hughes JP, Ostchega Y, Yoon SS, Nwankwo T. Mean systolic and diastolic blood pressure in adults aged 18 and over in the United States, 2001-2008. Natl Health Stat Report. 2011;(35):1-22,24.
12. El-hay SAA, Elmezayen S. Knowledge and Perceptions Related to Hypertension, Lifestyle Behavior Modifications and Challenges That Facing Hypertensive Patients. IOSR-JNHS. 2015 Nov-Dec;4(6):15-26.
13. Maharjan N, Maharjan N, Li R. Knowledge on Diet among the Hypertensive Patients in a Tertiary Care Center Nepal: A Descriptive Cross-sectional Study. J Nepal Med Assoc 2020; 58(222):98-101.
14. Kebede T, Taddese Z, Girma A. Knowledge, attitude and practices of lifestyle modification and associated factors among hypertensive patients on-treatment follow up at Yekatit 12 General Hospital in the largest city of East Africa: A prospective cross-sectional study. PLoS ONE 2020; 17(1): e0262780. Doi: 10.1371/journal.pone.0262780.
15. Rahimi A, Nkombua L. Hypertensive patients' knowledge and practices on lifestyle modification in Extension 6, Middelburg. S Afr Fam Pract. 2022; 64(1): a5528. Doi: 10.4102/safp.v64i1.5528.
16. Meresa A, Fekadu N, Degu S. T A and G B. An Ethno Botanical Review on Medicinal Plants Used for the Management of Hypertension. Clin Exp Pharmacol. 2017; 07. Doi: 10.4172/2161-1459.
17. Flack JM, Adekola B. Blood pressure and the new ACC/AHA hypertension guidelines. Trends Cardiovasc Med. 2020; 30: 160–164. Doi: 10.1016/j.tcm.2019.05.003.
18. Zungu LI, Djumbe F. Knowledge and lifestyle practices of hypertensive patients attending a primary health care clinic in Botswana. African J Phys Heal Educ Recreat Danc. 2013; 1–14.
19. Rizvi F, Afzal M, Chaudhry A, Baig A. Impact of education and physical activity on awareness and control of hypertension. Rawal Med J. 2009; 34(2):160–163.
20. Veghari GH, Sedaghat M, Moghaddami A. Impact of literacy on the prevalence, awareness, treatment and control of hypertension in adults in Golestan province (Northern Iran). Caspian J Intern Med. 2013; 4(1):580–584.
21. Powers BJ, Olsen MK, Bosworth HB. Literacy and blood pressure – Do health care systems influence this relationship? A cross-sectional study. BMC Health Serv Res. 2008; 8:219. Doi: 10.1186/1472-6963-8-219
22. Yilmazel G, Cetinkaya F. Relation between health literacy levels, hypertension awareness and control among primary-secondary school teachers in Turkey. AIMS Public Health. 217; 4(4):314–325. Doi: 10.3934/publichealth. 2017.4.314.
23. Ahmad S, Ahmad T, Ahmad S. Assessment of knowledge, attitude and practice among hypertensive patients attending a health care facility in North India. Int J Res Med. 2015; 4(2):122-7.
24. Rajan J, Sakthibalan M, Raj GM, Mangaiarkkarasi A. Knowledge, attitude and practice of hypertension among hypertensive patients in a tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2019; 8(5):1013-18.
25. Kisokanth G, Ilankoon IMPS, Arulanandem K, Goonewardena CSE, Sundaaresan KT, Joseph J. Assessment of knowledge on the disease, its complications and management strategies among hypertensive patients attending medical clinics at Teaching Hospital, Batticaloa, Sri Lanka. J Postgrad Inst Med. 2016; 3:1-11.
26. Aghoja OC, Okinedo PO, Odili VU. Knowledge, Attitude and Practice of Hypertensive Patients towards Hypertension in a Secondary Health Care Facility in Delta State. UK J Pharm and Biosci. 2017;5(2):24-33.
27. Jessen N, Santos A, Damasceno A, et al. Knowledge and behaviors regarding salt intake in Mozambique. Eur J Clin Nutr. 2018; 72:1690–1699. https://doi. org/10.1038/s41430-018-0125-y.
28. Alawwa I, Dagash R, Saleh A, Ahmad A. Daily salt consumption and the knowledge, attitudes and behavior of healthy adults: A cross-sectional study from Jordan. Libyan J Med. 2018; 18(1):1479602. https://doi.org/10.1080/19932820.2018.1479602
29. Wicaksana AL. Knowledge, attitude and behavior toward dietary salt: The nescience among hypertensive patients in Indonesia. Int J Res Med Sci. 2017; 5(8):3413–3419. https://doi.org/10.18203/2320-6012.ijrms20173532
30. DiNicolantonio JJ, Lucan SC. The wrong white crystals: not salt but sugar as aetiological in hypertension and cardiometabolic disease. Open Heart 2014; 1:e000167. Doi: 10.1136/openhrt-2014- 000167.

Patients' Attitude and Satisfaction with Telemedicine and Electronic Health Clinics in Aseer Healthy Cities, Saudi Arabia

Mohammed Alqahtani[1]; Metrek Almetrek[1]. Ali JAlfaifi[2]; Asaiel Al Hadi[3]; Enas Al Hadi[3]; Nasser Al Hayder[3]; Amnah Alzarar[3]; Shuruq Alzahuf[3]; Zahra Abdalwahab[3]; Laila Almalki[4]; Sarra Alqahtani[5]; Ahlam Alqahtani[5]; Nazeha Alassiri[5]; Arif Alamri[5]; Mubarak Alqahtani[6]; Adel Alqahtani[5]

(1) Consultant, Healthy Cities Program, Abha, Saudi Arabia
(2) Consultant, Family Medicine Department, Medical City at King Khalid University, Abha, Saudi Arabia
(3) Internship Department, College of Medicine, Najran University, Saudi Arabia
(4) Khamis Maternity & Children Hospital, Khamis Mushait, Saudi Arabia
(5) General Directorate of Health Affairs, , Aseer Region, Saudi Arabia
(6) Khamis Mushait General Hospital, Khasmis Mushait, Saudi Arabia

Corresponding Author:
Dr. Mohammed Alqahtani
Email: msqahtani@moh.gov.sa

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Mohammed Alqahtani et al. Patients' Attitude and Satisfaction with Telemedicine and Electronic Health Clinics in Aseer Healthy Cities, Saudi Arabia. World Family Medicine. December 2023; 21(11): 86-95. DOI: 10.5742/MEWFM.2023.95256235

Abstract

Background: Telemedicine was integrated into the medical sector to provide information and communication technologies and achieve more effective treatments. Telemedicine service has a pivotal role during the coronavirus pandemic enabling healthcare providers to communicate and follow up with patients, especially elderly patients, or those with chronic conditions. Patient satisfaction is an effective indicator to assess that service.

Aim: To assess the attitude and satisfaction of patients with telemedicine and e-clinics in Aseer Healthy Cities.

Methods: This cross-sectional study was performed at the medical centers that provided telemedicine clinics in seven healthy cities in Aseer (Abha, Bisah, Balgarn, Muhayel, Alharajah, Tareeb, and Alamwah) during 2023. The study was conducted in seven cities on patients who were served by telemedicine, using a valid-written questionnaire that was sent electronically.

Results: A total of 497 patients participated in this study; 50.3% were females, and most of the patients, 81.5%, used E-clinics 1-3 times. A small percent reported having worries about e-clinics (35.8%) and found confusion while using it (29.8%). The mean±SD of the satisfaction score was 4.306±0.8. The determinants of satisfaction included age (P<0.0001), medical insurance (P<0.0001), and family doctor (P<0.0001). There was a positive attitude among patients toward using e-clinics. Participants reported that using e-clinics is better than doctors' visits, they will use it again and will recommend it, (36.2%, 51.1%, and 57.5%, respectively).

Conclusion: Patients are satisfied with the telemedicine and e-clinic healthcare services, and they have positive attitudes toward them. This reflects improvements in healthcare services provided by Aseer Healthy Cities.

Keywords: Attitude, Telemedicine, Satisfaction, Healthcare services, Saudi Arabia.

Introduction

Healthcare service is considered one of the most crucial policies required by all populations around the world. Most of the population had different obstacles preventing them from getting adequate medical care and effective treatments. The demographic issue, especially for the elder patients and the geographical aspect (remote and rural areas) are considered a major obstacle to obtaining a good healthcare service. Therefore, integrating technology into the medical sector became essential for providing more information and communication technologies to achieve more effective treatments [1].

The telemedicine technology provides medical information for everyone worldwide to facilitate data exchange among relevant parties in different locations [1]. It provides remote medical diagnosis, medical care, and effective treatment and most of the elderly showed feelings of safety and reassurance with telemedicine [2]. Telemedicine has been used in different areas worldwide to manage healthcare from postoperative care to long-term medical conditions, according to Jeffery et al. [3]. Telehealth enabled healthcare staff to provide medical care services in remote areas using telemedicine technology such as video conferences and imaging. It was reported that using this technology improved the quality of health care and patient outcomes [4].

AlBar et al. [5] found that perceived usefulness and ease of use significantly affected Saudi patients' attitudes, which had a significant effect on the behavioral intention among patients ($P<0.05$). Albarrak et al. [6] reported that the majority of Saudi physicians had low knowledge of telemedicine, while others had positive perceptions of telemedicine and had the tendency to adopt it through clinics. Most physicians reported some barriers, such as costs, privacy issues, communication technology issues, and lack of training.

Patients' satisfaction is considered effective for the performance of healthcare service and reflects patients' expectations towards healthcare service. Patients became satisfied when there was a matching between the healthcare service that they expected and that they received [7].

Polinski et al. [4] conducted a cross-sectional patient satisfaction survey to assess patients' satisfaction with telehealth visits at the Consumer Value Store (CVS) MinuteClinic, United States. Most of the participants (94% to 99%) reported that they were very satisfied with telehealth services. Approximately 95% of patients reported their satisfaction with seeing the diagnostic images on the monitor and could see and hear the practitioner. Additionally, 95% appreciated the convenience and care quality. Most of them reported that telehealth facilitated access to care.

López et al. [8] carried out a telephone survey to assess patient satisfaction with real-time telemedicine consultation in a rural community in Colombia. The study results showed that 80% of patients were very satisfied with the teleconsultation. Almost 65% of the participants reported that their medical care was improved by using telemedicine technology. Additionally, more than half of patients reported telemedicine's positive impact in saving costs and 63% would use telemedicine again. In contrast, 27% reported that teleconsultation was not effective compared to traditional face-to-face consultation. Familiarity with it and the cognitive factors were recorded as the most common factors that affected patient satisfaction.

Davies et al. [9] performed a postal survey to assess patient satisfaction using telephone follow-up to manage thyrotoxicosis. Most patients (90%) were very satisfied with the telephone follow-up service. They reported that telephone follow-up met their needs, saved time, and they would use the service again. On the other hand, 12% of the participants expressed their disagreement with telephone follow-up, and the service wasn't good compared to traditional face-to-face consultation. The results were agreed with by Jeffery et al. [3] and Yip et al. [10].

Fleischhacker [11] conducted a systematic review to investigate patient's satisfaction with telehealth compared to in-office visits. They showed that the most common factors impacted patients' satisfaction with telehealth, such as cost savings, travel time/convenience, provider relationship, access to healthcare, inhibiting influences of telehealth, and clinical outcomes. It was reported that telehealth met patients' needs, and provided a better connection to healthcare providers, so it showed a positive effect on the patient's satisfaction. Also, Orlando et al. [12] reported patient's satisfaction with telehealth services.

In Saudi Arabia, telemedicine was integrated into the medical sector to provide information and communication technologies and achieve more effective treatments. The COVID-19 pandemic is a major health concern worldwide, due to its rapid transmission and several precautions were applied such as staying at home. Therefore, telemedicine service has a pivotal role during the coronavirus pandemic enabling healthcare providers to communicate and follow up with patients, especially elderly patients, or those with chronic conditions. Patient satisfaction is an effective indicator to assess the performance of healthcare services provided. Few studies have investigated patient satisfaction and attitude toward telemedicine and e-clinics in Saudi Arabia.

In Saudi Arabia, Wali et al. [13] carried out a cross-sectional survey among patients who attended the Primary Health Care centers (PHCCs). Most patients (74.5%) showed their agreement with improving telehealth by implementing electronic medical records (EMRs). Most of them were satisfied with implementing EMRs compared to the paper medical records with highly significant differences.

Most of the participants attributed their satisfaction to increasing the time for consultation and increasing listening by healthcare providers. They concluded that patient satisfaction during clinical consultation improved with the implementation of EMR.

This study aimed to assess patients' satisfaction and attitudes toward telemedicine and e-clinics and the associated factors in Aseer Healthy Cities, Saudi Arabia.

Subjects and Methods

This study followed a cross-sectional research design. Family medicine centers or PHCCs that provide Telemedicine clinics in seven Healthy Cities (Abha, Bishah, Balgarn, Muhayel, Alharajah, Tareeb, and Alamwah) in Aseer Region, Saudi Arabia, were included during the period from January till November, 2023.

The study population included Saudi adults (aged >18 years old) who have been served by Telemedicine throughout Family medicine centers or PHCCs. A valid questionnaire was designed by the researchers and sent electronically to participants. The study questionnaire included patient's demographic data (i.e., age, gender), in addition to questions regarding their satisfaction and attitudes toward telemedicine and e-clinics using the five-point Likert scale (i.e., somewhat satisfied, very satisfied, neutral, somewhat dissatisfied, or very dissatisfied). The participants were also asked to describe their needs or suggestions for telemedicine service improvement.

Before data collection, a brief description of the study and its objectives were provided to all potential participants, and written consent was obtained from each participant. Confidentiality was assured to all participants.

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (IBM, SPSS, version 25). Descriptive statistics (i.e., frequencies, percentages, mean and standard deviation) were used to present all categorical variables. Testing significance of differences was applied using the Kruskal Wallis and Mann Whitney-U tests. P-values <0.05 were considered statistically significant.

Results

A total of 497 Saudi individuals in seven healthy cities of e-Clinics responded to our online self-administered questionnaire to assess their attitude and satisfaction. Table (1) shows that the most common age group was 25-34 years (200, 40.2%). Females were slightly more than males (250, 50.3% vs. 247, 49.7%, respectively). Most participants reported using the services of E-clinics 1-3 times (405, 81.5%). About one-third reported having medical insurance (167, 33.6%), and having a family doctor (196, 39.4%). Also, about one-third reported having worries about E-clinics (178, 35.8%) and experienced confusion while using E-clinics (148, 29.8%).

Table (2) shows that, regarding patients' satisfaction, the highest percentages of patients who were very satisfied were related to understanding the services provided by e-clinics (275, 55.3%), hearing and seeing the healthcare providers very clearly (279, 56.1%), and 269 (54.1%) were very satisfied with E-clinics service. The mean(±SD) of the overall satisfaction score was 4.306±0.8, whereas the maximum score was 5.

Table (3) shows the relation between participants' characteristics and their mean satisfaction scores (±SD). There were significant differences according to their mean scores of satisfaction regarding their age groups, medical insurance, and having a family doctor (P<0.0001 for all).

The questions of attitude and the answers of participants are shown in Table (4). More than one-third of participants (180, 36.2%) reported that E-clinics are better than a real doctor. More than half of patients (254, 51.1% and 286, 57.5%) reported that they would use e-clinics again and they will recommend using e-clinics, respectively.

Tables (5-7) show that participants' attitudes did not differ significantly according to their gender. The medical insurance significantly affected the attitude of participants (Table 6). Table (7) shows that their worries regarding E-clinics significantly affected their preferences (P=0.001) and their recommendation (P=0.003).

Table (8) shows that the highest mean satisfaction score was associated with preferring E-clinic, reusing E-clinic, and recommendation for E-clinics (P<0.0001, for all).

Table 1: Participants' baseline characteristics

Characteristics		No.	%
Age	18-24 years	148	29.8
	25–34 years	200	40.2
	35-44 years	103	20.7
	45-54 years	31	6.2
	55-64 years	8	1.6
	≥ 65 years	7	1.4
Gender	Male	247	49.7
	Female	250	50.3
How many times did you use the e-Clinics service?	1-3 times	405	81.5
	4-10 times	63	12.7
	>10 times	29	5.8
Do you have medical insurance?	No	330	66.4
	Yes	167	33.6
Do you have a family doctor?	No	301	60.6
	Yes	196	39.4
Did you have any worries about e-Clinics?	No	319	64.2
	Yes	178	35.8
Did you find any confusion or misleading things while you are using e-Clinics?	No	349	70.2
	Yes	148	29.8

Table 2: Patients' satisfaction toward e-Clinics

Satisfaction variables		No.	%
I do understand all the services provided by e-Clinics	Very dissatisfied	6	1.2
	Dissatisfied	6	1.2
	Neutral	64	12.9
	Satisfied	146	29.4
	Very satisfied	275	55.3
Images and videos are clear on both ends	Very dissatisfied	4	0.8
	Dissatisfied	13	2.6
	Neutral	93	18.7
	Satisfied	130	26.2
	Very satisfied	257	51.7
Hearing and seeing the health care provider was very clear	Very dissatisfied	6	1.2
	Dissatisfied	9	1.8
	Neutral	66	13.3
	Satisfied	137	27.6
	Very satisfied	279	56.1
The nurse can provide me the service well	Very dissatisfied	10	2.0
	Dissatisfied	15	3.0
	Neutral	101	20.3
	Satisfied	112	22.5
	Very satisfied	259	52.1
Distant medicine was very good	Very dissatisfied	9	1.8
	Dissatisfied	6	1.2
	Neutral	77	15.5
	Satisfied	137	27.6
	Very satisfied	268	53.9
The treatment plan and educational tools were very good	Very dissatisfied	8	1.6
	Dissatisfied	9	1.8
	Neutral	83	16.7
	Satisfied	125	25.2
	Very satisfied	272	54.7
The service is very easy to use	Very dissatisfied	6	1.2
	Dissatisfied	7	1.4
	Neutral	60	12.1
	Satisfied	128	25.8
	Very satisfied	296	59.6
I'm satisfied with e-Clinics service	Very dissatisfied	11	2.2
	Dissatisfied	8	1.6
	Neutral	90	18.1
	Satisfied	119	23.9
	Very satisfied	269	54.1

Table 3: Participants' satisfaction score (Mean±SD) according to their characteristics

Characteristics		Satisfaction score		P-value
		Mean	SD	
Age	18-24 years	4.541	0.709	<0.0001*
	25 – 34 years	4.126	0.798	
	35-44 years	4.346	0.828	
	45-54 years	4.137	0.784	
	55-64 years	4.188	1.301	
	≥ 65 years	4.750	0.323	
Gender	Male	4.234	0.845	0.075**
	Female	4.376	0.751	
How many times did you use the e-Clinics service?	1-3 times	4.290	0.812	0.710*
	4-10 times	4.395	0.761	
	>10 times	4.328	0.753	
Do you have medical insurance?	No	4.205	0.822	<0.0001**
	Yes	4.504	0.722	
Do you have a family doctor?	No	4.177	0.799	<0.0001**
	Yes	4.503	0.767	
Did you have any worries about e-Clinics?	No	4.317	0.758	0.700**
	Yes	4.286	0.877	
Did you find any confusion or misleading things while you are using e-Clinics?	No	4.277	0.795	0.075**
	Yes	4.374	0.815	
*Kruskal Wallis test		**Mann Whitney U test		

Table 4: Participants' attitudes towards e-Clinics

Attitudes		No.	%
Comparing between e-Clinics and real doctor visit	Not sure	140	28.2
	Worse than a doctor's visit	34	6.8
	Same as a doctor's visit	143	28.8
	Better than a doctor visit	180	36.2
How likely to reuse e-Clinics?	For sure, I will not use it again	12	2.4
	Maybe I will not use it again	43	8.7
	Not sure	47	9.5
	Most probably, I will use it again	141	28.4
	For sure I will use it again	254	51.1
How likely will you recommend using e-Clinics?	No for sure	15	3.0
	Maybe not	52	10.5
	Most probably	144	29.0
	For sure	286	57.5

