



Qatar night skyline

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by primary care physicians in Qatar

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Editorial

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It is the last issue of the of the year and the beginning of volume 21 years of continuous work and help of authors in publishing their research and papers. I would like to wish all the production team, publication manager, editorial board and office and our readers a fruitful year filled with success and advancement.

This issue is rich with papers form different authors that dealt with topic ranging from metabolic disorders , diabetes , hypertension , paediatric care, ophthalmology and preventive issue. In addition to issue related to dental anxiety. A lot of papers stressed community awareness of vital issue to the community and to the practice of family medicine.

The issue of health education is stressed as well and dermatological issues were as well in focus. Along the prevention osteoporosis was dealt with and Prevalence, knowledge, attitude, and preventive behaviors of university students with symptomatic undiagnosed Irritable bowel syndrome.

The covid issue in the region still attract the attention of researcher. The prevalence of hypertension and diabetes mellitus during the COVID-19 pandemic era was reviewed and the barrier to COVID-19 vaccines receiving, barriers and encouraging factors among chronically ill patients.

Health issue of medical students and resident in training always being dealt with in this issue and previous issue. Workplace Violence against Health Care workers by Patients and Visitors was tackled as well. Knowledge and awareness of intestinal parasitic infections was raised as well.

The issue of donation was raised as well which is an important issue especially in our part of the World. In addition to nutrition and its effect on celiac disease. Tuberculosis was discussed in one of the paper as well.

Female issues are always a priority in our journals including the various health issues of breast cancer, pregnancy issues and all that concern primary health care. Breastfeeding: prevalence, health effects, obstacles and ways to encourage it was discussed.

In the quality of life issues, the Quality of life among patients with Glaucoma was raised and the Prevalence, quality of life and risk factors of chronic rhinosinusitis in adults . Quality of Life and Migraine Severity among Patients on Migraine Prophylactic.

The prevalence of empiric antibiotic use in the emergency department in children with suspected urinary tract infection was raised. As well to Barriers to pre-dialysis education in hemodialysis patients with end-stage renal disease.

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International Family Medicine Concludes, Sets Grand Stage for IFM 2023

2,500 healthcare professionals and visitors, 50 expert speakers, 40 scientific sessions

Dubai, UAE – 21 November 2022: The International Family Medicine Conference and Exhibition – IFM, which took place from the 25th until the 27th of October, concluded on a high-note and shed light on the future of Family Medicine for years to come. The event was officially inaugurated by H.E. Awad Saghir Al Ketbi, Director General of Dubai Health Authority, as the UAE follows through on its pledge to fully support the healthcare sector.

More than 2,500 healthcare professionals and visitors attended over the course of three days where 50 expert speakers delivered 40 scientific sessions. IFM also witnessed 30 participating countries, more than 40 brands on display throughout the exhibition hall, and 25 poster presentations shedding light on ground-breaking scientific research.

Pioneering studies were a major highlight at IFM 2022 as the poster presentations revealed insightful research by both professionals and students, which allowed everyone to engage in meaningful dialogue.

Conferences such as IFM contribute towards the betterment of health by enhancing the Family Medicine concepts inclusive of health promotions, prevention techniques and guidelines, curative programs, promoting equality for accessing health and medical services, and providing effective health programs to the community. Many of the top global healthcare companies in the UAE were in attendance and 85% of General and Family Medicine Practitioners from Dubai were also in present, proving that healthcare professionals in the UAE place Family Medicine as a top priority.

Dr. Ibtesam Al Bastaki, Conference Chairperson of IFM 2022, stated: “This edition of International Family Medicine was an amazing year, as we witnessed participation from across the globe. The Conference Agenda addressed a variety of topics focusing on Cardio Metabolic Diseases, Mental Health, Neurology, Rehabilitation and Sports Medicine, which all have a great impact on Family Physicians in their day-to-day practices. We specifically placed much focus on Mental Health this year because we see this as a larger issue faced across all levels from adolescents to adult population, and expert doctors deliberated these topics by addressing key issues that Family Physicians face in treatment of their patients.

Dr. Ibtesam continued: “I am happy to announce and share that the 10th edition of IFM in 2023 is going to be grand celebration for the complete Family of Physicians in the GCC and across the globe, so, we are looking forward to see you all at IFM 2023.”

International Family Medicine aimed at promoting and maintaining the best ethics and high-quality standards in the primary healthcare system through continuous education and informative discussions. The exhibition hall showcased innovative healthcare solutions and live demonstrations of the most advanced medicines and technology to date.

Carlos Malet, VP of Mind Maze, stated: “IFM was a great opportunity for us to introduce Mind Maze technology to the Family Medicine community who is encountering more brain health cases in their daily activity. The event counted with renown institutions and speakers, and the venue was remarkable.”

Family medicine plays an important role in providing direct and continuous care of a person and their family. Unlike other specialties that are limited to a particular organ or disease, family physicians are the only specialists qualified to treat most ailments and addresses the most pressing and most common medical needs of patients without being limited by age or gender. They also practice a range of medical subjects and specialties, rather than the depth of a specific medical field. Dr. Tony Bou-Khalil, Medical Director, Medical Affairs at Pierre Fabre Middle East, stated: “We must thank the IFM 2022 organizers for such a great program and extensive preparation. It was a great opportunity to meet face-to-face with fellow family and primary care doctors after a couple of difficult years. The audience engagement and the energy were at their best in this meeting. We are looking forward for the next edition.”

The next edition of International Family Medicine Conference and Exhibition will be held on Oct 31 through November 2nd, 2023. The annual event is organized by INDEX Conferences and Exhibitions Org. Est. – a member of INDEX Holding, and receives notable support from UAE Ministry of Health and Prevention, Dubai Health Authority, Global Family Medicine Scientific Alliance, Anti-smoking International Alliance, Dubai Sports council, International Hospital Federation, Emirates Society of Colon and Rectal Surgery, and Healthpoint.

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A quantitative study of shoulder pain management by primary care physicians in Qatar

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Abstract

Background: Patients with shoulder pain are mainly managed in primary care. There have been studies in other countries which suggested low confidence among general practitioners in diagnosing and managing shoulder pain, with frequent use of investigations. No comparable studies are available in Qatar. We conducted this study to understand the variations of practice amongst primary care physicians in patients with shoulder pain. We also aimed to assess the association between practice decisions and selected characteristics of physicians, such as their grade and musculoskeletal training or qualification. We hope our study will improve our knowledge of this subject and provide empirical evidence if a gap exists between practice and best evidence.

Methods: We conducted an online cross-sectional survey of all primary care physicians working within 27 health centers under the PHCC. Participation in this survey was voluntary and online survey responses were anonymous. The survey questionnaire included questions on participant characteristics and clinical scenarios describing the two most common shoulder pain presentations in primary care i.e., Rotator cuff tendinopathy and adhesive capsulitis. The response options for both scenarios were listed under categories of diagnosis, investigations, clinical management and referrals.

Results: 28% of physicians responded to email request with three quarters being male. Most of the responders were consultants and had more than 10 years of clinical experience. About one in five physicians reported to have musculoskeletal experience or qualifications. 73% of responders felt a CME session will be useful. In the first scenario, 49% felt confident

about the RCT diagnosing with 31% who didn't feel any investigation was required. From responders who chose to investigate, a nearly equal number selected plain shoulder radiography (71%) and Ultrasound scan (70%). For AdhC scenario, 64% of responders felt confident about the diagnosis. However, 78% chose investigation; the most common investigations were USS (65%), plain shoulder radiography (62%) and Blood test (58%). In both scenarios, USS was selected mainly to confirm diagnosis while shoulder radiography was considered to exclude other diagnosis. The most recommended treatment for both presentations was analgesia (RCT 86%, AdhC 82%) followed by physiotherapy (RCT 84%, AdhC 82%). 56% opted to refer RCT to secondary care compared to 62% for the AdhC. Association analysis revealed that junior grade responders were more likely to refer patient to specialist (RCT scenario, $p=0.022$) and relied more frequently on shoulder radiography (AdhC Scenario, $p=0.022$). Association analysis of previous MSK experience showed a statistically significant tendency to request blood tests and shoulder radiography by physicians with previous MSK experience ($p=0.022$).

Conclusion: This survey in Qatar identifies a reliance on frequent use of investigations in the management of common shoulder pain presentations. A tendency to choose early referral to secondary care was also noted especially amongst junior grade physicians. We hope with more experience and CME training they may feel more confident in their decision making and less inclined to refer in future. However, the low response rate to the survey means that caution needs to be exercised in generalising the findings due to potential non-response bias.

Key words. Shoulder pain management, Primary care, Qatar.

Introduction

Shoulder pain is one of the most frequent musculoskeletal complaints in the general population with an annual population prevalence of up to 46.7% and lifetime prevalence of up to 70% (1-3). Shoulder disorders cause pain, limit the ability to perform many routine activities and can significantly disrupt sleep. A recent community survey in Qatar demonstrated shoulder pain as the third commonest musculoskeletal complaint with a prevalence rate of 15.9%(4).