Table 5: Participants' attitudes towards e-Clinics according to their gender

Attitudes		Gender				P-value
		Male		Female		
		No.	%	No.	%	
Comparing between e-Clinics and real doctor visit	Not sure	59	23.9	81	32.4	0.13
	Worse than a doctor's visit	20	8.1	14	5.6	
	Same as a doctor's visit	71	28.7	72	28.8	
	Better than a doctor's visit	97	39.3	83	33.2	
How likely to reuse e-Clinics?	For sure I will not use it again	5	2.0	7	2.8	0.96
	Maybe I will not use it again	23	9.3	20	8.0	
	Not sure	23	9.3	24	9.6	
	Most probably, I will use it again	70	28.3	71	28.4	
	For sure I will use it again	126	51.0	128	51.2	
How likely will you recommend using e-Clinics?	No for sure	7	2.8	8	3.2	0.84
	Maybe not	24	9.7	28	11.2	
	Most probably	69	27.9	75	30.0	
	For sure	147	59.5	139	55.6	

Table 6: Participants' attitudes towards e-Clinics according to their medical insurance

Attitude		Do you have medical insurance?				P-value
		No		Yes		
		No.	%	No.	%	
Comparing between e-Clinics and real doctor visit	Not sure	115	34.8%	25	15.0%	<0.0001
	Worse than a doctor visit	21	6.4	13	7.8	
	Same as a doctor visit	85	25.8	58	34.7	
	Better than a doctor visit	109	33.0	71	42.5	
How much likely to reuse e-Clinics?	For sure, I will not use it again	7	2.1	5	3.0	0.007
	Maybe I will not use it again	29	8.8	14	8.4	
	Not sure	37	11.2	10	6.0	
	Most probably, I will use it again	106	32.1	35	21.0	
	For sure, I will use it again	151	45.8	103	61.7	
How likely will you recommend using e-Clinics?	No for sure	8	2.4	7	4.2	0.002
	Maybe not	44	13.3	8	4.8	
	Most probably	104	31.5	40	24.0	
	For sure	174	52.7	112	67.1	

Table 7: Participants' attitudes towards e-Clinics according to their worries about e-Clinics

Attitude		Did you have any worries about e-Clinics?				P-value
		No		Yes		
		No.	%	No.	%	
Comparing between e-Clinics and real doctor visit	Not sure	102	32.0	38	21.3	0.001
	Worse than a doctor's visit	16	5.0	18	10.1	
	Same as a doctor's visit	101	31.7	42	23.6	
	Better than a doctor's visit	100	31.3	80	44.9	
How likely to reuse e-Clinics?	For sure, I will not use it again	4	1.3	8	4.5	0.18
	Maybe I will not use it again	25	7.8	18	10.1	
	Not sure	32	10.0	15	8.4	
	Most probably, I will use it again	92	28.8	49	27.5	
	For sure I will use it again	166	52.0	88	49.4	
How likely will you recommend using e-Clinics?	No for sure	9	2.8	6	3.4	0.003
	Maybe not	24	7.5	28	15.7	
	Most probably	107	33.5	37	20.8	
	For sure	179	56.1	107	60.1	

Table 8: Participants' attitudes towards e-Clinics according to their satisfaction scores (Mean±SD)

Attitudes		Satisfaction score		P value
		Mean	SD	
Comparing between e-Clinics and real doctor visit	Not sure	3.922	0.742	<0.0001
	Worse than a doctor visit	3.460	1.001	
	Same as a doctor visit	4.416	0.716	
	Better than a doctor visit	4.676	0.603	
How much likely to reuse e-Clinics?	For sure I will not use it again	3.010	1.254	<0.0001
	Maybe I will not use it again	3.776	0.818	
	Not sure	3.723	0.630	
	Most probably, I will use it again	4.082	0.792	
	For sure I will use it again	4.688	0.544	
How likely will you recommend using e-Clinics?	No for sure	3.442	1.154	<0.0001
	Maybe not	3.563	0.848	
	Most probably	4.023	0.765	
	For sure	4.628	0.588	

Discussion

Effective adoption of e-health is dependent on the engagement of the patients [5]. In our study, most of the patients (81.5%) reported using e-clinics 1-3 times, whereas the least proportion (5.8%) reported using it more than ten times. Moreover, some participants reported having worries about e-clinics and found confusion while using them. This can be solved by educating the patients about how to use E-clinics and their benefits. A study in Jeddah reported a perception of the effectiveness of teleconsultation ranged between 71.43%-88.77% [14].

In Colombia, a study revealed that more than half of respondents thought that telemedicine had a positive impact on the improvement of medical care and saving time and cost [8]. The satisfaction of the patients is an essential factor in the performance of healthcare service; the satisfaction of patients occurs when they receive healthcare service that matches their expectations [7].

In the current study, the maximum score of satisfaction was five, and the mean score was 4.3, reflecting a high level of satisfaction among patients. The highest percentage of patients reported that they were very satisfied with the easiness of using the services and hearing the healthcare providers very well. Age of 65 years and older, having medical insurance, and family doctor were significantly associated with a higher level of satisfaction. These findings can be explained by the fact that the older age population prefers not to move frequently due to their medical conditions, and e-clinic and telemedicine saves their time and effort of visiting conventional clinics and waiting. Also, having a family doctor may help to educate the patients about E-clinics and their benefits and how to use them.

Similar findings were reported by a previous Saudi study conducted during the COVID-19 pandemic. The study reported that most participants thought that telemedicine is easier; more than-one half were very satisfied (52%), and the highest satisfaction was regarding the ease of registration and quality of audio and video. Also, age was a significant predictor for the satisfaction of participants, but in contrast to our findings, participants with younger age reported the highest mean score of satisfaction [15].

Another Saudi study included 439 patients who reported overall satisfaction with the virtual clinic of 68.1%. The factors that determined the satisfaction of patients included gender, age group, and level of education; younger age groups (18-59 years), males, post-graduate and middle school were significantly associated with higher satisfaction [16]. The previous study reported determinant factors in contrast to ours. A study that included 407 participants from Jeddah reported that the satisfaction level among participants ranged from 59.4-83.96%; older age patients were more prone to use teleconsultation in the future and strongly agreed about the effectiveness of teleconsultation [14].

On the contrary to the previous Saudi studies and our study, one Saudi study conducted to assess the implementation of telemedicine in anesthesia clinic; the study found that 50.7% of participants reported low satisfaction with telemedicine, whereas 63.1% had high satisfaction till their last appointment. The low satisfaction level was significantly associated with younger age (20-30 years) [17]. A systematic review included 18 articles that reported a high satisfaction level regarding telehealth during the COVID-19 pandemic [18]. A study comparing the satisfaction among 100 individuals regarding virtual clinic and telemedicine revealed a high satisfaction score with a mean score of 9.08 out of 10. The study demonstrated that telemedicine continues to develop and become more acceptable among the population [19].

There was a positive attitude among patients toward using e-clinics, where the highest proportions reported that they would use the service again and would recommend it. The determinants of the attitude, including age, medical insurance, and worries about e-clinics significantly affected different aspects of attitude. Participants with younger ages (18-24 years old) significantly reported that e-clinics are better than doctor visits, and they will recommend using e-clinics. The medical insurance significantly affected the attitude of participants regarding all aspects. The worries regarding e-clinics significantly affected the preferences of patients and their recommendations.

A previous Saudi study reported an acceptable attitude toward telemedicine among participants during the COVID-19 pandemic. In contrast to our study, gender was a determinant of attitude, where males had significantly higher attitudes compared to females [15]. A study from Colombia found that 27% of participants thought that telemedicine wasn't as good as face-to-face consultation [8]. A study from Japan that included 103 patients and that was conducted during the COVID-19 pandemic revealed that 60% were inclined to use telemedicine, and there was a tendency among patients to use telemedicine during the pandemic [20].

Conclusions

Telemedicine and E-clinics are acceptable by the Saudi population which was especially observed during the COVID-19 pandemic due to the fears of infection. Patients are satisfied with healthcare services provided by Telemedicine and e-clinics, especially older patients. Therefore, improving that service and raising awareness of the public about it can promote its use and hence, reduce the crowding and waiting times in clinics, as well as the cost of healthcare services.

Acknowledgents
The authors would like to thank the Public Health Department in the General Directorate of Health Affairs in the Aseer region and the Family & Community Department at King Khaled University for supporting all expenses of this research work and also all participants who voluntarily participated in this study.

References

1. Khemapech L, Sansrimahachai W, Toahchoodee M. Telemedicine – Meaning, Challenges and Opportunities. Siriraj Medical Journal, 2019; 71(3). http://dx.doi.org/10.33192/Smj.2019.38.
2. Bujnowska-Fedal MM, Grata-Borkowska U. Use of telemedicine-based care for the aging and elderly: promises and pitfalls. Smart Homecare Technology and TeleHealth. 2015; 8:91-105.
3. Jeffery S, Doumouchtsis SK, Fynes M. Patient satisfaction with nurse-led telephone follow-up in women with lower urinary tract symptoms. J Telemed Telecare 2007; 13:369–73.
4. Polinski JM, Barker T, Gagliano N, Sussman A, Brennan TA, Shrank WH. Patients' Satisfaction with and Preference for Telehealth Visits. J Gen Intern Med. 2016;31(3):269-275. doi:10.1007/s11606-015-3489-x.
5. AlBar, A. M., & Hoque, M. R. (2018). Patient Acceptance of e-Health Services in Saudi Arabia: An Integrative Perspective. Telemedicine and e-Health. doi:10.1089/tmj.2018.0107
6. Albarrak AI, et al. Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia. J Infect Public Health (2019), https://doi.org/10.1016/j.jiph.2019.04.006.
7. Un.org [Internet]. World population ageing [updated 2015; cited 2019 Apr 13]. Available from http://www.un.org/en/development/ desa/population/ publications/pdf/ageing/ WPA2015_Report. pdf.
8. López C, Valenzuela JI, Calderón JE, Velasco AF, Fajardo R. A telephone survey of patient satisfaction with realtime telemedicine in a rural community in Colombia. J Telemed Telecare. 2011;17(2):83-87. doi:10.1258/jtt.2010.100611.
9. Davies C, Vas P, Oyibo SO. Telephone follow-up for the management of thyrotoxicosis: a patient satisfaction survey. J Telemed Telecare. 2013;19(1):29-32. doi:10.1177/1357633X12474737.
10. Yip MP, Chang AM, Chan J, MacKenzie AE. Development of the Telemedicine Satisfaction Questionnaire to evaluate patient satisfaction with telemedicine: a preliminary study. J Telemed Telecare. 2003;9(1):46-50. doi:10.1258/135763303321159693.
11. Fleischhacker, C. L. (2020). Patient satisfaction with telehealth services compared to in-office visits: A systematic literature review [Master's alternative plan paper, Minnesota State University, Mankato]. Cornerstone: A Collection of Scholarly and Creative Works for Minnesota State University, Mankato. https://cornerstone.lib.mnsu.edu/etds/982/.
12. Orlando, J., Beard, M., Kumar, S., & Orlando, J. (2019). Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PloS One, 14(8), e0221848–e0221848. https://doi.org/10.1371/journal.pone.0221848.
13. Wali, R.M., Alqahtani, R.M., Alharazi, S.K. et al. Patient satisfaction with the implementation of electronic medical Records in the Western Region, Saudi Arabia, 2018. BMC Fam Pract 21, 37 (2020). https://doi.org/10.1186/s12875-020-1099-0.
14. Magadmi MM, Kamel FO, Magadmi RM. Patients' Perceptions and Satisfaction Regarding Teleconsultations During the COVID-19 Pandemic in Jeddah, Saudi Arabia..2021.
15. Nasser AA, Alzahrani RM, Fellah CA, Jreash DM, Almuwallad NT, Bakulka DS, Abed RA. Measuring the Patients' Satisfaction About Telemedicine Used in Saudi Arabia During COVID-19 Pandemic. Cureus. 2021 Feb;13(2).
16. Alharbi KG, Aldosari MN, Alhassan AM, Alshallal KA, Altamimi AM, Altulaihi BA. Patient satisfaction with virtual clinic during Coronavirus disease (COVID-19) pandemic in primary healthcare, Riyadh, Saudi Arabia. Journal of Family & Community Medicine. 2021 Jan;28(1):48.
17. Alrowailey AS, Saleh AA, Alshalan IS, Alshalan AS, Rafat A, Alsahaf AF. Postoperative patients' perspective toward the idea of implementing telemedicine in anesthesia clinic in a university hospital: a cross-sectional study. History. 2018 May 27;10:5-.
18. Andrews E, Berghofer K, Long J, Prescott A, Caboral-Stevens M. Satisfaction with the use of telehealth during COVID-19: An integrative review. International journal of nursing studies advances. 2020 Nov 1;2:100008.
19. Wall B, Daly P, Dunnill A, Osan J, Brogan K. Is Virtual Clinic the Way Forward: Patient Satisfaction Comparing Phone Clinic vs. Conventional Clinic.2021.
20. Kurihara K, Nagaki K, Inoue K, Yamamoto S, Mishima T, Fujioka S, Ouma S, Tsuboi Y. Attitudes toward telemedicine of patients with Parkinson's disease during the COVID-19 pandemic. Neurology and Clinical Neuroscience. 2021 Jan;9(1):77-82.

Awareness, attitude, and practices of adult females in Aseer Region, Saudi Arabia, about early detection of breast cancer

Abdulmohsen M.S. Alqahtani[1]; Faisal Abdullah I. Alshyer[1]; Mohammed Abdullah S. Alrabie[1]; Abdulrahman Mohammed A Alshehri[1]; Abdulkarim Abdurahman M. Alshehri[1]; Fowziah Mastour A. Al-Jouid[2]; Ali A. Al-Mousa AlQahtani[3]

1. Medical Students, King Khalid College of Medicine, Abha, Saudi Arabia
2. Nursing Specialist, King Faisal Medical Complex, Taif, Saudi Arabia
3. Family Medicine Consultant, General Directorate of Health, Aseer Region, Saudi Arabia

Corresponding Author
Abdulmohsen Mousa S. Almousa
Email: bshre0@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Abdulmohsen Mousa S. Almousa et al. Awareness, attitude, and practices of adult females in Aseer Region, Saudi Arabia, about early detection of breast cancer. World Family Medicine. December 2023; 21(11): 96-108
DOI: 10.5742/MEWFM.2023.95256236

Abstract

Aim of Study: To assess the awareness level of women about breast cancer as a major threat to women's health and the importance of its early detection.

Methods: This study followed a cross-sectional research design, which included 400 adult Saudi women, without breast cancer, who live in Aseer Region, Saudi Arabia. An online study questionnaire was developed in a simple Arabic language. It comprised participants' personal characteristics; their awareness about breast cancer; assessment of risk factors for breast cancer; and their attitude and screening practices for breast cancer.

Results: Only 59.4% of the participants were aware that breast cancer could be inherited in some families. The majority of the participants (78%) were aware that breastfeeding could protect against breast cancer. Early menarche and late menopause were recognized as risk factors for breast cancer by only 13.5% and 21.3% of the respondents respectively. Similarly, only 24.3% of the respondents answered correctly that the late age of first full-term pregnancy is a risk factor for breast cancer. More than half of the respondents (54.5%) were aware that hormonal replacement therapy is a risk factor for breast cancer. Women who had higher levels of education showed significantly more sufficient knowledge regarding breast cancer risk factors compared to those who were illiterate (48.2% versus 16.4%, P<0.001). The majority of women, 91.5%, who have heard of BSE, recognized that it should be done to search for tumours, while only 37.8%, 18.5%, and 27.4% recognized that the objective of BSE is to look for nipple discharge, nipple changes, and changes in the skin of the breast, respectively. Most of the participants in the 18-30 years age group (76.0%) have heard of BSE as compared to only 13.5% of those aged over 50. This association between women's ages and hearing of BSE was statistically significant (P<0.001). The majority of non-married women have heard of BSE (82.9%) as opposed to 53.1% of married women (P<0.001). More employed women have heard of BSE than non-employed women (81.0% vs. 54.0%, p<0.001). More women with a university education have heard of BSE than those who are illiterate and those who have a school education (79.8% vs. 18.2% and 62.5% respectively, P<0.001).

Conclusions: Knowledge levels of adult Saudi women in Aseer Region about breast cancer risk factors and screening methods are suboptimal. The awareness and practice of BSE among them is generally poor. Primary healthcare professionals have a limited role in educating women regarding breast cancer issues.

Key Words: Awareness, attitude, practice, Women, Early detection of breast cancer, Saudi Arabia.

Introduction

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020, with breast cancer being the most common (2.26 million new cases and 685,000 deaths) (1). Generally, the breast cancer rate is higher in developed than in developing countries. This difference may be due to relatively low awareness, screening practices, and diagnoses in developing countries. Nevertheless, the rates are increasing rapidly in many developing countries (2).

Breast cancer remains the leading cause of death among Saudi women (3). It has a significant impact on the health of women worldwide, and Saudi Arabia is no exception (4). In Saudi Arabia, breast cancer was ranked first among females in 2014. It accounted for 15.9% of all cancers reported among Saudi nationals and for 28.7% of all cancers reported among females of all ages. The age-standardized rate was 22.7/100,000 for the female population while, at diagnosis, the median age was 50 years (3).

Balekouzou et al. (5) noted that early detection of breast cancer could decrease the risks, be more likely to have a better prognosis, and better outcomes/more successful treatments. On the other hand, a delayed diagnosis of breast cancer, and consequently worse prognosis, have been attributed to a lack of awareness of breast cancer risks or the presence of barriers limiting women to utilize healthcare services. Therefore, early detection of breast cancer could occur through increasing the awareness of women toward breast self-examination (BSE), clinical breast examination, and mammography screening utilization (6).

In Saudi Arabia, most women present at advanced stages of breast cancer, especially among young pre-menopause women (7). The prevalence of breast cancer reached more than 25% of all diagnosed cancers among women in the Kingdom(8).

Lack of knowledge of breast cancer risks and low utilization of mammograms are reported among women in Saudi Arabia (9).

Education for breast cancer prevention could decrease the burden of breast cancer risks (10), which might be achieved through the implementation of strategies for primary prevention. These strategies included increasing the awareness of women about breast cancer risk factors, adherence to healthy lifestyle habits, lowering their weight, breastfeeding, being physically active, and preventing alcohol consumption which is considered the major cause of breast cancer among women (11-15).

In Saudi Arabia, breast cancer is the leading cause of death among women (3). Its incidence is increasing rapidly in many developing countries (2). Its early detection is associated with decreased risks, better prognosis, and more successful treatments (5). This can be achieved by increasing the awareness of women toward BSE, clinical breast examination, and mammography screening utilization (6). This study aimed to assess the awareness level of women about breast cancer as a major threat to women's health and the importance of its early detection.

Subjects and Methods

Following a cross-sectional research design, the present study included adult Saudi women (aged >18 years), without breast cancer, who live in Aseer Region, Saudi Arabia. Non-Saudi women, who live outside Aseer Region, and those with a confirmed diagnosis of breast cancer were excluded.

A convenience sampling was followed. The sample size was determined according to Dahiru et al. (16), as follows:
$n = (Z\alpha^2 \times P \times Q) / D^2$

where:
• n: Calculated sample size
• $Z\alpha$: The z-value for the selected level of confidence ($1-\alpha$) = 1.96.
• P: Estimated prevalence of women's awareness in the study population (assumed to be 50%, i.e., 0.5).
• Q: (1 – P) = 0.5
• D: The maximum acceptable error = 0.05.

The minimum sample size was calculated to be 384 participants. However, the sample size was increased to 400 participants to compensate for missing data.

A study questionnaire was developed in a simple Arabic language. It was adapted from those used by similar studies (17-20). The study questionnaire comprised the following parts:
1- Personal characteristics (8 questions): Age, having regular menses, marital status, absolute breastfeeding practices, educational status, employment status, average monthly family income, and residence.
2- Awareness about breast cancer (6 questions): Having heard about breast cancer, sources of information about breast cancer, knowing a woman who has been diagnosed with breast cancer, screening methods, risk factors, and symptoms of breast cancer.
3- Assessment of risk factors for breast cancer (14 questions): Age at menarche, age at marriage, age at first pregnancy, number of pregnancies and abortions, number of children, use of hormonal contraceptives, family history of cancer of the breast, practice of physical activity, and smoking status.
4- Attitude and screening practices for breast cancer (12 questions): Age at start of BSE, being vulnerable to breast cancer, benefits of early diagnosis of breast cancer, advising others to perform BSE, what has been done for early diagnosis of breast cancer, intention to perform BSE in the future, sources of advice to perform BSE, frequency of performing BSE, how to perform BSE, and reasons for not performing BSE.