Patients with shoulder pain are mainly managed in primary care. Shoulder disorders are the third most common primary care musculoskeletal presentation, with up to 3% of adults likely to consult with new shoulder pain annually (1,5-7). Most patients present with minor symptoms lasting a relatively short duration i.e., less than 3 months, while others present with more severe symptoms lasting longer i.e., greater than 12 months, with chronicity and recurrence a common problem (2-4,8). The overall prognosis of shoulder pain is reported to be highly variable, with up to 50% of patients still reporting persistent pain 6–12 months after seeking an initial primary care consultation (3).

The most common cause of shoulder pain is rotator cuff tendinopathy (RCT), and its incidence increases with age.(9). Other major causes of shoulder pain include adhesive capsulitis (AdhC) which most commonly occurs in the 40–65 age group and glenohumeral osteoarthritis (OA) in the over 60 age group (10). Systemic diseases, such as rheumatoid arthritis and polymyalgia rheumatica, may also involve the shoulder (9).

The clinical management in primary care is based on the clinical history and physical examination to establish the likely clinical diagnosis, differentiate between the common causes mentioned above and exclude alternate diagnosis like referred neck pain and any serious pathology. Diagnosing and managing shoulder pain at the primary care level is challenging because many disorders exhibit similar clinical features and lack consensus on diagnostic criteria and concordance in clinical assessment (10). Physician's Knowledge and beliefs, patient expectation, access to investigations, availability of allied health and specialist services, receipt of special trainings and special interest may all influence uptake of evidence and impact clinical practice. There have been studies in other countries which suggested low confidence among general practitioners (GPs)/ primary care physicians in diagnosing and managing shoulder pain, with frequent use of investigations (11-14). Over-reliance on investigations could be explained by inherent uncertainties in patient symptomatology, natural reluctance to commit to a specific diagnosis based only on clinical information, access to investigations, or the availability of specialist services or simple lack of awareness of current evidence and guidelines.

Qatar is a small country with an estimated population of 2.6 million. The Primary Health Care Corporation (PHCC) is the state-run primary health care provider in Qatar, which operates through 27 health centers. Health centers are staffed with primary care physicians of different levels of expertise and grades (GP, Family Medicine Specialist, Consultants and Senior Consultants) with direct access to X-ray and physiotherapy services and referral to governmental secondary care providers. It is not clear to what extent findings from the surveys in other countries translate to Qatar's primary health care system as no comparable studies have been conducted locally (11-14).

Our study is the first of its kind in Qatar primary care. The primary aim of this study was to understand the variations of practice amongst primary care physicians in patients with shoulder pain. Furthermore, physician's management decisions can all be influenced by physician's knowledge and experience. Therefore, a secondary aim of our study was to assess the association between practice decisions and selected characteristics of physicians like their grade and specialized training or qualification. We used a physician survey including clinical scenarios which has previously been shown to be a suitable method to measure aspects of clinical practice and management decisions. We hope our study will describe current clinical practice and may help to identify any gaps between practice and best evidence. This in turn will guide future research in this area and help PHCC formulate its policies, thereby benefiting the service providers and ultimately receivers.

Methods

We conducted a cross-sectional survey of all primary care physicians working within 27 health centers under the PHCC. An email with an invitation to participate along with a survey link using Google forms was sent to all eligible participants during February 2022 via PHCC official email to complete an online Survey. Relevant information about the purpose of the study and instructions about the survey were included in the email containing the link to the survey. Participation in this survey was voluntary and online survey responses were anonymous. A reminder email was sent out after two weeks to increase the response rate of the study.

A survey questionnaire is a quantitative method (predefined questions formatted in standardized questionnaires) that provides access to quantitative and qualitative information. Clinical scenarios have previously been shown to be a suitable method to measure aspects of clinical practice related to management decisions (15-18). However they are limited by the fact that they are brief and can be interpreted differently by different clinicians. To minimize this limitation, we adopted these scenarios from previous surveys in other countries (12-14). This has also facilitated a comparative analysis with those studies. Survey questions were written in English as it is the common language across all the physicians in PHCC. The online questionnaire was designed in a way that included mandatory fields for all relevant areas and

did not allow erroneous data entry (e.g., numbers where text is required), comments or free text other than in the specified fields. We conducted a small informal pilot study of the questionnaire to collect feedback about clarity, acceptability, clinical relevance, representation of real patients and time required for completion, which was estimated to be around 5–10 minutes.

The survey questionnaires used had two sections.

A) Participant characteristics section was used to record age, gender, job designation, years of clinical experience and additional musculoskeletal/surgical experience/diploma/qualification.

PHCC primary care work force has physicians with a varied training and qualification background. Some physicians have been employed for a long time and were recruited as General Practitioner with no formal post graduate training while others possess formal post graduate training in family medicine. They have different designations as family medicine specialist, family medicine consultant and senior consultants. Some physicians have extra surgical or orthopedics training and qualifications. Data was collected about these variables. Participants were asked about how many patients with shoulder pain they see each month and how confident they feel in managing these patients in primary care. Lastly they were asked if they feel the need for a CME/training workshop relevant to shoulder pain disorder.

B) Scenario based questions describing the two most common shoulder pain presentations in primary care. The first scenario described a 77-year-old female with a six-week history of shoulder pain consistent with rotator cuff tendinopathy (RCT), while the second scenario described a 50-year-old female with a three-week history of shoulder pain compatible with early adhesive capsulitis (AdhC).

The response options for both scenarios were listed under categories of diagnosis, investigations, management including advice and medications and referrals.

1. Diagnosis: Physicians were asked to select a clinical diagnosis from a list of options. For each diagnosis selected they were asked to rate their confidence in the diagnosis on a 7-point Likert-type scale ('definitely yes', 'most likely', 'likely', 'notsure', 'unlikely', 'mostunlikely' and 'definitelynot').

2. Investigations: Physicians were asked to state whether they would request investigations for each patient. If yes, they were asked to select from a list of options including blood tests, USS of the shoulder, plain radiograph of the shoulder, MRI of the shoulder, MRI of the cervical spine and a free-text option. They were also asked to select a reason for any investigation they selected, choosing from the following options: 'to confirm the diagnosis', 'to exclude other diagnoses', 'to guide treatment options', 'to decide on a specialist referral' and a free-text option. They were free to select any combination of investigations but restricted to one reason only for each investigation.

3. Treatment: Physicians were asked to indicate whether they would recommend treatment. If yes, they were asked to select from a list of options. They were free to select any combination of options.

4. Referral to a specialist: Physicians were asked to indicate whether they would refer the patient for a specialist opinion. If yes, they were asked to select from a list of referral destinations and they were free to select any combinations of options.

5. Prognosis: We also asked doctors to indicate the likely prognosis and the likelihood that surgery would be required as either very likely, likely, not sure, unlikely, or very unlikely.

Sample size

All primary care family medicine physicians working in the 27 health centers under the PHCC, spread across the state of Qatar were included. A total of 516 physicians were invited to participate in the study to complete the online survey.

Statistical Methods

The Statistical analysis was performed by STATA 11.2 (College Station TX USA). Demographic details like age, gender, Staff grade, years of clinical experience, MSK Sports medicine experience qualifications diploma, How Many patients with shoulder pain do you see per month (On average), How Confident Do you feel in managing patients with shoulder pain and Do you feel the need for CME activities, were expressed as frequency and percentage. To summarise the confidence in the diagnoses, responses to the seven-item Likert scale were converted into five items, by combining the responses 'definitely yes' and 'most likely' into one group "confident yes", and 'definitely not' and 'most unlikely' into another group "confident no". The remaining responses of 'likely', 'not sure' and 'unlikely' were left ungrouped. Chi square test for goodness of fit was used to measure the association between the Staff grade and MSK experience with structured questionnaire of Blood tests, X-ray of the shoulder, CT scan of the shoulder, MRI Scan of the shoulder, Treatment and referral and it was expressed as frequency and percentage. $P < 0.05$ was considered as Statistically Significant.

Results

Of the 516 questionnaires emailed to physicians, 147 were returned, making a response rate of 28.4%. Due to the design features, the online responses were complete and did not include any erroneous or missing data.

Demographic and Participants' characteristics

Over three quarters of the respondents were males (Table 1). Most of the responders were consultant grade (67%), with the second biggest group being GP's. 86% of physicians had more than 10 years of clinical experience. About one in five physicians reported to have musculoskeletal (MSK), sports medicine experience or qualification. Regarding number of patients with shoulder pain seen per month, 44% selected 10-15. Regarding question about confidence in managing shoulder pain patients, 32% selected 'somewhat confident' while 31% felt 'fairly confident'. 'Completely confident' and 'not confident' at all was equally chosen by 7%. Nearly three quarters of physicians felt the need for CME session about this subject; 10% didn't feel it was necessary while 17% selected 'maybe'.