An electronic copy of the study questionnaire was designed using the Google Forms. Participants were invited through their social media groups and their WhatsApp

accounts. The study obtained the official approval from the Aseer Institutional Review Board (IRB), (#H-06-B-091) on March 4th, 2023.

All participants were informed about the study objectives and were asked to provide their consent to participate on the first page of the online questionnaire, and then to answer the questions. All respondents received a brief description of the study and its objectives. Collected data were secured by restricting unauthorized access.

Statistical Analysis

Collected data were statistically analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 28). Descriptive statistics (i.e., frequency and percentage for categorical data; and mean and standard deviation for quantitative data) were calculated. Testing significance of differences was applied using the chi-square (X^2) test. P-values <0.05 were considered as statistically significant.

Results

Participants' socio-demographic characteristics are presented in Table (1). Almost two-thirds of the respondents (60.4%) were in the age group 18-30 years and only 9.3% of them were over 50 years. Two hundred and seven (51.8%) were married. Exactly half of them (50%) were employed. Approximately two-thirds (64.2%) had a university education and 55 (13.8%) had no formal education.

Table (2) shows the participants` knowledge of risk factors for breast cancer. In response to the question on the inheritability of breast cancer, only 238 (59.4%) were aware that breast cancer could be inherited in some families. The majority of the respondents (78%) were aware that breastfeeding could protect against breast cancer. Early menarche and late menopause were recognized as risk factors for breast cancer by only 13.5% and 21.3% of the respondents respectively. Similarly, only 24.3% of the respondents answered correctly that the late age of first full-term pregnancy is a risk factor for breast cancer. More than half of the respondents (54.5%) were aware that hormonal replacement therapy is a risk factor for breast cancer. High-fat diet and lack of physical exercise were recognized as risk factors for breast cancer by 29.5% and 37% of the respondents respectively.

Figure (1) displays that 35 women (8.8%) did not answer any question correctly while 102 women (25.5%) answered more than five questions correctly.

Socio-demographic determinants of breast cancer risk factors knowledge are presented in Table (3). Sufficient knowledge was reported by 44.4% of respondents in the age group between 41 and 50 years compared to only 29.7% of those aged over 50 years. However, this difference was not statistically significant. Women who had higher levels of education showed more sufficient knowledge regarding breast cancer risk factors compared to those who were illiterate (48.2% versus 16.4%). This difference was statistically significant (P<0.001). There was no significant association between the level of knowledge of breast cancer risk factors and both marital status and work status.

Breast self-examination knowledge and practice

Figure (2) shows that about two-thirds of the participants have heard of BSE (67.5%). Figure (3) shows that about one-third of the participants had practiced BSE (37.8%). Figure (4) displays the reasons for non-practicing of BSE among those who claimed that they did not practice BSE. In more than half of them (51.3%), the reason was the carelessness of the participants. The reason for non-practicing BSE was fear/anxiety and ignorance of the proper technique among 26.9% and 21.8% of the participants respectively. Figure (5) shows that 25.2% and 23% of those who have heard of BSE claimed that their sources of information regarding BSE were their study curriculum and TV/press media respectively. Only 13.3% and 15.2% of them claimed that their sources of information were physicians and the Internet respectively.

Table (4) illustrates the knowledge of BSE among those who have heard of it (n=270). Most of them answered correctly the question about the optimal BSE frequency (72.2%). The majority of women, 91.5%, who have heard of BSE, recognized that it should be done to explore for tumors, while only 37.8%, 18.5%, and 27.4% recognized that the objective of BSE is to look for nipple discharge, nipple changes, and changes in the skin of the breast, respectively. More than half of women with BSE familiarity (54.8%), answered correctly that they should not wear gloves during BSE. Most of them (80.4%) recognized that they should stand in front of a mirror while practicing BSE.

Table (5) presents the association between socio-demographic characteristics of the participants and their familiarity with BSE. Most of the women in the 18-30 years age group (76.0%) have heard of BSE as compared to only 13.5% of those aged over 50 years. This association between women's ages and hearing of BSE was statistically significant (P<0.001). The majority of non-married women have heard of BSE (82.9%) as opposed to 53.1% of married women. This difference was statistically significant (P<0.001). More employed women have heard of BSE than non-employed women (81.0% versus 54.0%). This difference was statistically significant (P<0.001). Educational level was significantly associated with BSE familiarity. More women with a university education have heard of BSE than those who are illiterate and those who have a school education (79.8% versus 18.2% and 62.5% respectively), (P<0.001).

Table (6) illustrates the association between the socio-demographic characteristics of the participants and their history of practicing BSE. Slightly less than half of the women in the age group 18-30 years (47.1%) have practiced BSE as compared to only 13.5% of those aged over 50 years. This association between women's ages and practicing BSE was statistically significant

(P<0.001). Regarding marital status, non-married women have practiced BSE more than married women (52.3% versus 24.2%). This difference was statistically significant (P<0.001). Working women practiced BSE more than non-working women (52.5% versus 23.0%). This difference was statistically significant (P<0.001). The educational level was significantly associated with BSE practice among participants. Women who had a university education practiced BSE more than those who were illiterate and those who had a school education (50.6% versus 0.0% and 23.9% respectively) (P<0.001).

Table (7) shows that the highest knowledge score regarding BSE was reported among women in the 41-50 age group (61.5%) who had sufficient BSE knowledge compared to none of those aged over 50 and 26.6% of those in the 18-30 age group. These differences were statistically significant (P<0.001). Women who had their information from physicians had the highest BSE knowledge score as 72.2% of them had sufficient knowledge compared to 19.4% and 22% of those who depended on TV and the internet as a source of BSE information, respectively. The association between the source of information and BSE knowledge level was statistically significant (P<0.001). Educational level, work status, and marital status were not statistically significantly associated with the level of BSE knowledge.

Table 1: Socio-demographic characteristics of the study participants

Variables	Categories	No. (%)
Age (in years)	18-30	242 (60.4)
	31-40	76 (19.0)
	41-50	45 (11.3)
	>50	37 (9.3)
Marital status	Married	207 (51.8)
	Non-married	193 (48.2)
Employment status	Employed	200 (50.0)
	Unemployed	200 (50.0)
Educational level	Illiterate	55 (13.8)
	School †	88 (22.0)
	University	257 (64.2)

† Primary, intermediate, or secondary schools

Table 2: Participants' knowledge of risk factors for breast cancer

Risk factors	Correct answer No. (%)	Incorrect answer No. (%)	Don't know No. (%)
Early menarche	54 (13.5)	178 (44.5)	168 (42.0)
Late menopause	85 (21.3)	131 (32.7)	184 (46.0)
Late age of first full-term pregnancy (>30 years)	97 (24.3)	135 (33.7)	168 (42.0)
Never breastfed a child	312 (78.0)	39 (9.8)	49 (12.2)
Family history of breast cancer	238 (59.4)	93 (23.3)	69 (17.3)
Hormonal-replacement therapy	218 (54.5)	48 (12.0)	134 (33.5)
Taking oral contraceptives for a long period	203 (50.7)	56 (14.0)	141 (35.3)
High–fat diet	118 (29.5)	114 (28.5)	168 (42.0)
Lack of physical exercise	148 (37.0)	105 (26.3)	147 (36.7)
Diabetes mellitus	75 (18.8)	139 (34.8)	186 (46.5)

Figure 1: Distribution of the participants according to the number of correctly answered questions regarding breast cancer risk factors

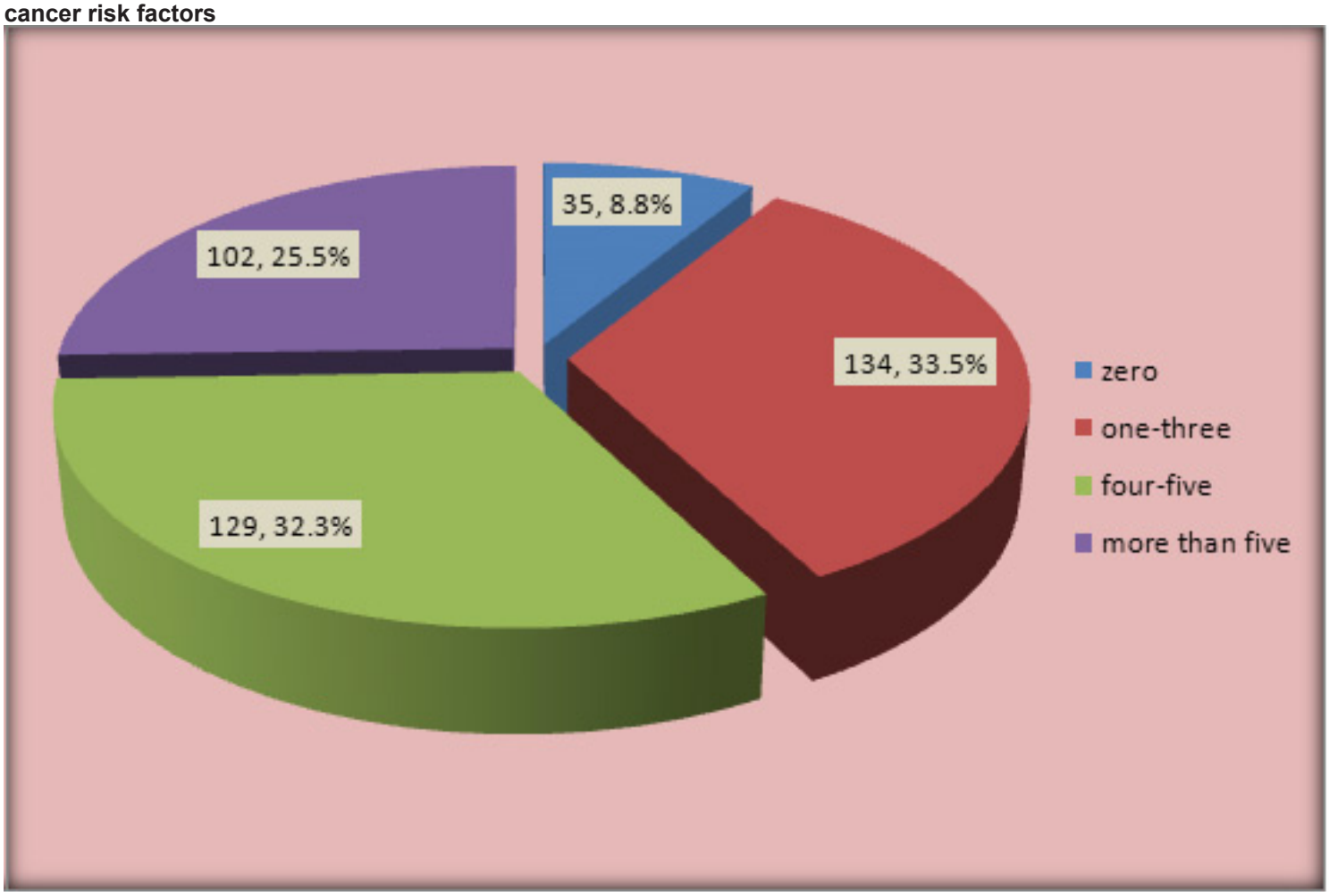


Table 3: Association between knowledge of breast cancer risk factors and relevant variables

Variables	Knowledge		χ^2 (P-value)
	Sufficient No. (%)	Insufficient No. (%)	
Age in years			
• 18-30 (n=242)	101 (41.7)	141 (58.3)	
• 31-40 (n=76)	31 (40.8)	45 (59.2)	
• 41-50 (n=45)	20 (44.4)	25 (55.6)	2.21 (0.529)
• >50 (n=37)	11 (29.7)	26 (70.3)	
Marital status			
• Married (n=207)	82 (39.6)	125 (60.4)	
• Not married (n=193)	81 (42.0)	112 (58.0)	0.23 (0.684)
Employment status			
• Employed (n=200)	88 (44.0)	112 (56.0)	1.75 (0.222)
• Unemployed (n=200)	75 (37.5)	125 (62.5)	
Educational level			
• Illiterate (n=55)	9 (16.4)	46 (83.6)	21.15 (<0.001)
• School (n=88)	30 (34.1)	58 (65.9)	
• University (n=257)	124 (48.2)	133 (51.8)	

Figure 2: Distribution of the participants according to their awareness of BSE

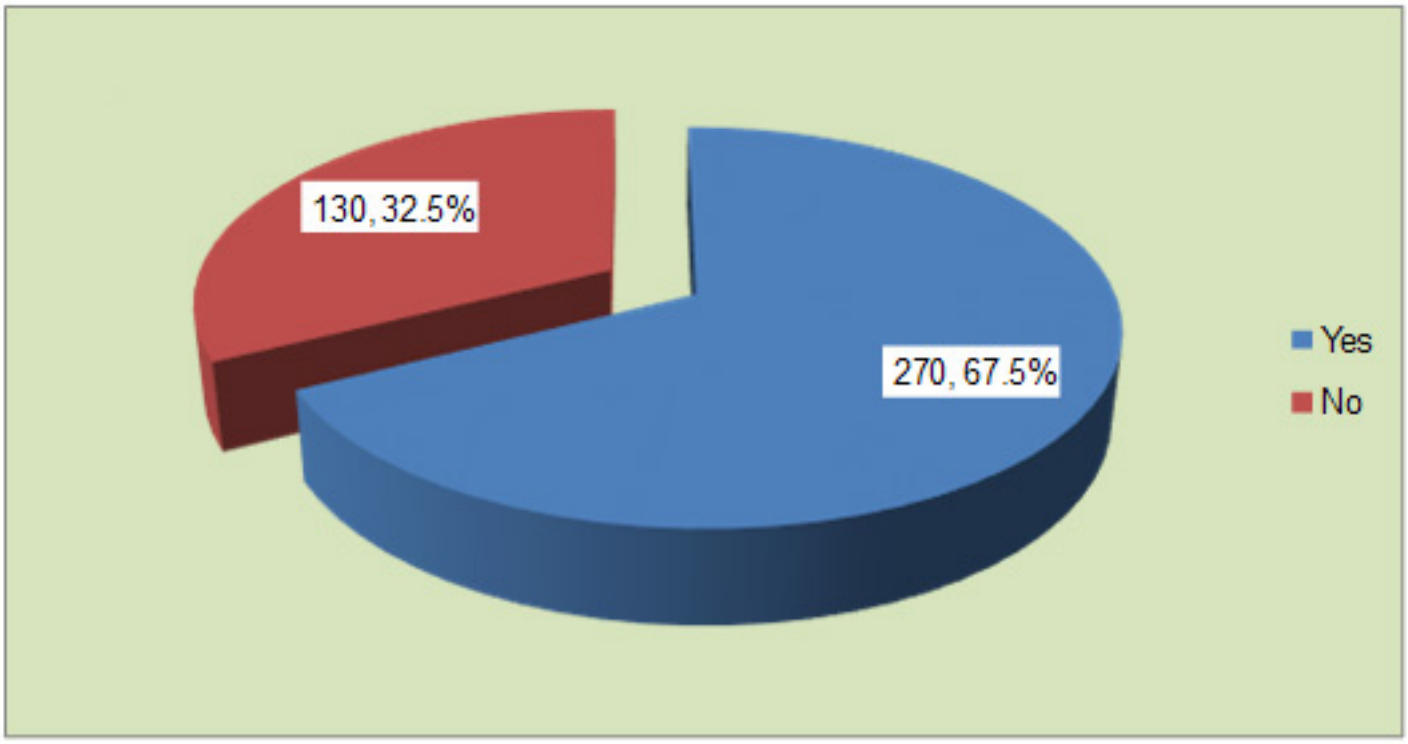


Figure 3: Distribution of the participants according to their BSE practice

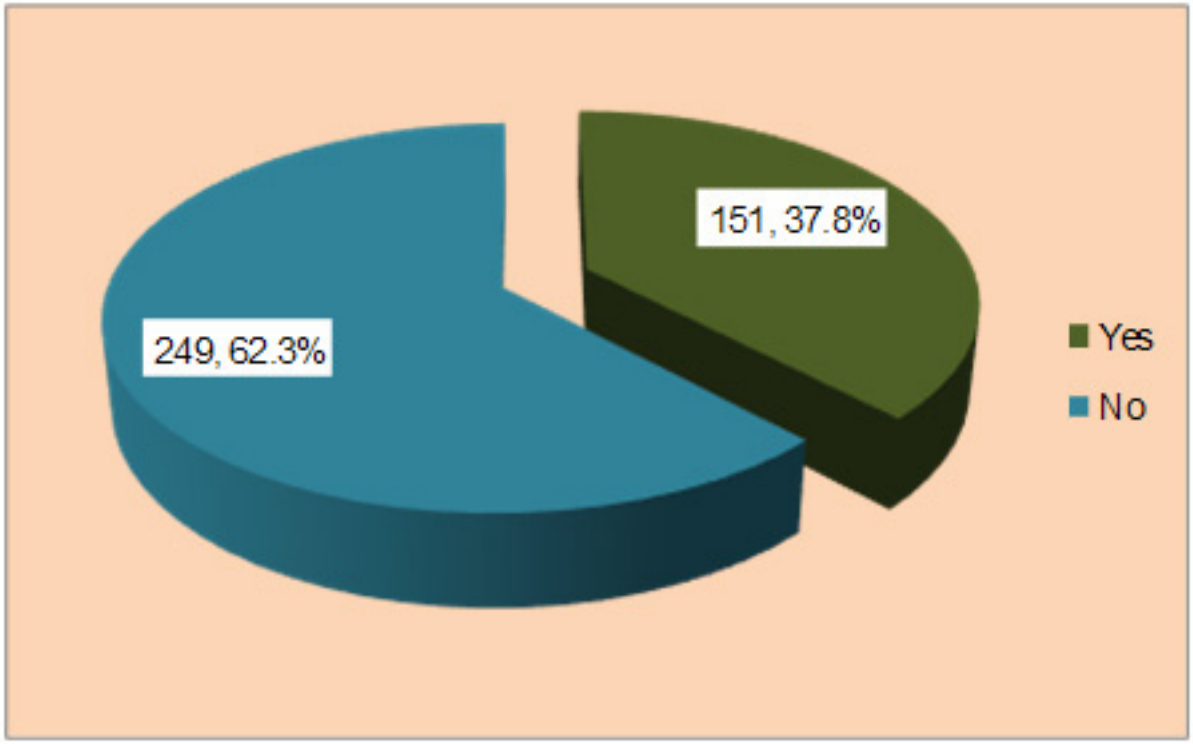


Figure 4: Reasons for non-practicing BSE among participants (n=249)

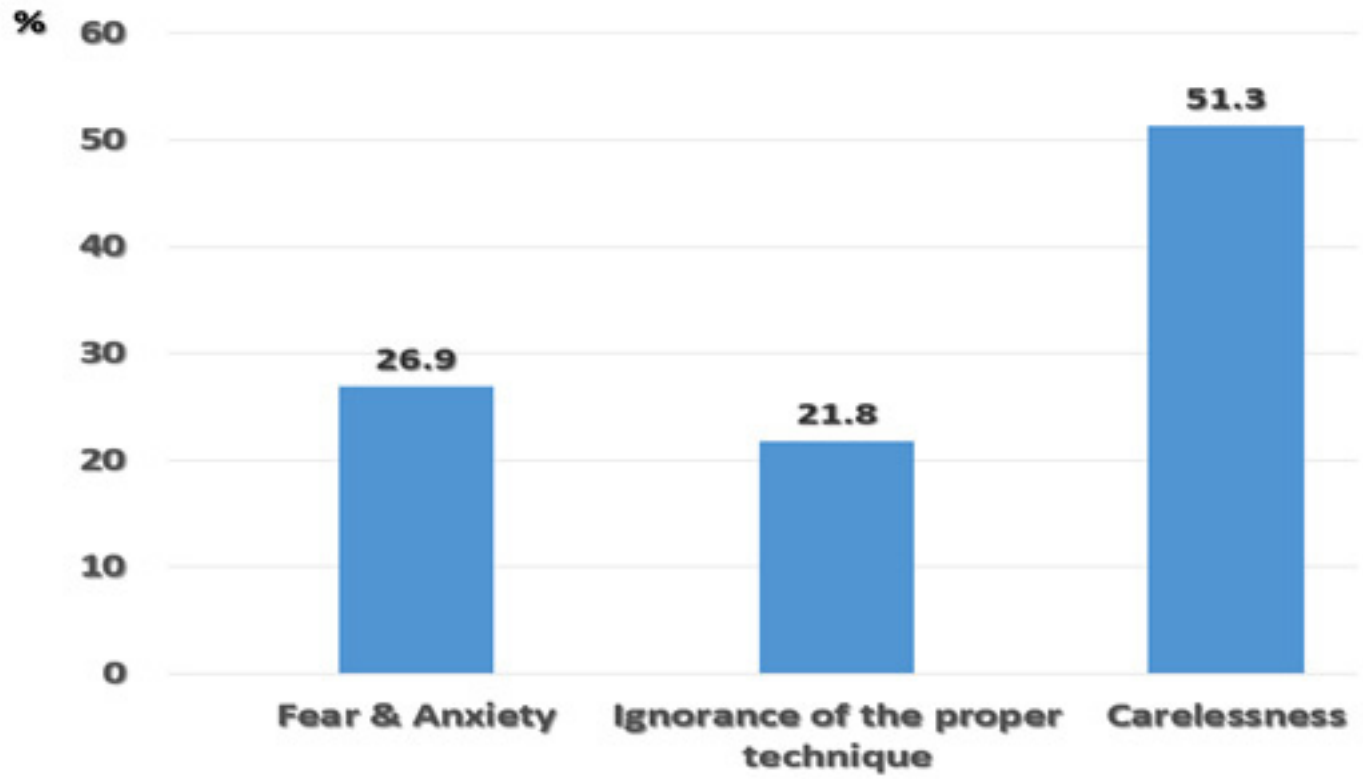


Figure 5: Source of information regarding BSE (n=270)

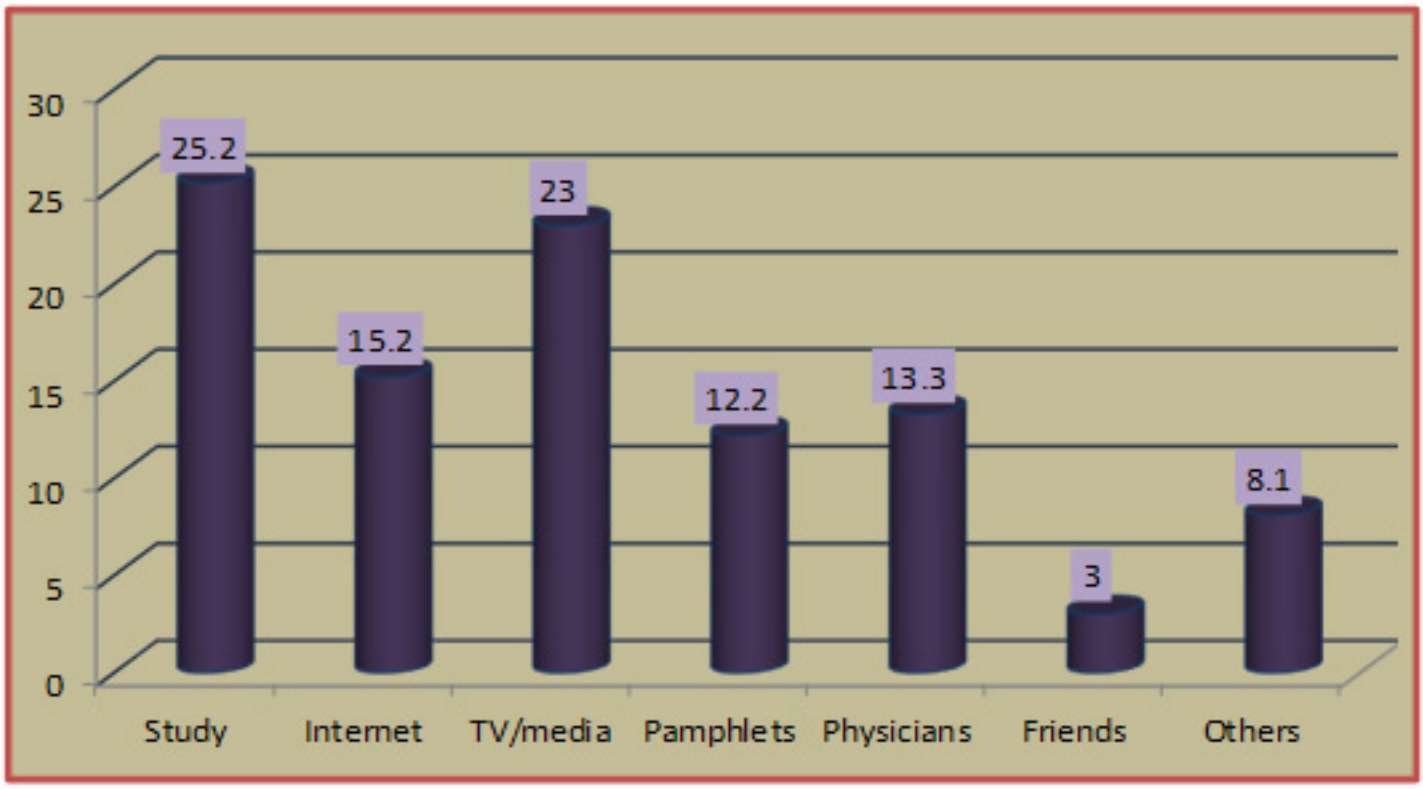


Table 4: Knowledge of BSE among participants (n=270)

Items	No. (%)
1. Optimal frequency for practicing BSE	
• Correct answer	195 (72.2)
• Incorrect answer	75 (27.8)
2. Objectives of BSE	
- Searching for tumors	
• Correct answer	247 (91.5)
• Incorrect answer	23 (8.5)
- Looking for nipple discharge	
• Correct answer	102 (37.8)
• Incorrect answer	168 (62.2)
- Looking for nipple change	
• Correct answer	50 (18.5)
• Incorrect answer	220 (81.5)
- Looking for a change in the skin of the breast	
• Correct answer	74 (27.4)
• Incorrect answer	196 (72.6)
- Wearing gloves during BSE	
• Correct answer	148 (54.8)
• Incorrect answer	81 (30.0)
• Do not know	41 (15.2)
- Standing in front of a mirror during BSE	
• Correct answer	217 (80.4)
• Incorrect answer	15 (5.6)
• Do not know	38 (14.1)

Table 5: Association between hearing about BSE and relevant variables

Variables	Practice BSE Yes No. (%)	Practice BSE No No. (%)	χ^2 (P-value)
Age in years			
• 18-30 (n=242)	114 (47.1)	128 (52.9)	
• 31-40 (n=76)	22 (28.9)	54 (71.1)	
• 41-50 (n=45)	10 (22.2)	35 (77.8)	25.39 (<0.001)
• >50 (n=37)	5 (13.5)	32 (86.5)	
Marital status			
• Married (n=207)	50 (24.2)	157 (75.8)	33.74 (<0.001)
• Not-married (n=193)	101 (52.3)	92 (47.7)	
Employment status			
• Employed (n=200)	105 (52.5)	95 (47.5)	37.03 (<0.001)
• Unemployed (n=200)	46 (23.0)	154 (77.0)	
Educational level			
• Illiterate (n=55)	0 (0.0)	55 (100.0)	
• School (n=88)	21 (23.9)	67 (76.1)	58.59 (<0.001)
• University (n=257)	130 (50.6)	127 (49.4)	

Table 6: Association between practicing breast self-examination and relevant variables

Variables	Practice BSE Yes No. (%)	Practice BSE No No. (%)	χ^2 (P-value)
Age in years			
• 18-30 (n=242)	114 (47.1)	128 (52.9)	
• 31-40 (n=76)	22 (28.9)	54 (71.1)	
• 41-50 (n=45)	10 (22.2)	35 (77.8)	25.39 (<0.001)
• >50 (n=37)	5 (13.5)	32 (86.5)	
Marital status			
• Married (n=207)	50 (24.2)	157 (75.8)	33.74 (<0.001)
• Not-married (n=193)	101 (52.3)	92 (47.7)	
Employment status			
• Employed (n=200)	105 (52.5)	95 (47.5)	37.03 (<0.001)
• Unemployed (n=200)	46 (23.0)	154 (77.0)	
Educational level			
• Illiterate (n=55)	0 (0.0)	55 (100.0)	
• School (n=88)	21 (23.9)	67 (76.1)	58.59 (<0.001)
• University (n=257)	130 (50.6)	127 (49.4)	

Table 7: Association between BSE knowledge and relevant variables (n=270)

Variables	BSE knowledge Sufficient No. (%)	Insufficient No. (%)	χ^2 (P-value)
Age in years			
18-30 (n=184)	49 (26.6)	135 (73.4)	15.74
31-40 (n=55)	15 (27.3)	40 (72.7)	(0.001)
41-50 (n=26)	16 (61.5)	10 (38.5)	
>50 (n=5)	0 (0.0)	5 (100.0)	
Marital status			
Married (n=110)	37 (33.6)	73 (66.4)	1.43 (0.145)
Not-married (n=160)	43 (26.9)	117 (73.1)	
Employment status			
Employed (n=162)	49 (30.2)	113 (69.8)	0.01 (0.914)
Unemployed (n=108)	32 (29.6)	76 (70.4)	
Educational level			
Illiterate (n=10)	2 (20.0)	8 (80.0)	2.70 (0.259)
School (n=55)	21 (38.2)	34 (61.8)	
University (n=205)	157 (27.8)	148 (72.2)	
Source of information			
Study (n=68)	14 (20.6)	54 (79.4)	
Internet (n=41)	9 (22.0)	32 (78.0)	
TV/press media (n=62)	12 (19.4)	50 (80.6)	47.02
Pamphlets (n=33)	15 (45.5)	18 (54.5)	(<0.001)
Physicians (n=36)	26 (72.2)	10 (27.8)	
Friends/relatives (n=8)	0 (0.0)	8 (100.0)	
Others* (n=22)	4 (18.2)	18 (81.8)	

*Books, conferences, and general knowledge

Discussion

In Saudi Arabia, breast cancer is the most common cancer, ranked first among females and accounting for 20.6% of all newly diagnosed female cancers. It usually presents at advanced stages and more frequently in young women in comparison to Western countries (21). In the present study, the knowledge of risk factors for breast cancer was unsatisfactory as only one-quarter of participants were able to answer five or more (out of 10) questions correctly.

Study findings confirmed the unsatisfactory knowledge regarding risk factors. The level of women's knowledge about breast cancer risk factors and screening methods previously reported among Saudi women (22). In a study done in the Qassim region, 76% of the participants were able to answer correctly 3 out of 7 questions (20).

The analysis of the knowledge of individual risk factors revealed that among the most identified risk factors were non-breastfeeding and hormonal treatment, which might reflect the religious culture that encourages, breastfeeding and natural methods of birth control. Almost 59.4% of respondents in the current survey recognized that family history was a risk factor for breast cancer compared to only 42% in a study done in the Qassim region (20). However, this proportion is low when compared with the studies carried out in the United Kingdom (UK) (90%),(23). Among studies in Tehran (63%)(24) and Singapore (78.3%), (25) participants were aware of the fact that a positive family history is a risk factor for breast cancer. In the present study, the knowledge of oral contraceptives as a risk factor was 50.6% as compared to 56% in the Qassim study, (20) 35% in the UK study (23) and 21.6% in the Singapore study (25). It is argued that ignorance regarding the risk of breast cancer makes it unlikely that at-risk females could currently make informed decisions on a range of breast issues (26).

Despite inconclusive evidence, it is thought that BSE makes women more "breast aware", which in turn may lead to earlier diagnosis of breast cancer. Two-thirds of respondents (67.5%) in the current study had heard about BSE. This rate is higher when compared with similar studies carried out in Jeddah, (8) Qassim, (20) Riyadh (27), and Alexandria, (28) where 39.6%, 30%, 12%, and 10.4% of the participants reported being aware of BSE respectively. However, it is low in comparison to similar studies in KSA, (29) Europe (30-31) and Nigeria (32).

In the current study, 37.8% of the participants claimed that they practiced BSE. This figure is lower than the rate of BSE practice of 44% and 52% reported in studies done in Europe and Hong Kong (33-34).

A higher rate of BSE practice was also reported in KSA in which 66% of the nursing students reported to perform BSE (12). However, the nursing students, being related to the medical profession, may have a higher level of awareness and are different from the current participants. The proportion of BSE performance in our study is greater when compared to similar studies carried out in Egypt (2.65%), (28) Iran (6%) (24), and Qassim (19%) (20).

The reasons for non-practicing of BSE in the current study were carelessness in 59.7% and ignorance of the proper technique of BSE in 21.8%. This finding claims the importance of a proper health education program for BSE. To confirm the role of proper BSE health education, a randomized clinical trial of nurse-provided, community-based teaching of BSE in Shanghai, was conducted. Women showed that at baseline, 9% of the intervention and 6% of the control groups did BSE at least every other month. After 12 months, 34% of the intervention, but only 11% of the control group did BSE that often ($P < 0.001$) (35).

Some factors were significantly responsible for a better knowledge level regarding BSE practice among participants. Statistical analysis indicated that performing BSE was significantly related to age, marital status, education, and working status. Those aged between 40 and 50 years showed the best level of knowledge. However, many studies pointed to the negative association of knowledge scores with age (36). The age of participants in this study was considered fairly young (60.4% were under 30 years) which coincides with the literature. In this study, an association was observed between the level of respondents` education and their awareness of BSE; those who had a university education were more knowledgeable and practiced BSE more. This finding is consistent with other studies conducted among nursing students in KSA (12) and healthcare workers in Iran (24).

It has been shown that women with less formal education were more likely to have inadequate knowledge about breast cancer which inversely influenced their breast cancer screening behaviors (37). The same finding has been mentioned by Montazeri et al. in Iran (38).

The source of information regarding BSE in the current study was physicians in 13.3% and pamphlets/brochures in 12.2%. This finding reflected a lack of active participation of healthcare workers in the health education of patients despite their great role in education as the best level of knowledge was reported among women who received information from physicians. The same has been reported in Qassim, KSA (20), and Nigeria (32) where mass media was the main source of information about breast cancer.

All participants in the current survey had positive attitudes towards breast cancer screening. This finding is in comparison with the study carried out in Jeddah, (8) where 82.4% had a positive attitude towards practicing and teaching BSE. This could be attributed to the fact that almost two-thirds of respondents in the current study had a university education.

In conclusion, our study findings confirm the suboptimal knowledge level of women about breast cancer risk factors and screening methods. The awareness and practice of BSE is generally unacceptable. Primary healthcare professionals have a limited role in educating women regarding breast cancer issues. The results of the present survey provide valuable clues and perspectives toward the formulation of relevant breast cancer prevention strategies in Abha City, Saudi Arabia.

Therefore, this study recommends a focused breast cancer education program to improve the knowledge about breast cancer and change misconceptions about risk factors. Primary health care professionals should play an important role in conveying correct information regarding breast cancer during regular physician office visits for other health issues. Educational programs could be designed to meet the women's needs in their workplace environment. The group approach would foster the regular practice of BSE as some women could be trained to act as peer educators for others, and encourage the production of electronic and print media that would provide access to comprehensive information on breast cancer risk factors as well as on BSE for these women. Health education programs should be targeted to women through various media including leaflets, television, and radio. Health education should be channeled through women-friendly agencies/ organizations such as hospital antenatal and postnatal clinics, religious organizations, and women's organizations. Non-governmental and other charitable organizations can also make significant contributions to "breast awareness" by sponsoring health talks, symposia, and workshops targeted at relevant segments of the population.

References

1- WHO. World Health Organization, “Cancer,” retrieved from http://www.who.int/topics/cancer/en/ on September 10, 2021.
2- Rojas K, Stuckey A. Breast Cancer Epidemiology and Risk Factors. Clin Obstet Gynecol. 2016; 59 (4):651–672.
3- Asiri S, Asiri A, Ulahannan S, et al. Incidence Rates of Breast Cancer by Age and Tumor Characteristics Among Saudi Women: Recent Trends. Cureus 2020; 12(1): e6664. DOI 10.7759/cureus.6664.
4- Saggu S, Rehman H, Abbas ZK, Ansari AA: Recent incidence and descriptive epidemiological survey of breast cancer in Saudi Arabia. Saudi Med J. 2015, 36:1176-1180.
5- Balekouzou A, Yin P, Pamatika CM, Nambei SW, Djeintote M, Doromandji E, et al. Assessment of breast cancer knowledge among health workers in Bangui, Central African Republic: A cross-sectional study. Asian Pac J Cancer Prev 2016; 17:3769–76.
6- Baig MR, Subramaniam V, Chandrasegar AA, Khan TM. A population-based survey on knowledge and awareness of breast cancer in the suburban females of Sungai Petani, Kedah, Malaysia. Int J Collab Res Inter Med Pub Health 2011; 3:671–9.
7- Chiedozi LC, El-Hag IA, Kollur SM. Breast diseases in the Northern region of Saudi Arabia. Saudi Med J. 2003; 24:623–7.
8- Radi SM. Breast cancer awareness among Saudi females in Jeddah. Asian Pac J Cancer Prev. 2013; 14:4307–12.
9- Binhussien BF, Ghoraba M. Awareness of breast cancer screening and risk factors among Saudi females at family medicine department in security forces hospital, Riyadh. J Family Med Prim Care. 2018; 7(6):1283-1287.
10- Holman DM, Grossman M, Henley SJ, Peipins LA, Tison L, White MC. Opportunities for cancer prevention during midlife: Highlights from a meeting of experts. American Journal of Preventive Medicine, 2014; 46 (30 Suppl 1):S73– S80.
11- Thomson CA, McCullough M, Wertheim BC, et al. Nutrition and physical activity cancer prevention guidelines, cancer risk, and mortality in the women’s health initiative. Cancer Prevention Research, 2014; 7(1): 42–53.
12- Kaplan CP, Haas JS, Pérez-Stable EJ, Gregorich SE, Somkin C, Des Jarlais G, Kerlikowske K. Breast cancer risk reduction options: awareness, discussion, and use among women from four ethnic groups. Cancer Epidemiol Biomarkers Prev. 2006 Jan;15(1):162-6. doi: 10.1158/1055-9965.EPI-04-0758.
13- Kratzke C, Amatya A, Vilchis H. Breast cancer prevention knowledge, beliefs, and information sources between non-Hispanic and Hispanic college women for risk reduction focus. J Commun Health. 2015:40124–30.
14- Colditz, G. A, Wollin, K. Y, & Gehlert, S. (2012). Applying what we know to accelerate cancer prevention. Science Translational Medicine, 4(127), rv4.
15- Dart, H, Wolin, K. Y, & Colditz, G. A. (2012). Commentary: Eight ways to prevent cancer: A framework for effective prevention messages for the public. Cancer Causes and Control, 23, 601–608.
16- Dahiru T, Aliyu A, Kene TS. Statistics in Medical Research: Misuse of Sampling and Sample Size Determination. Annals of African Medicine 2006; 5(3):158 –61.
17- Alwan NAS, Al-Attar WM, Eliessa RA, Madfaie ZA, Tawfeeq FN. Knowledge, attitude and practice regarding breast cancer and breast self-examination among a sample of the educated population in Iraq. EMHJ 2012; 18 (4):337-345.
18- Marzouni HZ, Lavasani Z, Shalilian M, Najibpour R, Fakhr MS, Nazarzadeh R, et al. Women’s Awareness and Attitude Toward Breast Self-Examination in Dezful City, Iran, 2013. Iran Red Crescent Med J 2015; 17(11): e17829.
19- Osei-Afriyie S, Addae AK, Oppong S, Amul H, Ampofo E, Osei E. Breast cancer awareness, risk factors and screening practices among future health professionals in Ghana: A cross-sectional study. PLoS ONE 2021; 16(6): e0253373. YAHIA
20- Jahan S, Al-Saigul AM, Abdelgadir MH. Breast cancer. Knowledge, attitudes and practices of breast self examination among women in Qassim region of Saudi Arabia. Saudi Med J. 2006; 27(11):1737-41.
21- Ministry of Health National Cancer Registry Cancer Incidence Report-Saudi Arabia-1999 – 2000. King Fahad National Library, 3840/22, date: 6/9/1422H, ISSN: 1658-0559, Riyadh May, 2004.
22- Dandash KF, Al-Mohaimeed A. Knowledge, Attitudes, and Practices Surrounding Breast Cancer and Screening in Female Teachers of Buraidah, Saudi Arabia. International Journal of Health Sciences 1997; 1(1): 75-85.
23- Grunfeld EA, Ramirez AJ, Hunter MS, Richards MA. Women` knowledge and beliefs regarding breast cancer. Br J Cancer 2002; 86:1373-1387.
24- Haji-Mahmoodi M, Montazeri A, Jaryandi S, Ebrahimi M, Haghighat S, Harirchi I. Breast self-examination: knowledge, attitudes and practice among female health care workers in Tehran, Iran. Breast Journal. 2002; 8:222.
25- Singapore: Chang PN, Krishnan M, Swah TS. Knowledge and practice of breast cancer screening among public health nurses in Singapore. Singapore Med J 2002; 43:509-516.
26- McMenamin M, Barry H, Lennon AM, Purcell H, Baum M, Keegan D, McDermott E, O’Donoghue D, Daly L, Mulcahy H: A survey of breast cancer awareness and knowledge in a western population: lot of light but little illumination. Eur J Cancer 2005; 41:393-397.
27- Kashgari RH, Ibrahim AM. Breast cancer: attitude, knowledge and practice of breast self-examination of 157 Saudi women. J Fam Comm Med 1996; 3:10-13.
28-Abdel-Fattah M, Zaki A, Bassili A, El-Shazly M, Tognoni G. Breast self-examination practice and its impact on breast cancer diagnosis in Alexandria, Egypt. East Mediterr Health J 2000; 6: 34-40.
29- Alam AA. Knowledge of breast cancer and its risk and protective factors among women in Riyadh. Ann Saudi Med 2006; 26(4); 272-277.
30- Persson K, Johansson I, Ek A. Breast self-examination among Swedish women: a survey of frequency, knowledge