Table 1: Demographic and Participant's characteristics		
	Number of Cases	Percentage
Age		
25-34	2	1%
35-44	77	52%
45-54	57	39%
55-64	8	5%
65+	3	2%
Gender		
Male	114	78%
Female	31	21%
Prefer Not to Say	2	1%
Grade		
Consultant	99	67%
GP	21	14%
Senior Consultant	12	8%
Specialist	15	10%
Years of Clinical Experience		
<5 Years	3	2%
5-10 Years	18	12%
>10 Years	126	86%
MSK Sports medicine experience qualifications diploma		
Yes	28	19%
No	119	81%
How Many patients with shoulder pain, do you see per month (on average)		
0-5	50	34%
5-10	64	44%
10-15	19	13%
15+	14	10%
How confident do you feel in managing patients with shoulder pain		
1. Completely	11	7%
2. Fairly	45	31%
3. Somewhat	47	32%
4. Slightly	34	23%
5. Not at all	10	7%
Do you feel the need for CME activities		
Yes	108	73%
No	14	10%
Maybe	25	17%

Clinical Scenario 1: Rotator Cuff Tendinopathy

Diagnosis

About half of the responders who selected the correct diagnosis of RCT felt that they were confident of this diagnosis (72, 49%) while about one third (46, 31%) stated the diagnosis was likely (Table 2). Five responders (3%) did not think it was a case of RCT. Acute rotator cuff was the second most probable diagnosis indicated by 15% while adhesive capsulitis was selected 'confident yes' by 13%.

Table 2: Physicians' confidence in diagnosis for the RCT clinical scenario

	Acute RC tear (n%)	Glenohumeral OA (n%)	ACJ disorder (n%)	RCT (n%)	Referred neck pain (n%)	AdhC (n%)
Confident Yes	22 (15%)	31 (21%)	10 (7%)	72 (49%)	3 (2%)	19 (13%)
Likely	23 (16%)	54 (37%)	39 (27%)	46 (31%)	19 (13%)	39 (27%)
Not Surely	8 (5%)	15 (10%)	19 (13%)	11 (7%)	13 (9%)	13 (9%)
Unlikely	56 (38%)	39 (27%)	69 (47%)	13 (9%)	78 (53%)	48 (33%)
Confidently No	38 (26%)	8 (5%)	10 (7%)	5 (3%)	34 (23%)	28 (19%)

Investigations

Of the 147 physicians who provided responses, 45 (31%) did not select any investigation (Table 3). A nearly equal number of responders selected plain shoulder radiography (104, 71%) and Ultrasound scan (103, 70%). Blood tests were the third most frequently selected, by 90 GPs (61%), followed by MRI of the shoulder, selected by 75 responders (51%). The majority selected these investigations in combination with others. The most common reason for selecting USS and MRI of the shoulder for this scenario was to confirm the diagnosis, while plain radiograph of the shoulder and blood tests were selected to exclude other diagnoses.

Table 3: Selected investigations for the RCT clinical scenario (Total n=102 (69%))

Reason for Investigation	Blood test (n%)	Plain radiograph shoulder (n%)	US shoulder (n%)	CT scan shoulder (n%)	MRI shoulder (n%)	MRI neck (n%)	Other
To confirm diagnosis	6 (7)	31 (30)	68 (66)	28 (42)	38 (51)	5 (8)	0
To exclude other diagnoses	58 (64)	61 (59)	18 (17)	15 (22)	10 (13)	39 (59)	
To guide treatment option	22 (24)	11 (11)	13 (13)	10 (15)	13 (17)	6 (9)	
To decide on a specialist referral	4 (4)	1 (1)	4 (4)	14 (21)	14 (19)	16 (24)	
Other							
Total number	90, 61%	104, 71%	103, 70%	67, 46%	75, 51%	66, 45%	0%

Treatment, referral & prognosis

Oral analgesia was the most selected treatment (126, 86%), followed by physiotherapy (123, 84%) and corticosteroid shoulder injection (58, 39%) (Table 4). A small number of physicians (3, 2%), did not select any treatment. Most of the time, treatments were selected in combinations instead of a single option. The most common combination was analgesia and physiotherapy (62, 42%) followed by corticosteroid shoulder injection and physiotherapy (45, 31%).

Table 4: Treatment options, referral, and prognosis				
	SCENARIO 1: RCT		SCENARIO 2: AdhC	
	number	%	number	%
TREATMENT OPTIONS				
No treatment	3	2%	3	2%
Analgesia Total	126	86%	120	82%
Injection Total	58	39%	75	51%
Physiotherapy Total	123	84%	121	82%
Breakdown				
Analgesia alone	15	10%	14	10%
Injection alone	5	3%	2	1%
Physiotherapy alone	12	8%	10	7%
Analgesic & Injection	4	3%	5	4%
Analgesic & Physio	62	42%	43	30%
Injection & Physiotherapy	4	3%	10	7%
Analgesic, Injection & Physiotherapy	45	31%	58	41%
REFERRAL				
Yes	82	56%	90	62%
No	65	44%	56	38%
Destination				
Orthopedic Surgeon	62	42%	86	59
Rheumatologist	11	8%	24	16
Rheumatologist & Orthopedic Surgeon	6	4%		
Other	3	2%	4	3
PROGNOSIS				
Recover within 2 weeks	8	5%	7	5%
Recover within 6 weeks	92	63%	62	42%
Recover within 1-2 Years	25	17%	62	42%
Have recurrence within 2 years	10	7%	7	5%
Have permanent difficulties with activities of daily life	11	7%	4	3%
Require surgery	1	1%	5	3%

More than half of the physicians (82, 56%) opted to refer the patient to a specialist in secondary care. The most common destination was orthopedics (62, 42%) while 11 physicians (8%) chose a referral to a rheumatologist. Six physicians (4%) selected both orthopedics and rheumatologist referral.

Most of the physician believed that the patient in this scenario will recover within 6 weeks (92, 63%). Seven percent of physicians felt that the patient will have permanent difficulties with activities of daily life and the same number of physician's expected recurrence of symptoms within 2 years. Need for surgery was mentioned by a small number of physicians i.e. 1% and 3% for RCT and AdhC scenarios respectively.

Clinical Scenario 2: Adhesive Capsulitis

Diagnosis

The majority of physicians indicated that they were confident of the correct diagnosis of the patient described in this scenario (94, 64%) (Table 5) with 19% (28) stating that the diagnosis was likely. 7% (10) of responders were not sure of this diagnosis. 18% (26) physicians felt this scenario was consistent with diagnosis of rotator cuff tendinopathy while 17% (25) chose Acute rotator cuff tear.

	Acute RC tear (n%)	Glenohumeral OA (n%)	ACJ Disorder (n%)	RCT (n%)	Referred Neck pain	AdhC (n%)
Confident Yes	25 (17%)	7 (5%)	8 (5%)	26 (18%)	4 (3%)	94 (64%)
Likely	23 (16%)	31 (21%)	21 (14%)	50 (34%)	17 (12%)	28 (19%)
Not Surely	8 (5%)	12 (8%)	27 (18%)	19 (13%)	16 (11%)	10 (7%)
Unlikely	59 (40%)	79 (54%)	66 (45%)	33 (22%)	72 (49%)	13 (9%)
Confidently No	32 (22%)	18 (12%)	25 (17%)	19 (13%)	38 (26%)	2 (1%)

Investigations

Of the 147 physicians who provided responses, 115 (78%) chose an investigation while 32 (22%) did not select any investigation (Table 6). The most common investigation selected was USS of the shoulder, selected by 95 (65%). Plain radiography of the shoulder was the second most frequently selected, by 91 physicians (62%), followed by blood tests, selected by 85 physicians (58%). The majority selected these in combination with other investigations. The only other investigation suggested by 1 responder was joint aspiration. The most common reasons for selecting investigations are similar to those related to the first scenario: for USS and MRI of the shoulder to confirm the diagnosis, and for blood tests and plain radiographs of the shoulder to exclude other diagnoses.

Reason for Investigation	Blood test n (%)	Plain radiograph shoulder n (%)	USS shoulder n (%)	CT scan shoulder n (%)	MRI shoulder n (%)	MRI neck n (%)	Other
To confirm diagnosis	15 (18)	21 (23)	63 (66)	24 (40)	52 (68)	18 (29)	
To exclude other diagnoses	52 (61)	63 (69)	20 (21)	15 (25)	5 (7)	29 (46)	1*
To guide treatment option	11 (13)	5 (6)	10 (11)	5 (8)	5 (7)	4 (6)	
To decide on a specialist referral	7 (8)	2 (2)	2 (2)	16 (27)	14 (18)	12 (19)	
Total number	85 (58%)	91 (62%)	95 (65%)	60 (41%)	76 (52%)	63 (43%)	

Treatment, referral & prognosis

Physiotherapist and oral analgesia were selected by a nearly equal number of physicians (82%), (Table 4). Corticosteroid injection was indicated by about half of the responders (57, 51%). Most responders selected more than one treatment. The most common combination was analgesics, injection and physiotherapy (58, 41%) followed by analgesics and physiotherapy (43, 30%).

More than half of the physicians (90, 62%) opted to refer the patient to a specialist in secondary care. The most common destination was orthopedics (86, 59%) while 24 physicians (16%) chose a referral to rheumatologist.

Sixty-two physicians (42%) felt that the patient will recover within 6 weeks while the same number indicated that recovery would take 1-2 years. Three percent of physicians felt that the patient will have permanent difficulties with activities of daily life. Need for surgery was mentioned by a similar number of physicians (3%).

Association analysis

Impact of physician's grade on diagnosis and management of shoulder pain

Based on the grades, physicians were divided into two, Junior Grade (GP & Specialist, n=36) and Senior Grade (Consultant & Senior Consultants, n=111). Analysis of RCT clinical scenario revealed that Junior grade physicians were more likely to refer the patient to secondary care and the difference was clinically significant (p=0.022) (Table 7). Furthermore, during analysis of AdhC scenario, Junior grade physicians were found to more frequently rely on x-ray of the shoulder with a statistically significant difference (p=0.022). There were no other statistically significant differences between these groups

Table 7: Impact of physician's grade on diagnosis and management of shoulder pain								
	Junior Grade (n=36)	Senior Grade (n=111)	Total	P-Value	Junior Grade (n=36)	Senior Grade (n=111)	Total	P-Value
				SCENARIO 1: RCT		SCENARIO 2: AdhC		
Blood tests								
To Confirm the Diagnosis	2 (8%)	4 (6%)	6	0.301	6 (22%)	9 (16%)	15	0.569
To decide on a specialist referral	2 (8%)	2 (3%)	4		2 (7%)	5 (9%)	7	
To Exclude Other Diagnoses	13 (50%)	45 (70%)	58		14 (52%)	38 (66%)	52	
To Guide treatment options	9 (36%)	13 (20%)	22		5 (19%)	6 (10%)	11	
X-ray of the Shoulder								
To Confirm the Diagnosis	11 (38%)	20 (27%)	31	0.065	12 (42%)	9 (14%)	21	0.022
To decide on a specialist referral	1 (3%)	0	1		1 (4%)	1 (2%)	2	
To Exclude Other Diagnoses	12 (41%)	49 (65%)	61		14 (50%)	49 (78%)	63	
To Guide treatment options	5 (17%)	6 (8%)	11		1 (4%)	4 (6%)	5	
Ultrasound of the Shoulder								
To Confirm the Diagnosis	17 (68%)	51 (65%)	68	0.829	18 (62%)	45 (68%)	63	0.606
To decide on a specialist referral	1 (4%)	3 (4%)	4		0	2 (3%)	2	
To Exclude Other Diagnoses	3 (12%)	15 (19%)	18		8 (28%)	12 (18%)	20	
To Guide treatment options	4 (16%)	9 (12%)	13		3 (10%)	7 (11%)	10	
CT Scan of the Shoulder								
To Confirm the Diagnosis	8 (38%)	20 (43%)	28	0.967	6 (26%)	18 (49%)	24	0.329
To decide on a specialist referral	5 (24%)	9 (20%)	14		7 (30%)	9 (24%)	16	
To Exclude Other Diagnoses	5 (24%)	10 (22%)	15		7 (30%)	8 (22%)	15	
To Guide treatment options	3 (14%)	7 (15%)	10		3 (13%)	2 (5%)	5	
MRI Scan Shoulder								
To Confirm the Diagnosis	7 (30%)	31 (61%)	38	0.085	17 (61%)	35 (73%)	52	0.689
To decide on a specialist referral	7 (30%)	7 (13%)	14		7 (25%)	7 (15%)	14	
To Exclude Other Diagnoses	3 (13%)	7 (13%)	10		2 (7%)	3 (6%)	5	
To Guide treatment options	6 (26%)	7 (13%)	13		2 (7%)	3 (6%)	5	
MRI Cervical spine								
To Confirm the Diagnosis	3 (14%)	2 (5%)	5	0.459	8 (2%)	10 (26%)	18	0.707
To decide on a specialist referral	6 (27%)	10 (23%)	16		6 (24%)	6 (16%)	12	
To Exclude Other Diagnoses	12 (55%)	27 (61%)	39		10 (40%)	19 (50%)	29	
To Guide treatment options	1 (5%)	5 (11%)	6		1 (4%)	3 (8%)	4	
TREATMENT								
Analgesic & Injection	0	4 (4%)	4	0.442	0	5 (5%)	5	0.226
Analgesic & Physio	19 (53%)	43 (39%)	62		10 (30%)	33 (30%)	43	
Analgesic, Injection & Physio	7 (19%)	38 (34%)	45		13 (39%)	45 (41%)	58	
Analgesia	3 (8%)	12 (11%)	15		5 (15%)	9 (8%)	14	
Injection & Physiotherapy	1 (3%)	3 (3%)	4		0	10 (9%)	10	
Injection	2 (6%)	3 (3%)	5		1 (3%)	1 (1%)	2	
Physiotherapy	4 (11%)	8 (7%)	12	4 (12%)	6 (6%)	10		
REFERRAL								
Yes	26 (72%)	56 (50%)	82	0.022	26 (72%)	64 (58%)	90	0.133
No	10 (28%)	55 (40%)	65		10 (28%)	46 (42%)	56	

Impact of physician's MSK experience on diagnosis and management of shoulder pain

Based on the previous experience and qualifications provided by responders, they were divided into two groups; Group one with no musculoskeletal (MSK) experience or qualification (n=28) and group 2 with previous MSK experience or qualification (n=119). Analysis of RCT clinical scenario did not show any statistically significant difference in their diagnosis and management decisions (Table 8). However, during analysis of AdhC scenario, Physicians with MSK experience were more likely to select plain radiographs of the shoulder and blood tests with the difference being clinically significant (p=0.022). There were no other statistically significant differences between the two groups.

Discussion

This is the first national study to report on primary care management of patients with shoulder pain by primary care physicians in Qatar, using clinical scenarios. Our survey revealed the current pattern of care for shoulder pain as variable. Nearly one third of participants felt "fairly confident" while a nearly similar number felt "somewhat confident" in managing shoulder pain patients. In general, there was a high reliance on imaging, particularly plain radiographs, ultrasound, and MRI to either confirm the diagnosis or exclude alternate diagnoses.

There have been studies in Canada, USA, Australia and the UK which suggested low confidence among primary care physicians in diagnosing and managing shoulder pain, with frequent use of investigations (11-14). Over-reliance on investigations could be explained by inherent uncertainties in patient symptomatology, natural reluctance to commit to a specific diagnosis based only on clinical information, access to investigations, or the availability of specialist and allied health services, or simple lack of awareness of current evidence and guidelines. In our study, only a modest number of respondents confidently committed to correct diagnosis in the scenario. This could be a consequence of limited clinical information available in the scenario rather than a genuine lack of confidence in committing to a diagnosis. However, the fact that a high number of responders selected investigation, a possibility of genuine reluctance to make a clinical diagnosis cannot be completely ruled out. This is further supported by the fact that even when physicians responded that they were confident of a diagnosis, they still requested investigation to confirm it. This pattern is like the findings in previous such studies mentioned earlier.

Rationale in choice of investigations is mixed. In the RCT scenario, 70% of responders selected plain radiography of shoulder. Out of these, 60% selected this to exclude other diagnosis which could be explained by the fact that the patient in the scenario is elderly and had 6 weeks history of shoulder pain not responding to conservative treatment. However, in the AdhC scenario, plain radiography was selected again by most responders (two thirds). This practice is not evidence based as in the absence of any

red flag symptoms, in a middle-aged woman with three weeks history of shoulder pain, alternate diagnosis like glenohumeral joint OA is unlikely as this usually affects older people. Similarly, in both scenarios, nearly two thirds of responders selected USS mainly to confirm the diagnosis, a rationale that is not supported by published evidence and literature. Imaging of the rotator cuff with USS is rarely indicated in primary care. A normal rotator cuff US does not exclude serious shoulder pathologies such as tumor and glenohumeral osteoarthritis. The procedure is highly operator-dependent. Asymptomatic changes on ultrasonography are common and increase with age and many observed abnormalities might not require specific treatment (19,20). This has led to concerns that ultrasound findings might be misleading, may cause unnecessary anxiety for the patient and may result in inappropriate and/or delay correct diagnosis and potentially unnecessary intervention. This type of imaging is therefore more usefully performed after secondary care referral when it can help direct secondary care treatment when conservative care has failed. Any positive US findings need to be interpreted by shoulder surgeons in the context of patient symptoms, disability, and response to treatment. Referrals to secondary care should therefore be based on patient symptoms, disability, and response to conservative treatment rather than US reports.