and attitude. J Cancer Educ 1995; 10:163-167.
31- Janda M, Obermair A, Haidinger G, Waldhoer T, Vutuc C. Austrian women` attitude towards and knowledge of breast self-examination. J Cancer Educ 2000; 1591-94.
32- Salaudeen AG, Akande TM, Musa OI. Knowledge and attitudes to breast cancer and breast self examination among female undergraduates in a state in Nigeria European Journal of Social Sciences 2009; 7(3): 157-165.
33- Wardle J, Steptoe A, Smith H, Groll-Knappe E, Koller M, Smith D, et al. Breast self-examination: attitudes and practice among young women in Europe. Eur J Cancer Prev 1995; 4:61-68.
34- Ng KK, Fung SY, Chow LW. Practice of BSE among high risk Chinese women in Hong Kong. Chin Med J. 2000; 113:1100-1103.
35- Liu md CY, Xia HO, Isaman DM, Deng W, Oakley D., Nursing clinical trial of breast self-examination education in China. International Nursing Review 2010; 57(1):128-134.
36- Chamot E, Perneger TV. Men's and Women's Knowledge and perceptions of breast cancer and mammography screening. Prev Med. 2002; 34(3):380-5.
37- Webster P, Austoker J: Women's knowledge about breast cancer risk and their views of the purpose and implications of breast screening- a questionnaire survey. J Public Health 2006, 28:197-202.
38- Montazeri A, Vahdaninia M, Harirchi I,Harirchi AM, Akram Sajadian A, Khaleghi F, Ebrahimi M, et al. Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. Asia Pacific Family Medicine 2008; 7:6.

Adherence of Type 2 Diabetic Patients to Antidiabetic Medications and its Associated Factors in Najran Armed Forces Hospital, Saudi Arabia

Metrek Almetrek[1], Maryam Alqahtani[2], Asrar Al Mudawi[2], Atheer Assiri[2], Alaa Alfayi[2], Nouf Alotaibi[2], Mohammed Quhal[2], Sara Sanad[2], Mona Alshahrani[3], Norah Alshehri[3], Seham Alzahrani[3], Albatoul Al Margan[4], Anwar Al Sharyan[4], Mai Almaraih[4], Faris Al Margan[4], Fatimah Alkhaywani[4], Aljawharh Alyami[4], Sarah Al-qablai[5], Mona Al-Ahmary[3], Faisal Ali M. Al-Qarni[6]

1. Family & Community College of Medicine, Najran University, Najran Saudi Arabia, Najran Saudi Arabia
2. Pharmacy Department at Najran Armed Forces Hospital, Najran Saudi Arabia
3. Khamis Mushait General Hospital, Asser Region Saudi Arabia
4. Internship Department, College of Medicine, Najran University, Najran Saudi Arabia
5. Armed Forces Hospital Southern Region, Khamis Mushait Saudi Arabia
6. Blood Bank, Aseer Central Hospital, Abha, Saudi Arabia

Corresponding Author
Dr. Metrek A. Almetrek
Email: almetrek421@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Metrek Almetrek et al. Adherence of Type 2 Diabetic Patients to Antidiabetic Medications and its Associated Factors in Najran Armed Forces Hospital, Saudi Arabia. World Family Medicine. December 2023; 21(11): 109-119
DOI: 10.5742/MEWFM.2023.95256237

Abstract

Background: Adherence to antidiabetic medications is crucial for optimum glycemic control and decreasing complications. This study aimed to assess adherence to antidiabetic medications and the associated factors among individuals with type-2 diabetes mellitus (T2DM) attending chronic illness clinics at Najran Armed Forces Hospital (NAFH), Najran Region, Saudi Arabia.

Methods: A cross-sectional study was conducted. A systematic sampling technique was used. Morisky Medication Adherence Scale (MMAS) scores were used for labeling patients as adherent or non-adherent. Data were entered and analyzed using SPSS version 20. To see the association of variables logistic regression with OR and 95% CI was done.

Results: A total of 288 study participants were interviewed with a response rate of 100%. The level of adherence was found to be 85%. Factors found to be significantly associated with antidiabetic medication adherence were level of education (AOR = 14.27, 95% CI = 3.0, 67.82), duration of diabetes (AOR = 6.10, 95% CI = 2.03, 18.34), and knowledge about DM and its medications (AOR = 28.05, 95% CI = 8.96, 87.8).

Conclusions and Recommendations: Our study, a family medicine-based cross-sectional study, found high medication adherence by patients with T2DM regarding their prescribed diabetes medication. Low adherence was significantly associated with educational status, duration of diabetes, and knowledge. We recommend improving T2DM patients' knowledge related to diabetes and note the importance of compliance with the medication regimen through several health education sessions at diabetic educators, coaches, and other healthcare facilities. These sessions can be delivered by physicians and other healthcare providers, namely, nurses and community pharmacists.

Keywords: Type 2 diabetes, adherence to medications, Najran Armed Forces Hospital, Najran Region.

Background

Diabetes mellitus (DM) is "a chronic, metabolic disease characterized by an elevated level of blood glucose (or blood sugar), which leads over time to serious complication" and may lead to death (1-2). The prevalence of diabetes among adults in Saudi Arabia is experiencing a rapid rise; it is expected that the total number of cases will reach around 7.5 million by 2035 (3).

DM has been determined as the sixth leading cause of death in Saudi Arabia (4-5). Adherence to the treatment is indispensable for the successful management of DM. Adherence to the medication is the first step on a path leading away from complications (6-7). According to the World Health Organization (WHO), the average rate of medication adherence is only 50% in developed countries. Nevertheless, a suboptimal level of adherence prevails (8).

This growing healthcare issue is costly in multiple aspects. Its financial burden may surpass that of managing the disease itself (9). In Saudi Arabia, the care of diabetic patients is 10-fold higher compared to other diseases, which exerts an economic burden (10). Furthermore, as suboptimal adherence may manifest as complications, it is the underlying cause of more than 30% of medicine-related hospital admissions (11).

Given the above, it is deleterious in terms of both health and economy. Adherence and compliance are terms that are sometimes equated with one another and used interchangeably (11). However, adherence is deemed superior to compliance, as it entails that the patient's management plan is mutually tailored by the healthcare provider and the patient (12). WHO defines adherence as "the extent to which a person's behavior - taking medication, following a diet, and/or executing lifestyle changes - corresponds with agreed recommendations from a healthcare provider" (13-14).

Meanwhile, compliance is defined as "the extent to which the patient's behavior matches the prescriber's recommendations". The term "adherence" will be mainly used in this study. The literature review reveals significant determinants of adherence. These can be categorized into three major categories: the medical status, personal characteristics of the patient, and the agreed-upon therapeutic plan and medical encounter (15). The number of medications, dispensing of medication via a third-party provider (Wasfaty), complexity of the regimen, side effects, cost, and lack of trust in treatment efficacy are under the umbrella of the therapeutic plan and medical encounter (16). Adherence to antidiabetic medications decreases the risks of DM complications especially macrovascular (17-18).

Several factors play roles in adherence and non-adherence to antidiabetic medications among diabetic patients according to multiple studies worldwide (19-21). In Saudi Arabia, some areas and regions have assessment studies that measure adherence and its factors, to antidiabetic medications (22-24). Up to the evidence in Najran Region, there are no assessment studies investigating medication adherence among diabetic patients, so we aimed to assess the level of adherence to the medications and the associated factors among T2DM patients treated in Najran Armed Forces Hospital (NAFH) in this study.

Method and Subjects

Study Design: Cross-sectional analytical research design.
Study Population: All T2DM patients registered at the NAFH.
Sampling: The sample size was calculated by the Slovin's Formula [n/(1+Ne2] to be 288 T2DM patients registered at NAFH, where:

N= Population size = 1030 type 2 diabetic patients
e = margin of error (0.05) = 0.0025
n = Sample size = 1030/[(1030 x 0.0025) + 1] = 288

Tools:
An interview-administered questionnaire assessing the following:

- Socio-demographic data
- Associated factors:
  A. Patients' medical status;
  B. personal characteristics of the patient;
  C. The agreed-upon therapeutic plan and medical encounter;
  D. forgetfulness, E. personal beliefs;
  F. number of medications;
  G. dispensing of medication via a 3rd party provider (i.e., Wasfaty);
  H. complexity of the regimen; I. side effects;
  K. cost, and lack of trust in treatment efficacy are under the umbrella of the therapeutic plan and medical encounter.
- The Morisky medication adherence scale (MMAS-4) consists of four questions designed to describe the medication-taking behavior of patients (25). It has dichotomous response categories with YES = 1 or NO = 0. Its scores for the adherence levels with correct numbers are: high (0), moderate (1-2), and (3-4).
  The rationale behind the four items was that drug errors of omission could occur in any or all of several ways: forgetting, carelessness, stopping the drug when feeling better, or starting the drug when feeling worse.

The sensitivity and specificity were 81% and 44% respectively. Cronbach's alpha reliability is 0.61, which is below the acceptable value of 0.7. (26). We classified the adherence level into two groups, adherent (high and moderate) and non-adherent (low adherent).

Study Area & Setting: Armed Forces Hospital in Najran City, outpatient clinic (family medicine, internal medicine, and chronic illness clinic)

Study duration: July –September 2023.

Ethical Consideration:
We followed and completed the requirements of the Ethical Approval Committee in NAFH & IRB.

Data Collection Procedure: We sent an official letter describing the aims, objectives, and processes of the study to the director of NAFH to request permission to assess all diabetic patients in the outpatient clinic for recruitment to this study. After obtaining the permission, the questionnaire was sent to all randomly selected patients by the assigned teams.

Covering letters informing the participants about the aims of the study and asking them for their permission to participate covered the questionnaires. The participants were informed that confidentiality and anonymity would be respected.

Data Management (Entering, Analysis of Data):
The Statistical Package for Social Sciences (IBM, SPSS version 25.0) for data entry analysis. We computed the descriptive statistics in the form of frequency and percentage for categorical data and in the form of measures of central tendency (arithmetic mean and median) and measures of dispersion (standard deviation and range) for continuous variables. Regarding analytic statistics, the Chi-square test was utilized to test for the association and /or difference between categorical variables. Fisher's exact test was applied instead of the Chi-square test if the frequency in at least one cell was less than five.

Results

Sociodemographic Characteristics:
A total of 288 diabetes patients were involved in this study. The response rate was 100%. Among the total of 288 respondents, 111 (38.5%) and 177 (61.5%) were males and females, respectively. The mean age was 55.2 (SD 10.966) years. The majority, 272 (94.4%) and 256 (88.9%) of the respondents were inside the Najran region and main city, respectively. One hundred and sixty-nine (58.7%) were married. Ninety-eight (34%) had a bachelor certificate and above, while seventy-two (25%) could not read and write. The majority, 98 (34%), of the participants were housewives and government employees, 50 (17.4%). The mean average monthly income was 8106 (SD 2108.120) SR. A large proportion, 240 (83.3%), resided in an Urban area. One hundred and fifty-seven (54.5%) took below half an hour for a single trip to arrive at the hospital (Table 1).

Medication Adherence
The majority, 245 (85.1%), of the respondents were adherent (Figure 1).

Clinical and Medication Characteristics of Respondents
One hundred and eighty-one (62.8%) of the respondents were treated with oral hypoglycemic agents (OHAs) only. The majority, 190 (66%) and 175 (60.8%) had been 3 years and more since medically diagnosed and treated for diabetes, respectively. The mean duration since being medically diagnosed with diabetes was 63.69 (SD 54.754) months. The majority, 143 (49.7%), had been taking two types of drugs and the mean number of tablets taken per day was 3.33 (1.638). The frequency of daily dose and number of comorbidities section of the responses indicated that 170 (59%) would have been taking their medications three times or more a day and 119 (41.3%) of the respondents had one comorbidity. As to the cost of medication, 18.6% were buying their medication by themselves from outside private clinics and 53.3% of the respondents were getting their medication for free (Table 2).

Knowledge and Attitude toward Diabetes
Most of the respondents, 243 (84.4%), were knowledgeable about diabetes and its medication, and a large proportion, 220 (76.4%), of them had a positive attitude toward diabetes (Table 3).

Reasons for Non-adherence
For the respondents who could not adhere to their antidiabetic medications, the most common reasons adduced for this scenario include the following: being busy 96 (33.3%) and forgetfulness 93 (32.3%) followed by being away from home 85 (29.5%) and not having companions (Figure 2).

Factors Associated with Antidiabetic Medication
Variables considered in the bivariate analysis were sex, age, educational status, occupation, monthly income, place of residence, distance from follow-up, duration of diabetes, duration of treatment, type of treatment, number of tablets, number of drugs, frequency of daily dose, number of comorbidities, coverage of drug cost, knowledge on diabetes, attitude towards diabetes, and patient-provider relationship. Variables with a value ≤ 0.2 were included in the multiple logistic regressions. Lastly educational status, occupation, duration of diabetes, and knowledge of diabetes remained to be significantly associated with adherence to antidiabetic medications.

According to the result of the multivariate analysis, a shift from being unable to read and write to grades 1–6th will increase the probability of antidiabetic medication adherence by 5.25 (AOR = 5.25, 95%, CI = 1.19, 23.12). Similarly, patients with an educational level of bachelor's certificate and above were 14 times more likely to be adherent with medications than those who cannot read and write (AOR = 14.27, 95% CI = 3.0, 67.82). Individuals with three years or more since being medically diagnosed with diabetes were 12 times more likely to be adherent to their medications than patients with less than three years' duration (AOR = 6.10, 95% CI (2.03, 18.34)). Regarding knowledge, the analysis showed that clients who are knowledgeable about diabetes and its medications were about 28 times more probable to be adherent to antidiabetic medications (AOR = 28.05, 95%, CI (8.96, 87.8) (Table 4).

Table 1: Sociodemographic characteristic of the study participants (n=288)

Variables	Frequency	%
Sex		
Male	111	38.5
Female	177	61.5
Age (years)		
18-40	31	10.8
41-59	173	60.1
≥ 60	84	29.2
Residency		
Najran Region	272	94.4
Najran City	10	3.5
Outside Najran Region	6	2.1
Marital status		
Unmarried	15	5.2
Married	169	58.7
Divorced	38	13.2
Widowed	66	22.9
Educational status		
Cannot read and write	72	25.0
Grades 1-6	46	16.0
Grades 7-12	72	25.0
Bachelor's Certificate and above	98	34.0
Employment status		
Government	50	17.4
Merchant	37	12.8
Student	1	0.3
Housewife	98	34.0
Homework	20	6.9
Retired	39	13.5
Other	43	14.9
Monthly income		
<8000 *SR*	103	35.8
8000 - 12000 *SR*	63	21.9
> 12000 *SR*	122	42.4
Residence		
Urban	240	83.3
Rural	48	16.7
Distance from the hospital (a trip)		
<0.5 hours	157	54.5
≥ 0.5 hours	131	45.5

Figure 1: Level of adherence towards antidiabetic medications among type II diabetic patients in NAFH, Saudi Arabia

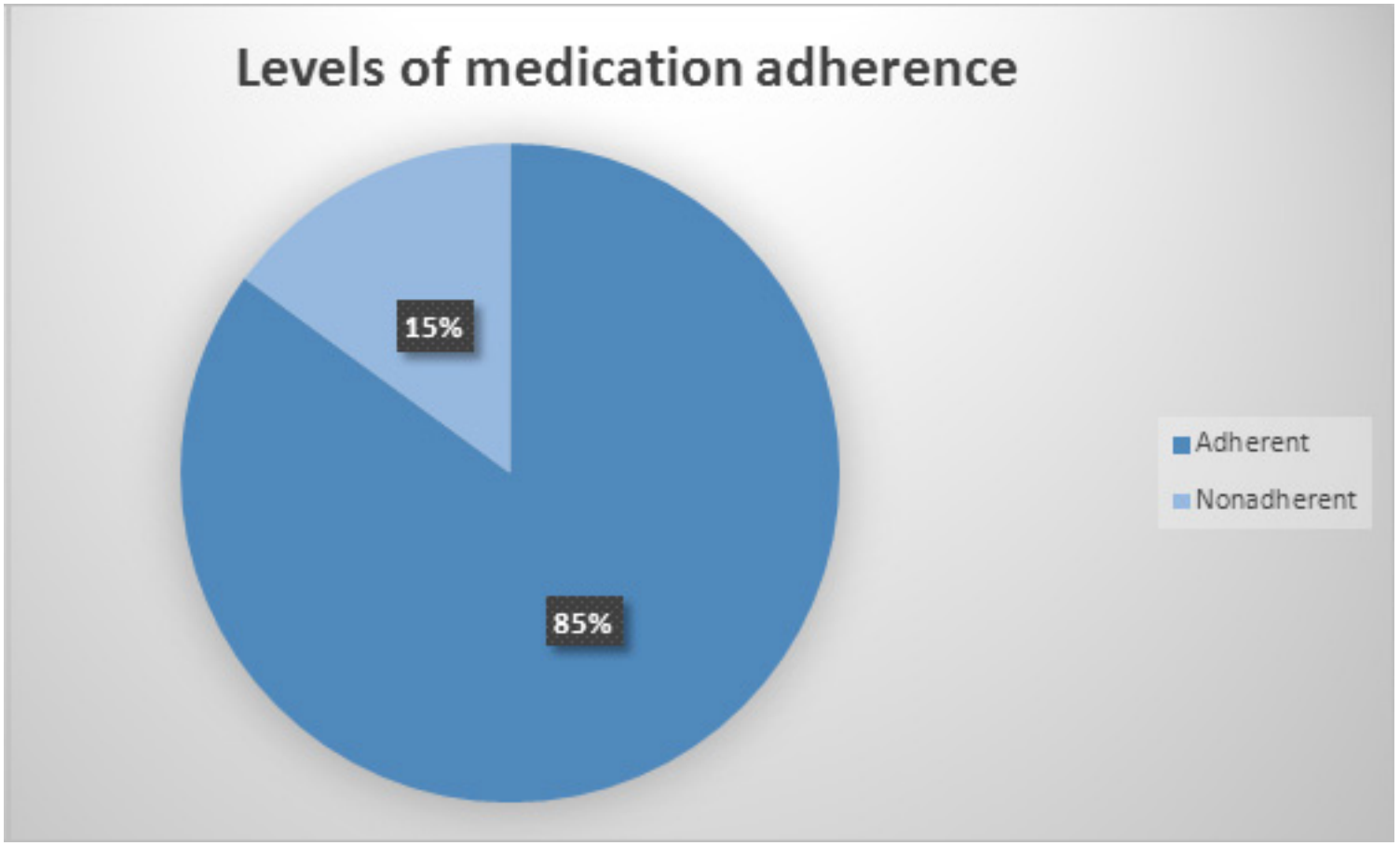


Table 2: Clinical and medication characteristics of respondents, among T2DM patients in NAFH, Najran Region Saudi Arabia

Variables	Frequency	%
Duration of DM (years)		
1/12-3	98	34.0
> 3	190	66.0
Duration of treatment(years)		
1/12-3	113	39.2
> 3	175	60.8
Type of treatment		
OHA	181	62.8
OHA+ insulin	44	15.3
Insulin	63	21.9
Number of tablets/days		
≤ 2	105	36.5
>2	183	63.5
Number of drugs		
Monotherapy	142	49.3
Two	143	49.7
Three or more	3	1.0
Frequency of daily dose		
Once	25	8.7
BID	93	32.3
TID or more	170	59.0
Number of comorbidities		
None	122	42.4
One	119	41.3
Two	42	14.6
Three or more	5	1.7
Who pays for medications		
Self	53	18.6
Government	108	37.5
Welfare/charity	1	0.3
Employer	4	1.4

Table 3: Knowledge and attitude towards DM and its medication, among T2DM patients in NAFH, Najran Region Saudi Arabia

Variables	Frequency	Percent (%)
Knowledge level		
Knowledgeable	243	84.4
Not knowledgeable	45	15.6
Attitude level		
Good attitude	220	76.4
Poor attitude	68	23.6

Figure 2: Reasons for non-adherence toward antidiabetic medications, among T2DM patients in NAFH, Najran Region, Saudi Arabia

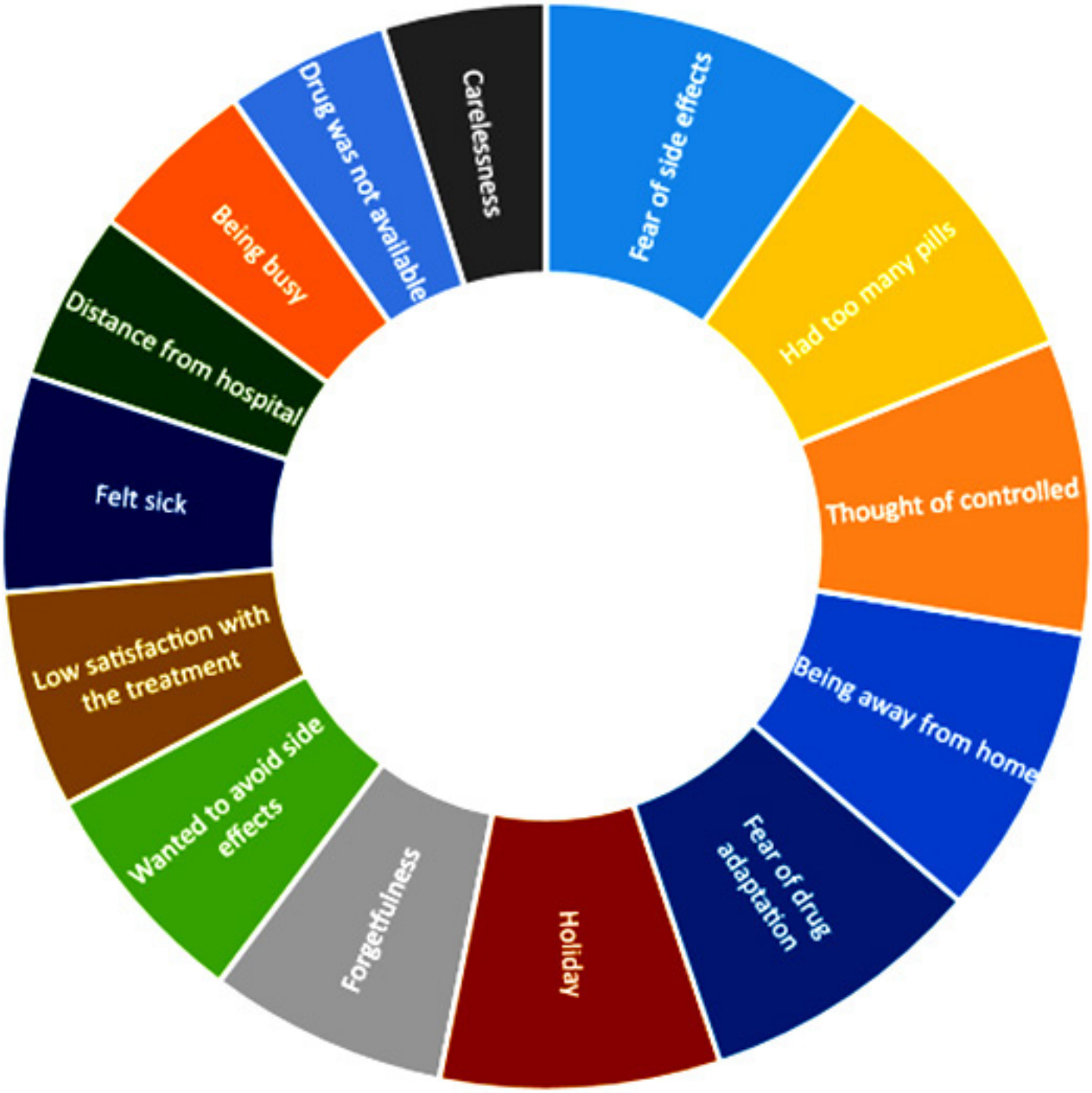


Table 4: Logistic regression output showing the impact of selected sociodemographic, clinical, and other characteristics on adherence to antidiabetic medications, among T2DM patients in NAFH, Najran Region, Saudi Arabia

Variables	Adherence status		COR (95% CI)	AOR (95% CI)
	Non-adherent	Adherent		
Educational status				
Illiterate	26	46	1	1
Grades 1-6th	6	40	3.76 (1.40, 10.07)	5.25 (1.19 , 23.12)••
Grades 7-12th	8	64	4.52 (1.87, 10.88)	2.64 (0.64, 10.86)
University	3	95	17.89 (5.14, 62.21)	14.27 (3.0, 67.82) ••
Residence				
Urban	26	214	1	
Rural	17	31	0.22 (0.10, 0.45)	
Type of treatment				
OHA	29	152	1	
OHA + insulin	9	35	0.74 (0.32, 1.70)	
Insulin	5	58	2.21 (0.81, 5.99)	
Dosage frequency				
Once daily	9	16	1	
BID	13	80	3.46 (1.26, 9.45)•	
TID and above	21	149	3.99 (1.26, 10.7)•	
Duration of diabetes				
< 3 years	35	63	1	1
≥ 3 years	8	182	12.63 (5.56, 28.69)	6.10 (2.03, 18.34)••
Duration of treatment				
< 3 years	37	76	1	
≥ 3 years	6		13.71 (5.55, 33.86)	
Number of tabs per day				
≤ 2	20	85	1	
>2	23	160	1.63 (0.85, 3.14)	
Knowledge towards DM and medications				
Not knowledgeable	31	14	1	1
Knowledgeable	12	231	42.62 (18.08, 100.4)	28.05 (8.96, 87.8)••
Attitude toward DM and medication				
Negative	17	51	1	
Positive	26	194	1.43 (0.15, 13.15)•	

*Variables that were significant during bivariate logistic analysis at p ≤ 0.2 but were not significant by backward multivariate logistic regression analysis at p<0.05.

**Variables that were found to have significant association both during bivariate and multivariate analysis at p ≤ 0.2 and < 0.05, respectively.

Discussion

We evaluated T2DM patients' medication adherence, knowledge, and the factors in our study at NAFH, Najran region, Saudi Arabia. Adherence to prescribed medications by T2DM patients is correlated with lower healthcare spending costs for a country, better clinical outcomes, decreased morbidity, decreased hospital admission rates, and decreased mortality, as stated by the World Health Organization (WHO) (4,8).

This finding is in concordance with the health statistics of MOH, KSA as it reported a high incidence of DM among adult patients in Saudi Arabia (27). Diabetes education, based on a patient's knowledge to protect their health, is the theme of the current year of the World Diabetes Day 2021–23 activities (28).

We discovered that 85% of patients with T2DM were adherent to the medications prescribed by doctors. A study by AlQarni et al. in Al Khobar City, KSA, reported that a slightly higher proportion (35.8%) of diabetes patients were highly adherent to medications (29). The difference between our study and that of AlQarni et al. could be due to the inclusion of participants and study settings. Our study was conducted among T2DM patients attending the Chronic Diseases clinics in the Family Medicine Department, while AlQarni et al. included participants from the endocrine and diabetic clinics at a tertiary care center. An institutionally based observational survey conducted by Ayele et al. stated that a higher proportion of patients with T2DM were poorly adherent to medications (30).

Murwanashyaka et al. also reported that a higher proportion of participants had poor adherence practices (31). Interestingly, Balkhi et al. of the KSA reported that nearly half of their participants complied well with diabetes medication adherence (32). These large discrepancies across these findings by different authors could be attributed to various factors, namely, study settings, tools used to assess medication adherence, and the access to and availability of appropriate diabetes care services. Furthermore, our results emphasized the need for implementing the suggested activities of the WHO and the American Diabetes Association (7,8).

Adherence with antidiabetic medications in our study (85%) was higher than the earlier finding in Ethiopia (75%) (33), Malaysia (66%) (34), and Iran (18%) (35). The discrepancy is possibly because of the time gap, the age limit of participants enrolled, differences in source population, and medication adherence measurement method. The age limit and knowledge (Malaysia) and the participants enrolled in a study done in Iran were randomly selected from eight healthcare centers (Iran); the level of medication adherence measured was based on patients' blood glucose record (Ethiopia) and pill count (Malaysia), in addition to self-report.

In our study, a significant association between educational level and adherence level was observed. Accordingly, patients with Bachelor's degrees were more adherent than those who are unable to read and write.

This finding is in line with a study done in Spain (36), Malaysia (34), and Isfahan-Iran (35). The studies done in India (37), Uganda (38), and Ethiopia (39) also support the findings of our current study. Individuals with elementary educational status were more likely to be adherent than unable to read and write individuals. A possible justification for this could be the fact that educational level is the most important predictor of knowledge of patients. Low schooling makes learning more difficult; as diabetes drug therapy gets more complex, patients are required to have more complex cognitive skills to be able to understand the prescribed drug therapy and to adhere to treatment for good glucose control.

The duration of diabetes was another variable, significantly associated with the adherence status of respondents. Those patients who had been three years and above since medically diagnosed with diabetes were more likely to be adherent than those with less than three years duration.

This finding agrees with the study done in Malaysia (34) Iran (AOR = 3.6, 95% CI: 2.1, 5.7) (35), and Sudan (40); patients who had been diabetic for 3 years and above are more adherent than those less than 3 years. This could be explained by patients with longer duration of diabetes by their frequent contact with health facilities and health professionals making them more likely to be given repetitive instruction on medication adherence and become aware of the acute and chronic complications of uncontrolled blood glucose. In addition, it could reflect wider social interaction with other diabetic patients on antidiabetic medication adherence.

Participants' knowledge about DM and its medications was found to be positively associated to the adherence level of patients. This finding is in line with studies done in Malaysia (34) and Ethiopia (39), where knowledgeable patients were found to be significantly associated with a higher adherence rate. The possible justification of why people with better knowledge were adherent could be the right knowledge about DM and its medications creates a clear understanding and avoids confusion about the treatment and the disease condition. But people with wrong/poor knowledge may make wrong decisions. Knowledge of patients has an impact on diabetic patients' adherence to antidiabetic medications in health care settings.

Conclusion and Recommendations

Our study revealed a high medication adherence by patients with T2DM regarding their prescribed diabetes medication. Low adherence was significantly associated with educational status, duration of diabetes, and knowledge. Moreover, we found that medication adherence is lowly correlated with diabetes knowledge and patients' inability to read and write about their diabetes status. We recommend improving T2DM patients' knowledge related to diabetes and note the importance of compliance with the medication regimen through several health education sessions with diabetic educators, coaches, and other healthcare facilities. These sessions can be delivered by physicians and other healthcare providers, namely, nurses and community pharmacists. Furthermore, we recommend mixed-method medication adherence assessment surveys in other regions of the KSA.

Acknowledgments:
The authors would like to thank the Department of Family Medicine at NAFH, and the Family & Community Department at Najran University for all expenses of the research work and all the study participants who voluntarily participated in this study.

References

1. World Health Organization. Global report on diabetes (2016). Accessed: December 27, 2022: https://www.who.int/publications/i/item/9789241565257.
2. World Health Organization. Diabetes. [Oct; 2021];https://www.who.int/health-topics/diabetes/#tab=tab_1 2021:29–2021.
3. Al Dawish MA, Robert AA, Braham R, Al Hayek AA, Al Saeed A, Ahmed RA, Al Sabaan FS. Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev. 2016;12(4)
4. World Health Organization. Saudi Arabia diabetes country profile. [Dec; 2021]. https://cdn.who.int/media/docs/default-source/country-profiles/diabetes/sau_en.pdf?sfvrsn=d3839de0_36&download=true 2016 2021:2016.
5. Naeem Z. Burden of Diabetes Mellitus in Saudi Arabia. Int J Health Sci (Qassim). 2015; 9(3):V-VI.
6. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE: Global estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes Res ClinPract. 2014; 103:137-149. DOI: 10.1016/j.diabres.2013.11.002
7. American Diabetes Association: Introduction: standards of medical care in diabetes-2022. Diabetes Care. 2022, 45:S1-S2. DOI: 10.2337/dc22-Sint
8. World Health Organization. Global report on diabetes. [Dec; 2021] ;https://www.who.int/publications/i/item/9789241565257 2016 :27–2021.
9. Kankeu, H.T., Saksena, P., Xu, K. et al. The financial burden from non-communicable diseases in low- and middle-income countries: a literature review. Health Res Policy Sys 2013; 11: 31.
10. Alhowaish AK: Economic costs of diabetes in Saudi Arabia. J Family Community Med. 2013; 20:1-7. 10.4103/2230-8229.108174.
11. Global estimates of diabetes prevalence for 2013 and projections for 2035. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE. Diabetes Res Clin Pract. 2014; 103:137–149.
12. Aminde LN, Tindong M, Ngwasiri CA, Aminde JA, Njim T, Fondong AA, Takah NF: Adherence to antidiabetic medication and factors associated with non-adherence among patients with type-2 diabetes mellitus in two regional hospitals in Cameroon. BMC EndocrDisord. 2019; 19:35. DOI: 10.1186/s12902-019-0360- 9.
13. De Geest S, Sabaté E: Adherence to long-term therapies: evidence for action. Eur J Cardiovasc Nursing. 2003; 2:323. DOI: 10.1016/S1474-5151(03)00091-4.
14. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. Lancet Glob Health. 2018 Nov;6(11):e1196-e1252. doi: 10.1016/S2214-109X(18)30386-3. Erratum in: Lancet Glob Health. 2018 Sep 18;: Erratum in: Lancet Glob Health. 2018; 6(11):e1162. Erratum in: Lancet Glob Health. 2021;9(8),
15. Laranjeira C, Carvalho D, Valentim O, Moutinho L, Morgado T, Tomás C, et al. Therapeutic Adherence of People with Mental Disorders: An Evolutionary Concept Analysis. Int J Environ Res Public Health. 2023; 20(5):3869.
16. Tariq RA, Vashisht R, Sinha A, et al. Medication Dispensing Errors and Prevention. [Updated 2023 May 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK519065/
17. Aloudah NM, Scott NW, Aljadhey HS, Araujo-Soares V, Alrubeaan KA, Watson MC: Medication adherence among patients with Type 2 diabetes: a mixed methods study. PLoS One. 2018, 13:e0207583. 10.1371/journal.pone.0207583
18. Khayyat SM, Mohamed MM, Khayyat SM, et al. Association between medication adherence and quality of life of patients with diabetes and hypertension attending primary care clinics: a cross-sectional survey. Qual Life Res. 2019, 28:1053-1061. 10.1007/s11136-018-2060-8
19. Demirtaş A, Akbayrak N. Development of an assessment scale for treatment compliance in type 2 Diabetes Mellitus in Turkish population: psychometric evaluation. Int J Nurs Sci. 2017; 4:244-251. DOI: 10.1016/j.ijnss.2017.06.002
20. Khan AR, Al-Abdul Lateef ZN, Al Aithan MA, Bu-Khamseen MA, Al Ibrahim I, Khan SA: Factors contributing to non-compliance among diabetics attending primary health centers in the Al Hasa district of Saudi Arabia. J Family Community Med. 2012; 19:26-32. DOI: 10.4103/2230-8229.94008
21. Lam WY, Fresco P: Medication adherence measures: an overview. Biomed Res Int 2015; 2015:217047. DOI: 10.1155/2015/217047
22. Ahmed NO, Abugalambo S, Almethen GH. Adherence to oral hypoglycemic medication among patients with diabetes in Saudi Arabia. Int J Health Sci (Qassim). 2017; 11:45-49.

23. Balkhi B, Alwhaibi M, Alqahtani N, et al. Oral antidiabetic medication adherence and glycaemic control among patients with type 2 diabetes mellitus: a cross-sectional retrospective study in a tertiary hospital in Saudi Arabia. BMJ Open. 2019; 9:e029280. DOI: 10.1136/bmjopen-2019-029280.
24. Salam MA, Siddiqui AF: Socio-demographic determinants of compliance among type 2 diabetic patients in Abha, Saudi Arabia. J ClinDiagn Res. 2013; 7:2810-2813. DOI: 10.7860/JCDR/2013/6986.3708.
25. MMAS-4 & MMAS-8 - the Morisky scales (no date) MMAR. Available at: https://www.moriskyscale.com/mmas-4--mmas-8-the-morisky-scales.html#/ (Accessed: 21 December, 2023).
26. Zongo A, Guénette L, Moisan J, Guillaumie L, Lauzier S, Grégoire JP. Revisiting the internal consistency and factorial validity of the 8-item Morisky Medication Adherence Scale. SAGE Open Med. 2016;4:205031211 6674850.
27. Alshehri KA, Altuwaylie TM, Alqhtani A, Albawab AA, Almalki AH: Type 2 diabetic patients adherence towards their medications. Cureus. 2020; 12:e6932. DOI: 10.7759/cureus.6932.
28. IDF. Theme—World Diabetes Day. Available online: https://worlddiabetesday.org/about/theme/ (accessed: 20 November 2023).
29. AlQarni K, AlQarni EA, Naqvi AA, AlShayban DM, Ghori SA, Haseeb A, Raafat M, Jamshed S. Assessment of Medication Adherence in Saudi Patients With Type II Diabetes Mellitus in Khobar City, Saudi Arabia. Front. Pharm. 2019; 10: 1306.
30. Ayele BA, Tiruneh SA, Ayele AA, Engidaw MT, Yitbarek, GY, Gebremariam, AD. Medication adherence and its associated factors among type 2 diabetic patients in Ethiopian General Hospital, 2019: Institutional based cross-sectional study. PLoS Glob. Public Health 2022; 2: e0000099.
31. Murwanashyaka JD, Ndagijimana A, Biracyaza E, Sunday FX, Umugwaneza M. Non-adherence to medication and associated factors among type 2 diabetes patients at Clinique Medicale Fraternite, Rwanda: A cross-sectional study. BMC Endocr. Disord. 2022; 22: 219.
32. Balkhi B, Alwhaibi M, Alqahtani N, Alhawassi T, Alshammari TM, Mahmoud M, et al. Oral antidiabetic medication adherence and glycaemic control among patients with type 2 diabetes mellitus: A cross-sectional retrospective study in a tertiary hospital in Saudi Arabia. BMJ Open 2019; 9: e029280.
33. Demoz GT, Telemariam W, Shishay B, Degenda K, Halefom W, Gebremariam N, et al. Predictors of poor adherence to antidiabetic therapy in patients with type 2 diabetes: A cross-sectional study insight from Ethiopia', Diabetology & Metabolic Syndrome, 12(1): 62. doi:10.1186/s13098-020-00567-7.
34. Omar MS, San KL. Diabetes knowledge and medication adherence among geriatric patient with type 2 diabetes mellitus," International Journal of Pharmacy and Pharmaceutical Sciences 2014; 6(3): 103–106.
35. Ranjbaran S, Shojaeizadeh D, Dehdari T, Yaseri M, Shakibazadeh E. Determinants of medication adherence among Iranian patients with type 2 diabetes: An application of health action process approach. Heliyon. 2020;6(7):e04442.
36. Gomez-Peralta F, Fornos Pérez JA, Molinero A, Sánchez Barrancos IM, Arranz Martínez E, Martínez-Pérez P, et al.. Adherence to antidiabetic treatment and impaired hypoglycemia awareness in type 2 diabetes mellitus assessed in Spanish community pharmacies: the ADHIFAC study. BMJ Open Diabetes Res Care. 2021;9(2): e002148.
37. Mukherjee S, Sharmasarkar B, Das KK, Bhattacharyya A, Deb A. Compliance to anti diabetic drugs: observations from the diabetic clinic of a medical college in Kolkata," Journal of Clinical and Diagnostic Research, 2013; 7(4): 661–665.
38. Kalyango JN, Owino E, and Nambuya AP. Non-adherence to diabetes treatment at Mulago hospital in Uganda: prevalence and associated factors. African Health Sciences, 2008; 8(2):67–73.
39. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E. Self-care behavior among patients with diabetes in Harari, Eastern Ethiopia: the health belief model perspective. PLoS ONE, 2012; 7(4): Article ID e35515, 2012.
40. Badi S, Abdalla A, Altayeb L, Noma M, Ahmed MH. Adherence to Antidiabetic Medications Among Sudanese Individuals With Type 2 Diabetes Mellitus: A Cross-Sectional Survey. Journal of Patient Experience 2020;7(2):163-168.