Blood tests are usually not indicated in primary care assessment in the absence of any red flags or findings suggestive of malignancy, PMR, generalized rheumatological condition or undiagnosed diabetes. Blood tests were also selected by three out of five physicians in both scenarios. Unilateral shoulder pain without any other symptoms in RCT scenario makes PMR and rheumatoid arthritis unlikely. A blood test in the AdhC scenario could be justified to exclude undiagnosed diabetes mellitus due to its strong association with adhesive capsulitis.

Regarding choice of treatment, analgesia and physiotherapy were recommended by the majority of responders for both scenarios. Half of the responders selected to offer intra-articular steroid in the AdhC scenario while two fifths chose to do so in the RCT case. Most responders selected more than one treatment; the most common combination being analgesics, injection & physiotherapy, and analgesics & physiotherapy. These treatment choices are similar to what has been described in previous primary care studies in other countries (13-14).

In our study, more than half of the physicians opted to refer the patient to a specialist in secondary care in both scenarios with orthopedics clinic being the most common destination. Patients in our scenarios had 6 weeks (RCT) and 3 weeks (AdhC) duration of symptoms and had not had a trial of physiotherapy or steroid injection. The latest British Orthopedics Association guidelines suggest that Physiotherapy rehabilitation should usually be used for a minimum of 6 weeks unless patients are unable to tolerate, or physiotherapists identify a reason for earlier referral to secondary care (21). In patients who show improvement

Table 8: Impact of physician's MSK experience on diagnosis and management of shoulder pain

	Have MSK experience (n=28)	No MSK experience (n=119)	Total	p-Value	Have MSK experience (n=28)	No MSK experience (n=119)	Total	p-Value
	SCENARIO 1				SCENARIO 2			
Blood tests								
To Confirm the Diagnosis	3 (17%)	3 (4%)	6	0.234	6 (38%)	9 (13%)	15	0.022
To decide on a specialist referral	1 (6%)	3 (4%)	4		1 (6%)	6 (9%)	7	
To Exclude Other Diagnoses	9 (50%)	49 (68%)	58		5 (31%)	47 (68%)	52	
To Guide treatment options	5 (28%)	17 (24%)	22		4 (25%)	7 (10%)	11	
X-ray of the Shoulder								
To Confirm the Diagnosis	5 (26%)	26 (31%)	31	0.940	2 (15%)	19 (24%)	21	0.025
To decide on a specialist referral	0	1 (1%)	1		0	2 (3%)	2	
To Exclude Other Diagnoses	12 (63%)	49 (58%)	61		8 (62%)	55 (71%)	63	
To Guide treatment options	2 (11%)	9 (11%)	11		3 (23%)	2 (9%)	5	
Ultrasound of the Shoulder								
To Confirm the Diagnosis	11 (2%)	57 (70%)	68	0.213	12 (67%)	51 (66%)	63	0.222
To decide on a specialist referral	0	4 (5%)	4		0	2 (3%)	2	
To Exclude Other Diagnoses	6 (29%)	12 (15%)	18		2 (11%)	18 (23%)	20	
To Guide treatment options	4 (19%)	9 (11%)	13		4 (22%)	6 (8%)	10	
CT Scan of the Shoulder								
To Confirm the Diagnosis	4 (33%)	24 (44%)	28	0.702	5 (46%)	19 (39%)	24	0.516
To decide on a specialist referral	2 (17%)	12 (22%)	14		2 (18%)	14 (29%)	16	
To Exclude Other Diagnoses	3 (25%)	12 (22%)	15		2 (18%)	13 (27%)	15	
To Guide treatment options	3 (25%)	7 (13%)	10		2 (18%)	3 (6%)	5	
MRI Scan Shoulder								
To Confirm the Diagnosis	8 (67%)	30 (48%)	38	0.613	12 (92%)	40 (63%)	52	0.226
To decide on a specialist referral	1 (8%)	13 (21%)	14		1 (8%)	13 (21%)	14	
To Exclude Other Diagnoses	1 (8%)	9 (14%)	10		0	5 (8%)	5	
To Guide treatment options	2 (17%)	11 (17%)	13		0	5 (8%)	5	
MRI Cervical spine								
To Confirm the Diagnosis	3 (2%)	2 (4%)	5	0.048	6 (55%)	12 (23%)	18	0.088
To decide on a specialist referral	2 (17%)	14 (26%)	16		0	12 (23%)	12	
To Exclude Other Diagnoses	5 (42%)	34 (63%)	39		5 (45%)	24 (46%)	29	
To Guide treatment options	2 (17%)	4 (7%)	6		0	4 (8%)	4	
TREATMENT								
Analgesic & Injection	1 (4%)	3 (3%)	4	0.812	0	5 (5%)	5	0.226
Analgesic & Physio	13 (46%)	49 (41%)	62		10 (30%)	33 (30%)	43	
Analgesic, Injection & Physio	6 (21%)	39 (33%)	45		13 (39%)	45 (41%)	58	
Analgesia	4 (14%)	11 (9%)	15		5 (15%)	9 (8%)	14	
Injection & Physiotherapy	0	4 (3%)	4		0	10 (9%)	10	
Injection	1 (4%)	4 (3%)	5		1 (3%)	1 (1%)	2	
Physiotherapy	3 (11%)	9 (8%)	12		4 (12%)	6 (6%)	10	
REFERRAL								
Yes	16 (57%)	66 (55%)	82	0.872	16 (57%)	74 (63%)	90	0.586
No	12 (43%)	53 (45%)	65		12 (43%)	44 (37%)	56	

of therapy is justified. If a patient fails to respond to 3 months of conservative treatment measures, they should be referred to secondary care. However, patients should be referred earlier if severe symptoms necessitate it as it is inappropriate to persist with ineffective treatments. Physicians in Qatar primary care have direct access to a physiotherapy clinic. We are not sure if an early referral to secondary care is due to lack of GP confidence to diagnose and manage shoulder complaints or lack of awareness of current management and referral guidelines. Our finding of a high reliance upon specialist referral is in keeping with some but not all previous studies (12-14,22 5,23).

We examined whether physicians with senior grade and with MSK experience were more confident in making a diagnosis and whether they differed in their approach to requesting investigations or offering treatment. One would expect them to have a higher level of knowledge and skills in managing patients with shoulder pain. Our study found that junior grade physicians more frequently relied on radiography of the shoulder and more frequently referred the patients to secondary care. On the other hand, physicians with MSK experience were keener to select plain radiography of shoulder and blood tests in the AdhC scenario. Interestingly this finding is consistent with a finding in a primary care study in the UK.

Strengths and limitations

Scenario-based surveys are limited by the fact that they are brief and can be interpreted differently by different individuals. To minimize this limitation, we adopted surveys which have been used successfully in similar studies in other countries. Participation in this study was completely voluntary and the physician's choice to participate or not, was not held against them. Data was collected anonymously, and no personally identifiable data was collected from the participants.

We measured stated rather than actual practice, which means patient preference, or perceived patient pressure, are less likely to influence stated management responses.

All participants work for the same national primary care organization and hence have the same set up of services and access to investigations and specialists. Thus, our findings of general overreliance on imaging and referral would indicate that access or lack of it was not really a factor in the physician's stated responses

A potential limitation of our study is the low response rate which limits generalizability of its result. The low response rate means that the findings are likely to be influenced by non-response bias. Within our study population, we can only compare responders to non-responders based on gender and designation which limits our ability to assess the likely influence of such bias. We used direct email containing survey link as the method of electronic distribution. We are not clear whether newer electronic distribution methods like social media would give a different response.

Implications for future research and interventions

Our survey describes clinical practice of a large sample of primary care physicians in Qatar and provides insight into their reasoning about imaging and treatment decision. We believe that despite the availability of evidence to inform clinical practice, our study indicates an 'evidence -practice' gap among primary care physicians. The objection could be that clinical scenarios are brief and can be interpreted differently by different clinicians. Moreover, the diagnosis of shoulder pain presentations is known to be challenging with symptoms and signs potentially reflecting various underlying conditions. However, in our support, the clinical scenarios used in this survey were adapted from previous studies conducted in other countries (11-14).

We believe a more in-depth understanding of their clinical reasoning, perhaps using qualitative research, would particularly help better understand the rationale for their decision regarding investigations and other management choices. In the meanwhile, interventions are needed to improve diagnosis and treatment of common shoulder problems in primary care and to reduce inappropriate imaging and specialist referral. This can include academic detailing like education seminar, a hands-on workshop focused on shoulder clinical examination including shoulder injection technique or a joint clinic with primary care physicians and orthopedic surgeon. Finally, we suggest the development and dissemination of local clinical guidelines aimed at primary care management of patients with shoulder pain.