Prevalence, Risk Factors, and Awareness of Electronic-Cigarette Use among Medical Students at King Khalid University, Saudi Arabia

Osama Abdulaziz Albaqqar[1], Safar Abadi Alsaleem[2], Awad Saeed Alsamghan[2], Mohammed Albaggar3, Mohannad Albajjar[3], Khalaf Abdulaziz[4], Mohammed Abdullah Alghamdi[5], Saad Mohammed Alghamdi[6], Nasser Khalil[6], Abdulrahman Abdullah Alghamdi[7]

1. Family Medicine Specialist, Ministry of Health, Albaha, Saudi Arabia
2. Associate Professor, Family & Community Medicine Department, College of Medicine, King Khalid University, Abha, Saudi Arabia
3. Family Medicine Consultant, Ministry of Health, Albaha, Saudi Arabia
4. Pharmacist, Ministry of Health, Albaha, Saudi Arabia
5. Health Administration Specialist, Ministry of Health, Albaha, Saudi Arabia
6. Public Health Specialist, Ministry of Health, Albaha, Saudi Arabia
7. General Practitioner, Ministry of Health, Albaha, Saudi Arabia

Corresponding Author:
Dr. Osama Abdulaziz Albaqqar
Email: osooo2011@hotmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.
Citation: Osama Abdulaziz Albaqqar et al. Prevalence, Risk Factors, and Awareness of Electronic-Cigarette Use among Medical Students at King Khalid University, Saudi Arabia. World Family Medicine. December 2023; 21(11): 120-130
DOI: 10.5742/MEWFM.2023.95256238

Abstract

Objectives: To determine the prevalence, pattern of smoking, and associated factors as well as attitudes toward E-cigarettes among medical students.

Methods: A cross-sectional study was conducted among 340 medical students. An online questionnaire was used in data collection. It consists of socio-demographic characteristics, smoking history, awareness of E-cigarettes, the prevalence of their use, beliefs regarding E-cigarettes, and reasons for E-cigarette use

Results: Males represented 58.8%, with a mean age of 22.4±1.5 years. The prevalence of current smoking and ex-smoking among participants was 13.5% and 9.1%, respectively. Most participants have heard of E-cigarettes (94.4%); female students have heard about E-cigarettes more than males (99.3% vs. 91%, respectively, p<0.001); 36.8% of participants have tried using E-cigarettes at least once during their lifetime, 15.9% have used them during the last month and 11.8% intended to use them in the next year. Junior students were likelier to try E-cigarettes during their lifetime (44.5% vs. 32.1%, respectively, p=0.020). The commonest reasons for trying E-cigarettes were reducing the number of traditional cigarettes (93.6%), being less dangerous than traditional cigarettes (87.2%), and as an attempt to quit smoking (84.8%).

Conclusions: E-cigarettes are tried by a considerable proportion of medical students, mainly to reduce the number of traditional cigarettes, assuming that they are less dangerous than traditional cigarettes, and as an attempt to quit smoking.

Key Words: Cigarette smoking, E-smoking, medical students, knowledge, attitude, risk factors.

Introduction

Tobacco smoking is one of the largest public health threats that face the world. It kills around 6 million people every year. More than 5 million of those deaths are due to direct tobacco use, while more than 600,000 are the result of non-smokers being exposed to second-hand smoke. It has been practiced by over one billion people all over the world, most of them in the developing world. Most smokers start smoking during adolescence or early adulthood. Some behavioral research indicated that adolescents begin their smoking habits as a result of peer pressure, and cultural influence (1).

Tobacco smoking causes diseases that directly affect the heart and lungs. Moreover, smoking is a major risk factor for other health problems, such as heart attacks, strokes, chronic obstructive pulmonary disease (COPD), emphysema, and cancer, mainly lung cancer, cancers of the larynx and mouth, esophageal cancer, bladder and pancreatic cancer (2).

In the Kingdom of Saudi Arabia (KSA), the prevalence of traditional cigarette smoking among male medical students has been reported in previous studies and shown to range from 13% in central Saudi Arabia (3) to 30.4% in Majmaah (4). In contrast, for females, the prevalence was 0.32% (5). Overall, despite that more than 7 thousand Saudis are killed by tobacco-related diseases, more than twenty thousand children and more than three million adults continue to smoke tobacco daily (6).

Electronic cigarettes (E-cigarettes) have been recently introduced to the country with little known about their prevalence or pattern of utilization among medical students in Saudi Arabia. Recently, a study among health science students reported a prevalence of 27.7% (7). The E-cigarette is an electronic emit-vapor device that delivers nicotine in an aerosol form. It consists of a battery, mouthpiece, an automatic or manual switch, a cartridge, and an atomizer with a heating element that contains a solution “e-liquids” which contain propylene glycol or glycerol (or both) and can contain nicotine, flavors, and additives (8).

The main concern is the availability of E-cigarettes with sweet flavors for the young population, which simulate smoking behavior as well as facilitate addiction to nicotine, which consequently leads to the use of traditional tobacco smoking (9, 10).

It is documented that E-cigarettes have been proven to cause addiction (11). Additionally, the risks of prolonged exposure to vapors chemicals of E-cigarettes which contain toxic substances, including formaldehyde, have not been reported (12). Moreover, the effect of E-cigarettes on the health of human beings is still under investigation (13).

Aim of study

To explore the magnitude and predictors of E-cigarette smoking among medical students and to determine their attitude toward it.

Specific objectives

- To determine the prevalence and patterns of E-cigarettes smoking among medical students,
- To define the risk factors associated with E-cigarette smoking among medical students,
- To explore their attitude toward the benefits, safety, and efficacy of E-cigarettes, compared to traditional cigarettes.

Subjects and Methods

The present study followed a cross-sectional research design. It was conducted at the Medical College of King Khalid University (KKU) in Abha City, Saudi Arabia. Medical students (males and females) enrolled throughout the academic year 2019-2020 (approximately 1600 students; 1000 males and 600 females) constituted the study’s target population. No exclusion criteria were considered.

The minimum sample size for this study has been estimated according to Dahiru et al. (14), as follows: $n=Z^2xPxQ/D^2$, where:

- n: Calculated sample size
- Z: The z-value for the selected level of confidence = 1.96.
- P: Estimated prevalence of e-cigarette use among university students = 27.7%, (7).
- Q: (1 – P) = 72.3%, i.e., 0.723
- D: The maximum acceptable error [precision level] = 0.05.

$n = (1.96^2 \times 0.277 \times 0.723)/0.05^2 = 308$

Therefore, the calculated minimum sample size for this study was 308 medical students. However, the study sample was increased to 340 students to compensate for possible non- or incomplete responses. A stratified random sample with proportional allocation was adopted. A simple random sampling technique was applied to select subjects from each academic level using a list of students’ names obtained from the college administration.

A self-administered questionnaire (in English) was used for data collection, which has been used in a similar study carried out in Romania (15). Permission to use the questionnaire was requested from the corresponding author through e-mail communications. It consists of:

- Socio-demographic characteristics: Age, gender, and academic level.
- Smoking history.
- Awareness toward E-cigarettes (8 statements with Yes/No responses)
- Prevalence of E-cigarette use (6 statements with yes, neutral, and no responses)
- Beliefs in E-cigarettes (3 statements with a 5-Likert scale response; totally agree, somewhat agree, neutral, somewhat disagree, totally disagree)
- Reasons for E-cigarette use

The questionnaire was validated by three family medicine consultants (face and content validity). A pilot study was conducted on 30 medical students to explore the clarity of included statements and the average time needed to fill out the questionnaire. Their responses were not included in the final research, although no significant changes were required; the questionnaire was clear and no changes were made.

The data were collected through an online survey distributed to the randomly selected medical students through Google Forms. The link to the questionnaire was sent to them through their WhatsApp accounts.

Ethical considerations

The study proposal was approved by the Regional Research and Ethics Committee in KKU (ECM#2020-3209, on 24/12/2020). The permission to conduct the study at the College of Medicine was obtained from the college dean. The study purpose was clearly and briefly explained on the cover page of the online form of the questionnaire. All participants were informed that they had the full right not to participate in the study or to withdraw from it before completion. Confidentiality and privacy were guaranteed for all collected data.

Data entry and statistical analysis

Collected data were verified and then coded. The Statistical Package for Social Sciences (IBM, SPSS, version 25) was used for data analysis. Descriptive statistics (e.g., number, percentage, mean, and standard deviation) and inferential statistics (e.g., Chi-square "$\chi 2$" or Fisher exact - tests were applied). P-values <0.05 were considered as statistically significant.

Results

Table (1) summarizes their demographic characteristics. Males represented 58.8% of them. Their age ranged between 19 and 27 years with a mean of 22.4±1.5 years. Sixth-year students (11th and 12th levels) represented 22.3% of participants, whereas 2nd-year students (3rd and 4th levels) represented 16.5% of them.

Smoking history

Prevalence rates of current smoking and ex-smoking among the participants were 13.5% and 9.1%, respectively. Among current smokers, 82.6% reported smoking a maximum of one packet/day. Almost three-quarters (73.9%) of current smokers had intention to quit smoking in the next year.

Medical students' awareness of E-cigarettes

Table (2) shows that the majority of participants (94.4%) have heard about E-cigarettes. They were mostly aware that an E-cigarette is a nicotine delivery system (90.3%) and an E-cigarette vaporizes nicotine (84.7%). However, about a third of them were aware that an E-cigarette is not currently regulated by the Food and Drug Administration (39.1%), there is no combustion in an E-cigarette (36.5%), and that carbon monoxide is not emitted from an E-cigarette (33.2%). Female students have heard about E-cigarettes slightly more than male students (99.3% vs. 91%), were more aware that an E-cigarette is a nicotine delivery system (97.1% vs. 85.5%), an E-cigarette vaporizes nicotine (92.9% vs. 79%), and there is no carbon monoxide in E-cigarettes (45% vs. 25%). Also, female students were more aware than male students that an E-cigarette is not currently regulated by the Food and Drug Administration (48.6% vs. 32.5%). On the other hand, male students were more aware than female students that an E-cigarette can be smoked with different additives (70.5% vs. 50.7%) and an E-cigarette can be smoked with different flavors (68.5% vs. 47.9%).

Table (3) shows that never-smokers and current smokers were more aware than ex-smokers that an E-cigarette is a nicotine delivery system (91.6% and 91.3% vs. 77.4%, respectively, p=0.040). Ex-smokers and current smokers were more aware than never-smokers that an E-cigarette can be smoked with different additives (83.9% and 76.1% vs. 57.4%, respectively, p=0.002). Also, ex-smokers and current smokers were more aware than never-smokers that an E-cigarette can be smoked with different flavors (80.6% and 76.1% vs. 54%, respectively, p=0.001) and there is no combustion in an E-cigarette (61.3% and 50% vs. 31.2%, p=0.001).

Table (4) shows no statistically significant difference between junior students (second and third years) and senior students (4th to 6th years) concerning their awareness of E-cigarettes.

Prevalence of e-cigarette use

Table (5) shows that 36.8% of participant students have tried using E-cigarettes at least once during their lifetime, 15.9% have used them in the last month and 11.8% intend to use them in the next year. About half of the students (49.4%) have friends, 5.9% have parents and 32.4% have siblings who have tried smoking E-cigarettes.

Table (6) shows that male students were more likely than female students to have friends who tried E-cigarettes (55% vs. 41.4%, p=0.046).

Table (7) shows that there were no statistically significant differences between students regarding e-cigarette use according to their current smoking status.

Table (8) shows that junior students were more likely than senior students to try E-cigarettes at least once during their lifetime (44.5% vs. 32.1%, p=0.020) and intended to use E-cigarettes in the next year (18.8% vs. 7.5%, p=0.008), while senior students were more likely than junior students to have siblings who have tried E-cigarettes (34% vs. 29.7%, p=0.018).

Table (9) shows that there were statistically significant associations between a history of trying E-cigarettes and having such a history among parents or siblings (p<0.001 for both).

Beliefs regarding e-cigarettes

Table (10) shows that more than half of the participants either totally agreed or somewhat agreed that E-cigarettes can help smokers quit, and that E-cigarettes are less dangerous than traditional cigarettes (54.4% and 50.6%, respectively), whereas 26.2% either totally agreed or somewhat agreed that E-cigarettes are used only by smokers.

Table (11) shows no statistically significant differences between medical students concerning their beliefs regarding E-cigarettes according to their gender.

Table (12) shows no statistically significant differences between medical students concerning their beliefs regarding E-cigarettes according to their current smoking status.

Table (13) shows no statistically significant differences between junior and senior students concerning their beliefs regarding E-cigarettes.

Reasons for trying E-cigarettes

Figure (1) shows that, among medical students who ever tried E-cigarettes (n=125), the commonest reported reasons were reducing the number of traditional cigarettes (93.6%), believing that they are less dangerous than traditional cigarettes (87.2%) and as an attempt to quit smoking (84.8%).

Table 1: Demographic characteristics of participant medical students at King Khalid University during the academic year 2019-2020

	Frequency	Percentage
Gender		
• Male	200	58.8
• Female	140	41.2
Age (years)		
• Range	19-27	
• Mean±SD	22.4±1.5	
Academic year/level		
• Second year (3rd and 4th levels)	56	16.5
• Third year (5th and 6th levels)	72	21.2
• Fourth year (7th and 8th levels)	71	20.9
• Fifth year (9th and 10th levels)	65	19.1
• Sixth year (11th and 12th levels)	76	22.3

Table 2: Medical students' awareness about E-cigarettes according to their gender

Awareness about E-cigarettes	Males (n=200) No. (%)	Females (n=140) No. (%)	Total (n=340) No. (%)	P Value
Have you heard about E-cigarettes?	182 (91.0)	139 (99.3)	321 (94.4)	<0.001*
Are you aware that an E-cigarette is a nicotine delivery system?	171 (85.5)	136 (97.1)	307 (90.3)	<0.001*
Are you aware that an E-cigarette is an appliance that vaporizes nicotine?	158 (79.0)	130 (92.9)	288 (84.7)	<0.001†
Are you aware that an E-cigarette can be smoked with different additives (i.e., nicotine)?	141 (70.5)	71 (50.7)	212 (62.4)	<0.001†
Are you aware that an E-cigarette can be smoked with different flavors (i.e., peach)?	135 (68.5)	67 (47.9)	202 (59.4)	<0.001†
Are you aware that there is no combustion in an E-cigarette?	74 (37.0)	50 (35.7)	124 (36.5)	0.808†
Are you aware that there is no carbon monoxide in an E-cigarette?	50 (25.0)	63 (45.0)	113 (33.2)	<0.001†
Are you aware that the FDA does not currently regulate E-cigarettes?	65 (32.5)	68 (48.6)	133 (39.1)	0.003†

*Fisher exact test †Chi-square test

Table 3: Medical students' awareness about E-cigarettes according to their smoking status

Awareness about E-cigarettes	Never smoker (n=263) No. (%)	Current smoker (n=46) No. (%)	Ex-smoker (n=31) No. (%)	P Value†
Have you heard about E-cigarettes?	251 (95.4)	41 (89.1)	29 (93.5)	0.223
Are you aware that an E-cigarette is a nicotine delivery system?	241 (91.6)	42 (91.3)	24 (77.4)	0.040
Are you aware that an E-cigarette is an appliance that vaporizes nicotine?	220 (83.7)	43 (93.5)	25 (80.6)	0.187
Are you aware that an E-cigarette can be smoked with different additives (i.e., nicotine)?	151 (57.4)	35 (76.1)	26 (83.9)	0.002
Are you aware that an E-cigarette can be smoked with different flavors (i.e., peach)?	142 (54.0)	35 (76.1)	25 (80.6)	0.001
Are you aware that there is no combustion in an E-cigarette?	82 (31.2)	23 (50.0)	19 (61.3)	0.001
Are you aware that there is no carbon monoxide in an E-cigarette?	263 (33.1)	13 (28.3)	13 (41.9)	0.455
Are you aware that the FDA does not currently regulate E-cigarettes?	99 (37.6)	20 (43.5)	14 (45.2)	0.582

†Chi-square test

Table 4: Comparison between junior and senior students regarding their awareness about E-cigarettes

Awareness about E-cigarettes	Junior (n=128) No. (%)	Senior (n=212) No. (%)	P Value†
Have you heard about E-cigarettes?	124 (96.9)	197 (92.9)	0.095
Are you aware that an E-cigarette is a nicotine delivery system?	117 (91.4)	190 (89.6)	0.590
Are you aware that an E-cigarette is an appliance that vaporizes nicotine?	112 (87.5)	176 (83.0)	0.266
Are you aware that an E-cigarette can be smoked with different additives (i.e., nicotine)?	75 (58.6)	137 (64.6)	0.266
Are you aware that an E-cigarette can be smoked with different flavors (i.e., peach)?	75 (58.6)	127 (59.9)	0.811
Are you aware that there is no combustion in an E-cigarette?	50 (39.1)	74 (34.9)	0.440
Are you aware that there is no carbon monoxide in an E-cigarette?	46 (35.9)	67 (31.6)	0.411
Are you aware that the FDA does not currently regulate E-cigarettes?	47 (36.7)	86 (40.6)	0.481

†Chi-square test Junior: 2nd and 3rd years Senior: From 4th to 6th years

Table 5: E-cigarette use among medical students

E-cigarettes use	Yes No. (%)	Neutral No. (%)	No No. (%)
At least once during my lifetime	125 (36.8)	28 (8.2)	187 (55.0)
During the last month	54 (15.9)	19 (5.6)	267 (78.5)
I intend to use E-cigarettes next year	40 (11.8)	34 (10.0)	266 (78.2)
Having friends who tried E-cigarettes	168 (49.4)	30 (8.8)	142 (41.8)
Having parents who tried E-cigarettes	20 (5.9)	84 (24.7)	236 (69.4)
Having siblings who tried E-cigarettes	110 (32.4)	55 (16.2)	175 (51.5)