Conclusion

The results of our survey among primary care physicians in PHCC, Qatar, using brief clinical scenarios show an apparent frequent use of investigations, including blood tests, plain radiographs and USS in the management of common shoulder pain presentations. This reliance on investigations was more prevalent in junior grade physicians. The most common treatment approach was analgesia and physiotherapy.

A tendency to choose early referral to secondary care was also identified which was more frequently noted amongst junior grade physicians. We hope with more experience and CME training they may feel more confident in their decision making and less inclined to refer in future. However, the low response rate to the survey and potential non-response bias means that caution needs to be exercised in generalizing the findings.

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Assessment of the level of willingness to donate liver and kidney among the general population in Saudi Arabia

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Abstract

Background: For patients with end-stage liver disease and underlying chronic kidney disease or prolonged acute kidney injury, liver and kidney transplantation is a life-saving procedure. As a result, estimating the general population's willingness to donate liver and kidney is critical.

Objectives: To assess the level of willingness to donate liver and kidney and its relationship with different socio demographic factors among the general population in Saudi Arabia.

Methods: This is cross sectional study that was conducted in various regions in Saudi Arabia during March – May 2022. Data were collected through online self-administered questionnaire prepared via Google Form. Participants were selected using a convenient non-probability sampling technique. SPSS was used to perform data analysis.

Results: A total of 983 participants were included in this study. The majority were females. The most common age group was 18-30 years. Our results found that 23.6 % of the participants reported their willingness to donate a liver or a kidney for an unknown patient, whereas 71.1% reported willingness to do so for a close family member or a friend. 58.3% were willing to accept a donated liver or kidney from an unknown donor whereas 67.7% were willing to accept it from a close family member or

a friend. Moreover, gender was significantly associated with willingness of donation for an unknown patient ($P<0.05$) whereas gender was not significantly associated with willingness for donation for a close family member or a friend. Age groups, marital status and occupational status was found to be significantly associated with donation for both unknown patients and close family members or friends ($P<0.05$).

Conclusion: According to our findings, the willingness of participants to donate a kidney or a liver was 23.6 percent for unknown patients and 71.1 percent for close relatives. Gender, marital status, age, income and occupation were observed to be significantly associated with willingness to donate an organ for unknown patients or close family members or friends or both.

Key words: donation, liver, kidney, general population, Saudi Arabia

Introduction

The first effective transplantation in the case of both living and dead donors occurred in 1954 and 1962 in Boston. It was done by Dr Joseph Murray and Dr David Hume. Later on, till the 1970s, there were many successful organ transplantations worldwide, such as lung, kidney, liver, heart and pancreas transplantation. But in 1980, there was an improvement in organ rejection cases due to immune suppression therapies used. The data of the Global Observatory on Donation and Transplantation (GODT) displayed the increasing organ transplantation demand and less transplantations achieved, i.e. 10 percent of the demand. Further, it also displayed the gap between organ availability and demand ratio among developed (Western) and developing countries (African & Asian countries) (1). The GODT constitutes 109 WHO states, covering 85% of the world population. Out of 85%, 74% of member countries have organizations to look at the organ contribution and transplantation; among those, 80% have proper regulatory laws for organ acquirement and transplantation (2).

Liver is a vital body organ which plays an important role in multiple mechanisms of the human body including metabolism, detoxification, nutrient storage, digestion and immune system regulation. Liver in the human body is the largest organ, weighing almost 1.4 kilograms, and comprises approximately 2% of the adult body weight. Blood from the digestive system is carried to the liver through a portal vein for processing of dissolved substances such as nutrients, drugs and toxins. These substances are sorted out in the liver for storage, metabolism or elimination from the body (3, 4).

Liver is anatomically divided into four lobes namely right lobe, left lobe, quadrate lobe and caudate lobe, where right and left lobe are considered the true functional lobes which are divided by the Cantlie line. Hepatocytes are functional units of liver and are distributed in three zones including Zone I or periportal zone with best perfusion, and Zone II or pericentral zone and Zone III which is farthest from portal blood supply and has least perfusion (5).

Liver may fail to perform its functions because of injuries that may have been caused by multiple factors. Inability of liver to perform its function is termed as liver failure and it is characterized into three groups, namely subacute liver failure, acute liver failure and hyperacute liver failure. Subacute liver failure is defined when the interval between jaundice development and encephalopathy onset is within 5 to 12 weeks. On the other hand, if the interval between jaundice development and encephalopathy onset is within 1-4 weeks, it is characterized as acute liver failure, and if this interval is reduced to within 7 days, then the condition is characterized as hyperacute liver failure. The most common cause of acute liver failure is hepatitis induced by viral infection (viral hepatitis) in the developing countries and drug effects (drug induced hepatitis) in the developed countries. Besides, some other infections, e.g. Amanita phalloides, may cause liver injury due to hepatotoxic effects. Other common causes of liver failure include

hepatic conditions such as Wilson disease, Budd-Chiari syndrome, acute fatty liver of pregnancy, hemolysis, elevated liver enzymes, low platelet (HELLP) syndrome, autoimmune hepatitis, veno-occlusive disease, sepsis and liver malignancies (6,7).

Liver transplantation is a management strategy for acute and chronic end stage liver disease when other baseline management strategies such as medical therapy do not work. This management option has been evolving since its first attempt in 1963 in terms of surgical procedures, organ donation, and quality of life of both the recipient and donor. Along with acute liver failure, liver transplantation is indicated in decompensated liver disease and cirrhosis due to underlying medical conditions such as chronic hepatitis (hepatitis C and hepatitis B), Primary sclerosing cholangitis (PSC), Primary biliary cholangitis (PBC), Alcohol-related liver disease, Nonalcoholic steatohepatitis (NASH), hepatocellular carcinoma (HCC), Alpha-1 antitrypsin deficiency, hereditary hemochromatosis (HH), familial amyloid polyneuropathy (FAP), Primary hyperoxaluria type I, glycogen storage disease and cystic fibrosis (5,8).

Scarcity of donated liver is a key challenge in the treatment of liver disease through liver transplantation. Acute hepatic failure incidence is estimated to be less than 10 cases per million population each year in the developed countries. Around 2,800 cases of acute liver failure are reported each year in the United States while the frequency of hepatic failure is much higher in developing countries, mostly affecting the young population (6). Moreover, there is a progressive imbalance between the number of available liver donors and the recipients, as candidates for liver transplant are increasing with passage of time (9). Many countries have been working to design and implement innovative strategies targeting incentivized donation to overcome the hurdle of donor-recipient discrepancies through improving liver allocation, liver utilization from donors with cardiac death and facilitation of living donors (10).

Similarly, the kidney, a vital body excretory organ, has been an important concern for researchers in case of kidney failure. In 2016, 16,315 patients were on hemodialysis due to end-stage renal disease (ESRD) in KSA. By 2020, this number will increase to 20,000. The age of patients with ESRD varies from 26 to 65 years (11). This age limit is younger compared to other illnesses. The small age limit makes ESRD an alarming health concern to be highlighted. That is why ESRD is usually treated by kidney transplantation. Kidney transplantation lengthens the duration of life and provides a quality of life. Moreover, it stabilizes the cognitive health abilities and increases the patient's confidence and self-esteem due to fewer changes in the body (12). But kidney transplantation is not always achievable due to differences in demand and supply of the kidney (13).

Improvements in the KSA donation system and new implementations are considered to regulate the organ donation rate. It is an ultimate need to increase the number of kidney donors to enhance the availability of

kidneys for transplantation and to reduce the number of individuals on the waiting list (14). Not only in KSA, but also in other parts of the world, kidney availability is not meeting kidney demand by kidney transplant patients. In Eastern and Central European countries, the patients who acquire kidney transplantation make up one-third of total patients with kidney failure (15). It is why education and public awareness have become an immense need to increase the availability rate of kidneys from living donors, particularly from family members and immediate relatives (16) along with unfamiliar persons according to paired exchange programs (17).

The willingness of the public to donate kidney organs can be increased by altering the attitude and education of the individuals in the health care sector (18). The need to focus on the health care students is due to their positive influence on the general public regarding the willingness of kidney donation (19). Moreover, health care individuals are an integral part of society. Due to their positive attitude toward the public to enhance willingness for organ donation, they set an ideal example to follow. Many studies establish a relationship between donor groups and health care staff's education and awareness of organ donation (20).

The willingness of living donors to donate the kidney is important in terms of the recipient of the kidney and the protection of the donor. The donor must know the possible risks and advantages of offering the kidney. Several factors should be considered while offering organs, such as health risks, possible side effects of kidney elimination, recovery time and failure to rejoin work immediately after surgery (21). The values and beliefs of donors contribute to the choices of decisions in different life situations they make. Their values have motivational power and guide an individual to adopt an action according to their choices and create a potential donor (22). In the case of living donation, humanity, sympathy, and personal standards are important for a healthy society (23).

This study aims to assess the factors affecting the education and willingness of the general public for liver and kidney donation in Saudi Arabia.

Rationale

The limited availability of liver donors and increasing number of liver transplant candidates pose a big challenge for effective healthcare and management strategies to treat liver diseases. These challenges reduce the effectiveness and utilization of recent advancements in the field of liver transplantation (24). Improvements in public understanding and willingness for liver donation may help to convert potential donors into actual donors, and hence, increase the availability of liver donors (25). Thus, data collection regarding the factors affecting public awareness and willingness for liver donation is necessary to design innovative interventions necessary for an improved number of liver donors.

Literature Review

In a meta-analysis of 1806 items of literature obtained from PubMed, Medline, Google Scholar and other authentic sources, the willingness and education of the general public to donate the organ were analysed. After narrowing down the criteria for selecting articles, 14 studies were selected based on knowledge assessment through a questionnaire including questions about organ donation. It includes general knowledge, awareness, religious and social understandings and knowledge among different races about organ donation. Fourteen studies evaluated the willingness, but ten studies assessed the knowledge, while two investigations focused on both the willingness and education. These studies depicted that increased knowledge improves willingness (26).

Liver donors are very limited in number as compared to the number of candidates waiting for liver transplant. A comprehensive literature survey and a case series report was carried out in the United States (US) by Shan et al., describing that liver donation can be facilitated through improvements in anonymous living liver donation (ALLD) programs at various settings. This program encourages healthy individuals to volunteer for donation of a part of their liver. Different institutions have set up their protocols for ALLD which can be modified to increase the pool of donated livers through improved awareness of AALD and covering the financial risks. In the case series, the researchers recruited more than 40 potential ALLDs of which 5 completed the process and ended up with successful living liver donation. The authors suggested that adoption of institutional policies that should allow ALLD, establishing financial aid programs for donors and sharing this information with the public may improve the general public attitude towards ALLD and may help in saving more lives by reducing the wait for liver transplant in patients affected with acute liver failure (27). Recently, liver donation through an anonymous nondirected live liver donation (ANLLD) program in the US was reported to implement effective and safe protocols for partial liver donation (28, 29).

Ríos et al. reported a favorable attitude towards live liver donation among Spanish medical students after conducting a multicenter, interdisciplinary sociological and observational study. In this study, data was collected from more than 9500 students enrolled in medical schools through a validated questionnaire. Analysis of data revealed that 89% of the study subjects were in favor of living liver donation to relatives while 39% supported unrelated living liver donation. Prominent factors associated with a positive attitude towards liver or other organ donation were age, gender, academic year, geographical area, possibility of facing a need for transplant in future, perception about deceased liver donation, perception about accepting liver donation from a family member, discussions about organ donation with family or friends, partner's opinion about organ donation and having a history of altruistic activity. The most common fear associated with liver or kidney donation among the medical students was risk of body mutilation (30). Moreover, López-Navas et al. reported

that lack of awareness about living liver donation among patients, who are waiting for liver transplant, has limited the potential donor relatives to donate live liver (31).

Similarly, a positive attitude towards living organ donation was reported in another study carried out by Lin et al. from Taiwan. This study recruited 375 healthcare professionals and observed that 65% of them were willing to donate their living liver. Among these, 78.9% of the subjects showed willingness to donate living organs for unknown and unrelated recipients. Factors associated with willingness for living organ donation were motivation to help others, financial support from the authorities, positive attitude towards living organ donation, and reduced concerns for personnel health (32).

Reduced inclination towards liver donation is also a significant challenge for liver transplantation in the Middle Eastern countries and the countries of Arabian Gulf region. Religious and cultural factors, lack of consensus among religious scholars about organ donation, lack of proper health infrastructure, low awareness among medical professionals and general public and lack of support from government are key elements that hinder the expansion of donor pool in this region (33, 34). Liver transplants have been carried out at institutional level in two countries, i.e. Turkey and Iran, while living liver donation is a common source for organ transplant in this region (33). Khder and AlNoaimi reported that the majority of study participants (95.17%) from Bahrain did not register for organ donation while 35.17% did not show willingness to donate organs after death (33). Another study was carried out by Janahi et al. in the United Arab Emirates (UAE) by recruiting more than 490 subjects. The authors reported positive attitude and belief of the public towards organ donation and transplantation (80%) while the knowledge about local laws related to organ transplantation was inconsistent in most of the participants (60%) (35).

Althonaian et al. carried out a retrospective cohort study at a tertiary healthcare center, King Abdulaziz Medical City (KAMC) in Saudi Arabia, recruiting more than 100 participants who donated live liver for transplantation. The researchers reported the procedures to be safe as no life threatening complications were observed in any of the donors while two donors faced Grade III complications and six donors reported Grade II complications after the surgery for donation (36). Moreover, Sadagah et al. observed that the majority (81%) of the total 370 recruited family members of hemodialysis patients were willing for organ donation. However, only 11% of the participants thought their knowledge level about the topic to be high or very high. Male gender and age less than 40 years was found to be associated with increased willingness of organ donation (37). Another study was carried out by Alnasyan et al. to assess the general public awareness about organ donation and transplantation in Saudi Arabia. This study enrolled more than 1450 Saudi adults among whom more than 77% showed willingness for organ donation. Data analysis showed that almost 29% of the study participants were willing to donate organs for their relatives while

only 22.3% refused organ donation. Moreover, 77.4% of the study participants with age more than 40 years were willing to donate organs to unrelated patients while the majority (78%) of younger participants (less than 40 years old) showed willingness to donate organs for unrelated patients (38).

There were 140,993 organs donated in 2018 worldwide. Of the total, 1,350 organs were transplanted in Saudi Arabia, which makes up 0.95% of total transplantations (1). This 0.95 % of surgeries involved kidney donation mainly, i.e., 1006, and then 270 liver transplantations and 96 heart transplantations (39).

Moreover, the literature concluded that the poor organ donation rate is due to social stigma, lack of education and carelessness (40). Further, it is assumed that Saudi Arabia will have to face a shortage of organ donors in the future (38). That is why it is required to assist in educating the general public to enhance willingness for organ donation, particularly among medical staff (41).

Yan et al. and Okita et al. in their studies also highlight the importance of sociodemographic factors such as age, sex, religion, ethnicity, financial, marital and education status (42,43). Certain other factors are essential to making the public ready for a kidney donation, such as religion and socioeconomic status. The factors contributing to organ donation are favoured by a study in Germany that revealed the link between medical staff and education and willingness to donate the organ (44). Other studies revealed the link between education, behaviour and enhanced willingness to donate the organ (45).

Objectives

General:

- Study the level of willingness to donate liver and kidney among general population in Saudi Arabia.

Specific:

- To explore the relationship between Liver and Kidney donation willingness and different socio-demographic factors.

Methodology

Study design: This observational study has a cross-sectional study design.

Study Area: Data collection was done in various cities of Saudi Arabia during March – May 2022.

Study Population: The study population comprised the General Public Population.

Inclusion Criteria: Adult Saudi Arabian resident who agrees to participate in the study, any gender, any nationality, can read and own a social media account.

Exclusion Criteria: Non-Saudi Arabian resident, has no social media account, or refuses to participate and share the requested information.

Sample Size: EPI info program was used to determine the sample size. On the basis of total population of KSA, keeping a 5% margin of error and 95% confidence interval, the sample size came out to be 384.

Due to overwhelming response, the number of questionnaires collected reached 1083, and after enforcing inclusion criteria, a total of 983 responses were finalized to be included in the study.

Data collection tools: A validated self-administered online questionnaire was used to collect information. The most commonly used social media platforms were used to spread the link i.e., WhatsApp, Facebook and Twitter. The objective of the study was mentioned clearly in the preface. The questionnaire consisted of two parts. Part one was reserved for socio-demographic information, and the second part contained questions about participants' willingness for donation of kidney and liver.

Pilot study: A pilot study was accomplished to pretest the questionnaire including over 20 respondents. The results of this pilot study were not counted in the final study. A few changes were made for a better understanding and clarity of the questions.

Sampling Technique: Sampling was done using a convenient non-probability technique.

Data analysis: We used Statistical Package for Social Science (SPSS) version 23 for data analysis. Percentage and numbers were used to express qualitative data. To examine the difference in data in the two groups, we used Chi-square (χ^2) test.

Ethical considerations: Research Ethics Committee in Al-Baha University approved the study. Participants' information and the collected data was solely utilized for research and kept confidential.

Results

Participants' characteristics:

Of the total participants, the majority were females (669, 68.1%). The most common age group was 18-30 (683, 69.5%) whereas participants >70 years accounted for only 0.1%. More than half of the participants were single (596, 60.6%). 95.4% of the participants were Saudi. Regarding the participants' occupation, half of them were students. Most of the participants have average monthly income of less than 5000 (64.7%). Table 1 shows more details of the socio-demographic characteristics of the study participants. Most of the participants are from Al-Baha (33.6%). Other residence details are shown on Figure 1.