Table 6: E-cigarette use among medical students according to their gender

E-cigarettes use	Males (n=200) No. (%)	Females (n=140) No. (%)	P-value†
At least once during my lifetime	70 (35.0)	55 (39.3)	0.502
During the last month	36 (18.0)	18 (12.9)	0.442
I intend to use E-cigarettes next year	26 (13.0)	14 (10.0)	0.335
Having friends who tried E-cigarettes	110 (55.0)	58 (41.4)	0.046
Having parents who tried E-cigarettes	14 (7.0)	6 (4.3)	0.517
Having siblings who tried E-cigarettes	68 (34.0)	42 (30.0)	0.265

†Chi-square test

Table 7: E-cigarette use among medical students according to their current smoking status

E-cigarettes use	Never smoker (n=263) No. (%)	Current smoker (n=46) No. (%)	Ex-smoker (n=31) No. (%)	P value†
At least once during my lifetime	93 (35.4)	16 (34.8)	16 (51.6)	0.473
During the last month	36 (13.7)	12 (26.1)	6 (19.4)	0.160
I intend to use E-cigarettes next year	28 (10.6)	5 (10.9)	7 (22.6)	0.332
Having friends who tried E-cigarettes	123 (46.8)	25 (54.3)	20 (64.5)	0.166
Having parents who tried E-cigarettes	14 (5.3)	2 (4.3)	4 (12.9)	0.397
Having siblings who tried E-cigarettes	79 (30.0)	18 (39.1)	13 (41.9)	0.174

†Chi-square test

Table 8: Comparison between junior and senior medical students regarding E-cigarettes use

E-cigarettes use	Junior (n=128) No. (%)	Senior (n=212) No. (%)	P-value†
At least once during my lifetime	57 (44.5)	68 (32.1)	0.020
During the last month	24 (18.8)	30 (14.2)	0.314
I intend to use E-cigarettes next year	24 (18.8)	16 (7.5)	0.008
Having friends who tried E-cigarettes	53 (41.4)	115 (54.2)	0.067
Having parents who tried E-cigarettes	6 (4.7)	14 (6.6)	0.086
Having siblings who tried E-cigarettes	38 (29.7)	72 (34.0)	0.018

†Chi-square test

Table 9: E-cigarette use among medical students according to their family history of trying E-cigarette smoking

E-cigarettes use	No No. (%)	Yes No. (%)	Neutral No. (%)	P value†
Having parents who tried E-cigarettes				
No (n=236)	141 (59.7)	82 (34.7)	13 (5.5)	
Yes (n=20)	5 (25.0)	9 (45.0)	6 (30.0)	<0.001
Neutral (n=84)	41 (48.8)	34 (40.5)	9 (10.7)	
Having siblings who tried E-cigarettes				
No (n=175)	119 (68.0)	44 (25.1)	12 (6.9)	
Yes (n=110)	40 (36.4)	61 (55.5)	9 (8.2)	<0.001
Neutral (n=55)	28 (50.9)	20 (36.4)	7 (12.7)	

†Chi-square test

Table 10: Beliefs regarding E-cigarettes among medical students

Beliefs regarding E-cigarettes	Completely Agree No. (%)	Somewhat Agree No. (%)	Neutral No. (%)	Somewhat Disagree No. (%)	Completely disagree No. (%)
E-cigarettes are less dangerous than traditional cigarettes	66 (19.4)	106 (31.2)	104 (30.6)	44 (12.9)	20 (5.9)
E-cigarettes can help smokers to quit	83 (24.4)	102 (30.0)	110 (32.4)	24 (7.1)	21 (6.2)
E-cigarettes are used only by smokers	22 (6.5)	67 (19.7)	109 (32.1)	87 (25.6)	55 (16.2)

Table 11: Medical students' beliefs regarding E-cigarettes use according to their gender

Beliefs regarding E-cigarettes	Males (n=200) No. (%)	Females (n=140) No. (%)	P value†
E-cigarettes are less dangerous than traditional cigarettes	101 (50.5)	71 (50.7)	0.917
E-cigarettes can help smokers to quit	114 (57.0)	71 (50.7)	0.286
E-cigarettes are used only by smokers	50 (25.0)	39 (27.9)	0.474

†Chi-square test

Table 12: Medical students' beliefs regarding E- cigarettes according to their current smoking status

Beliefs regarding E-cigarettes	Never smoker (n=263) No. (%)	Current smoker (n=46) No. (%)	Ex-smoker (n=31) No. (%)	P value†
E-cigarettes are less dangerous than traditional cigarettes	135 (51.3)	25 (54.3)	12 (38.7)	0.093
E-cigarettes can help smokers to quit	143 (54.4)	27 (58.7)	15 (48.4)	0.744
E-cigarettes are used only by smokers	67 (25.5)	13 (28.3)	9 (29.0)	0.958

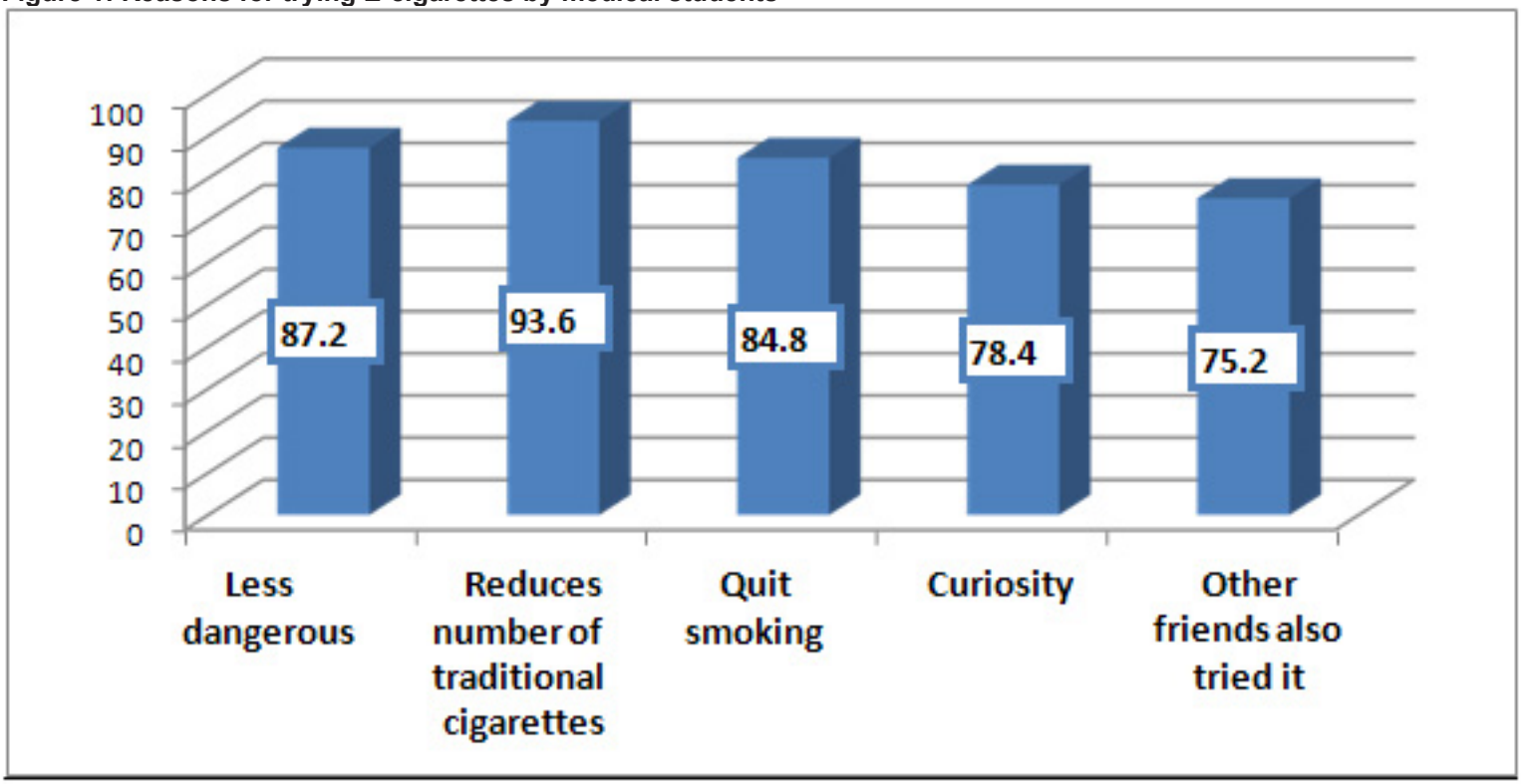
†Chi-square test

Table 13: Medical students' beliefs regarding E-cigarettes according to their seniority

Beliefs regarding E-cigarettes	Junior (n=128) No. (%)	Senior (n=212) No. (%)	P value†
E-cigarettes are less dangerous than traditional cigarettes	68 (53.1)	104 (49.1)	0.305
E-cigarettes can help smokers to quit	71 (55.5)	114 (53.8)	0.240
E-cigarettes are used only by smokers	35 (27.3)	54 (25.5)	0.479

†Chi-square test

Figure 1: Reasons for trying E-cigarettes by medical students



Discussion

The long-term adverse effects of E-cigarettes are not well known, since they contain dangerous chemicals like formaldehyde (12). Therefore, the effects of E-cigarettes on human health remain under frequent investigation (13).

Since the magnitude of the problem is not well documented in Saudi Arabia, the present study was conducted to estimate the prevalence and describe the pattern of E-cigarette smoking among medical students enrolled in King Khalid University students, Abha City, Saudi Arabia.

In the current study, most students have heard of E-cigarettes. Surprisingly, females have heard more than males about E-cigarettes. In the USA, males were more aware of E-cigarettes compared to females (16). Further studies are needed to explain this finding, especially when considering that female medical students in KKU also have tried E-cigarettes more than males. However, this finding is in agreement with that of another study carried out in the USA among the general population that reported a higher rate of females who tried E-cigarette smoking than males (17).

In the present study, almost one-third of the medical students have tried using E-cigarettes at least once during their lifetime, 15.9% have used them in the last month and 11.8% intended to use them in the next year.

Variable results were reported by different studies in Saudi Arabia. In another recent study carried out in Jeddah among students of the health science colleges, the prevalence of E-cigarette smoking was 27.7%; one-fifth of them were regularly using it. (7) Also, a rate of 25.6% has been reported by Awan among King Saud University's students in Riyadh (18). Moreover, an online survey reported that 33.5% of the general public in Saudi Arabia has tried E-cigarettes (19).

In Poland, the prevalence rates for E-cigarette smoking alone or combined with traditional cigarettes among medical students were 1.3% and 2.2%, respectively (20). Another study revealed a prevalence of E-cigarette smoking alone or both with traditional cigarettes at 1.1% and 1.8%, respectively among university students from five countries in Central and Eastern Europe (21). In a study carried out in Canada, trying E-cigarettes was admitted by 16.1% of young adults (16- 30 years) (22). Among USA individuals, only 8.1% had tried E-cigarettes, and the prevalence of current use was 1.4% (17). Another US study carried out among nursing, nutrition, and respiratory therapy students revealed that 21.2% had tried E-cigarettes at least once in their lifetime (16). In Romania, almost 25% of university students have tried e-cigarettes. (15).

This wide popularity of E-cigarettes in Saudi Arabia and other countries is probably attributed to the impact of advertising campaigns targeting adolescents and young adults, in a similar way that was applied to traditional cigarettes during the last century (23).

In the present study, there were no significant differences between students regarding the prevalence of E-cigarette use according to their current smoking status or their gender. However, alarmingly, junior students reported more trials of E-cigarette smoking than senior students. Also, students with parents or siblings who have tried E-cigarettes were more likely to try them compared to their peers.

In another study carried out in Poland, the overall prevalence of e-smoking was higher in males than females (4.9% versus 2.8%) (20). Also, in Central and Eastern Europe, the overall prevalence of E-cigarette smoking was higher in males than females (21). In Canada, the smoking status of young adults was important in determining E-cigarette smoking status as compared to non-smokers, ex-smokers and current smokers were more likely to have tried E-cigarettes, current smokers were more likely to have tried E-cigarettes than ex-smokers and current smokers were also more likely to be current users of E-cigarettes than both ex-smokers and non-smokers (22). In Romania, the predictors of E-cigarette smoking were male gender, being a current smoker of traditional cigarettes, having friends who have tried E-cigarettes, and having a belief that E-cigarettes could help in quitting smoking (15).

In the present study, among students who ever tried E-cigarettes, the commonest reported reasons were reducing the number of traditional cigarettes, believing that they are less dangerous than traditional cigarettes, and as an attempt to quit smoking.

In Saudi Arabia, in a study carried out in Jeddah, 42.7% of university students used E-cigarettes as a tool to quit smoking and 56.7% of them succeeded in quitting smoking (7). In Riyadh, almost one-quarter of university students use E-cigarettes to quit smoking (18).

A systematic review conducted to describe the pattern of use and attitude of the Saudi population toward E-cigarette smoking revealed that E-cigarettes smoking is high among Saudi nationals with different reasons for using, including reducing tobacco smoking, perceiving E-cigarettes as less harmful, less addictive, curiosity, lower cost, and peer influence (6).

In Poland, the main motivators to use E-cigarettes among medical students were quitting traditional tobacco, believing that they are less harmful to health and their cost (20). In Canada, the majority of smokers have tried E-cigarettes to help them quit smoking to be a long-term replacement for cigarettes or to smoke them where they cannot smoke (22). Contrary to that, Alanazi reported that the majority of nursing, nutrition, and respiratory therapy students in the USA disagreed that E-cigarettes are less dangerous than traditional cigarettes or can help smokers quit (16).

In the present study, there were no differences between smoker, ex-smoker, and non-smoker students regarding their beliefs regarding E-cigarettes. However, Brozek et al., in their multi-centric study among university students from five European countries observed a significant difference between smokers and non-smokers regarding perception of E-cigarettes (21).

Some limitations of the current study are acknowledged including the cross-sectional design and its inherited limitations for hypothesis generation and proving associations, rather than hypothesis testing or proving causality. Also, carrying out the study among medical students in one university is another limitation, which decreases the generalizability of our findings over the whole population. Moreover, the nature of data collection as being self-reported is subjected to recall and social desirability types of bias.

However, despite those limitations, the present study could identify why medical students, who are frequently considered role models, are using E-cigarettes. This could help decision makers to consider these reasons to put strategies to decrease the marketing strategies and consequently reduce the usage and sale of E-cigarettes.

In conclusion, E-cigarettes are being used by a considerable proportion of medical students at King Khalid University, Abha, particularly junior students, and those having parents and/or siblings who tried E-cigarette smoking. Female students are more aware of E-cigarettes and their contents and that they are not currently regulated by the Food and Drug Administration (FDA), than male students. On the other hand, male students are more aware than female students that E-cigarettes can be inhaled with different additives and flavors. Among students who ever tried E-cigarettes, the commonest reported reasons are to reduce the number of traditional cigarettes, assuming that E-cigarettes are less dangerous than traditional cigarettes, and as an attempt to quit smoking traditional cigarettes.

Therefore, it is necessary to raise awareness among adolescents and young adults about the possibly dangerous effects of E-cigarette smoking on their health and being as equally harmful as traditional cigarettes. Mass media and healthcare professionals should play an active role in increasing public awareness about the dangerous effects of E-cigarette smoking. The Ministry of Health should issue policies aiming at restricting the marketing and advertising of E-cigarettes as well as monitoring nicotine levels. Further study including on adolescents and young adults is necessary to have a clearer image of the situation in different regions of KSA.

References

1. WHO. Tobacco. World Health Organization. Available from: http://www.who.int/mediacentre/factsheets/fs339/en/. [cited 2021 Oct 5].
2. Centers for Disease Control and Prevention. Vital signs: current cigarette smoking among adults aged ≥18 years - United States, 2005-2010. MMWR. 2011;60(2):1207–12.
3. Al-Turki YA. Smoking habits among medical students in Central Saudi Arabia. Saudi Med J. 2006;27(5):700-3.
4. Al-Ghaneem SG, Al-Nefisah OS. The prevalence of smoking among male students of Majmaah University, KSA. Journal of Taibah University Medical Sciences 2016;11(2):175-178.
5. Azhar A, Alsayed N. Prevalence of smoking among female medical students in Saudi Arabia. Asian Pac J Cancer Prev. 2012; 13(9):4245-8.
6. Khanagar SB, Siddeeqh S, Khinda V, Khinda P, Divakar DD, Jhugroo C. Impact of electronic cigarette smoking on the Saudi population through the analysis of literature: A systematic review. J Oral Maxillofac Pathol 2019; 23:473.
7. Qanash S, Alemam S, Mahdi E, Softah J, Touman AA, Alsulami A. Electronic cigarette among health science students in Saudi Arabia. Ann Thorac Med 2019; 14:56-62.
8. Vaporizers, E-Cigarettes, and other Electronic Nicotine Delivery Systems (ENDS). FDA.gov; 2017. Available from: https:// www.fda.gov/tobaccoproducts/labeling/productsingredientscomponents/ucm456610.htm. [Last accessed on 2021 Apr 06].
9. Kong G, Morean ME, Cavallo DA, Camenga DR, Krishnan-Sarin S. Reasons for electronic cigarette experimentation and discontinuation among adolescents and young adults. Nicotine Tob Res 2015; 17:847-54.
10. Krishnan-Sarin S, Morean ME, Camenga DR, Cavallo DA, Kong G. E-cigarette use among high school and middle school adolescents in Connecticut. Nicotine Tob Res 2015; 17:810-8.
11. Ferkol TW, Farber HJ, La Grutta S, Leone FT, Marshall HM, Neptune E, et al. Electronic-cigarette use in youths: A position statement of the forum of international respiratory societies. Eur Respir J 2018; 51. pii: 1800278.
12. Jensen RP, Luo W, Pankow JF, Strongin RM, Peyton DH. Hidden formaldehyde in e-cigarette aerosols. N Engl J Med 2015; 372:392-4.
13. Callahan-Lyon P. Electronic cigarettes: Human health effects. Tob Control 2014;23 Suppl 2:ii36-40.
14. Dahiru T, Aliyu A, Kene TS. Statistics in Medical Research: Misuse of Sampling and Sample Size Determination. Annals of African Medicine 2006; 5(3):158 –61.
15. Lotrean LM. Use of electronic cigarettes among Romanian university students: a cross-sectional study. BMC Public Health 2015; 15:358 DOI 10.1186/s12889-015-1713-6
16. Alanazi AM. The prevalence of use, awareness and beliefs of electronic cigarettes among college-based health care students at a Southeastern Urban University. A thesis submitted in partial fulfillment of requirements for the degree of Masters of Science in Health Sciences in The Department of Respiratory Therapy Georgia State University, Atlanta, Georgia, 2016
17. Zhu S-H, Gamst A, Lee M, Cummins S, Yin L, Zoref L. The use and perception of electronic cigarettes and snus among the U.S. population. PLoS ONE 2013;8(10): e79332. doi: 10. 1371/ journal.pone.0079332
18. Awan KH. Experimentation and correlates of electronic nicotine delivery system (electronic cigarettes) among university students – A cross sectional study. Saudi Dent J. 2016; 28:91–5.
19. Al Baik M, Abdrabulnabi A, Aldahan S, Alkhadhrawi N. Electronic cigarette in Saudi Arabia: An online survey. Valley Int J. 2014; 1:411–26.

20. Brożek G, Jankowski M, Zejda J, Jarosińska A, Idzik A, Bańka P. E-smoking among students of medicine — frequency, pattern and motivations. Adv Respir Med 2017; 85: 8–1 DOI: 10.5603/ ARM. 2017.0003.
21. Brozek GM, Jankowski M, Lawson JA, Shpakou A, Pozna ´ nski M, Zielonka TM, et al. The prevalence of cigarette and e-cigarette smoking among students in Central and Eastern Europe—Results of the YUPESS Study. Int. J. Environ. Res. Public Health 2019, 16, 2297; doi:10.3390/ijerph16132297.
22. Czoli CD, Hammond D, White CM. Electronic cigarettes in Canada: Prevalence of use and perceptions among youth and young adults. Can J Public Health 2014; 105(2):e97-e102.
23. Gravely S, Fong GT, Cummings KM, Yan M, Quah ACK, Borland R. et al. Awareness, trial, and current use of electronic cigarettes in 10 countries: findings from the ITC project. Int J Environ Res Public Health 2014; 11: 11691–11704.