Table 1: Socio-demographic characteristics of the study participants (n=983)

Variable	Category	Frequency	Percent
Gender	Male	314	31.9%
	Female	669	68.1%
Age (years)	18-30	683	69.5%
	31-40	149	15.2%
	41-55	121	12.3%
	56-70	29	3%
	> 70	1	0.1%
Marital status	Single	596	60.6%
	Married	359	36.5%
	Divorced	21	2.1%
	Widowed	7	0.7%
Nationality	Saudi	938	95.4%
	Non-Saudi	45	4.6%
Education	Primary	7	0.7%
	Intermediate	19	1.9%
	Secondary	185	18.8%
	Bachelor	707	71.9%
	Other	65	6.6%
Occupational status	Student	491	49.9%
	Employed	237	24.1%
	Unemployed	133	13.5%
	Private business	27	2.7%
	Retired	38	3.9%
	Other	57	5.8%
Average monthly income (SAR)	< 5,000	636	64.7%
	5,000 - 9,999	159	16.2%
	10,000 - 14,999	100	10.2%
	15,000 – 19,999	50	5.1%
	> 20,000	38	3.9%

Figure 1: Residence of study participants (n=983)

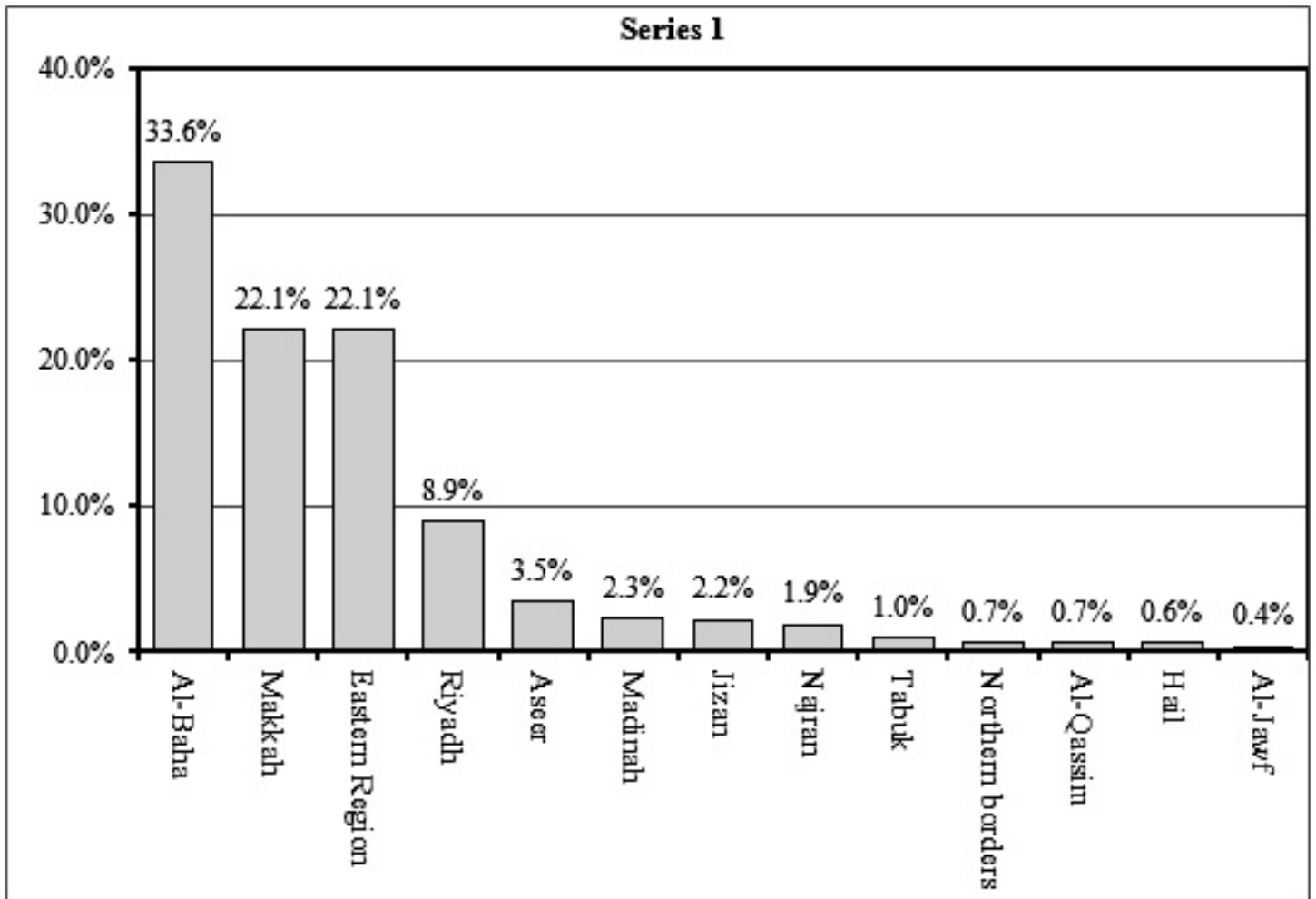
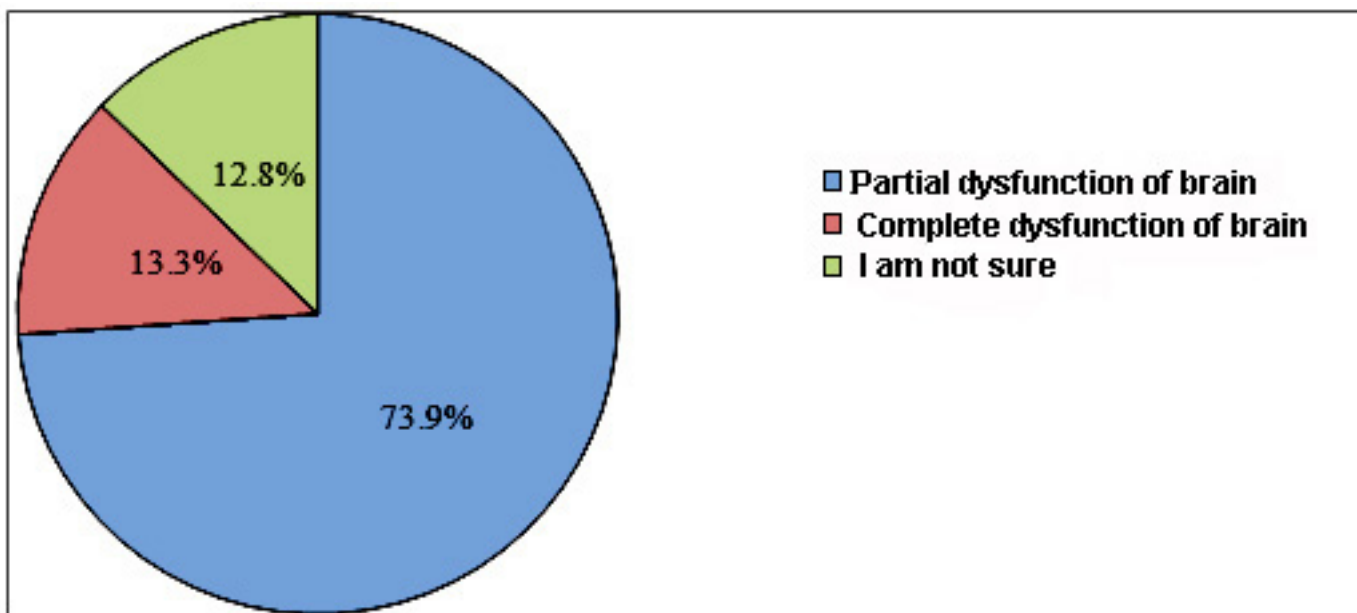


Figure 2: Perceptions of the participants regarding the definition of brain death



Liver and kidney donation willingness:

Our study showed that 87.1% and 95.8% of the participants had heard about liver and kidney donation respectively. Only 13 (1.3%) participants reported a previous donation of an organ whereas 18 (1.7%) reported receiving an organ from a donor. 23.6 % of the participants reported their willingness to donate a liver or a kidney for an unknown patient, whereas 71.1% reported doing so for a close family member or a friend. 58.3% were willing to accept donated liver or kidney from an unknown donor whereas 67.7% were willing to accept it from a close family member or a friend. When participants were asked about their familiarity with brain death 92.8% thought they are familiar with it, with only 12.6% thinking it is reversible. 73.9% of the participants reported brain death as a partial dysfunction of the brain (Figure 2). Most of the patients (36.4%) defined deceased liver or kidney as its donation after the brain stops functioning (Figure 3) whereas 44.6% defined living kidney or liver as its donation during the person's life (Figure 4). 89.6% of the participants think that the most important reason for donation is to save another human's life (Figure 5) whereas 59.5% think the most important reason for not donating is the fear of health issues (Figure 6). Further details of the liver and kidney donation willingness are shown in Table 2.

Figure 3: Perception of the participants about deceased liver or kidney donation

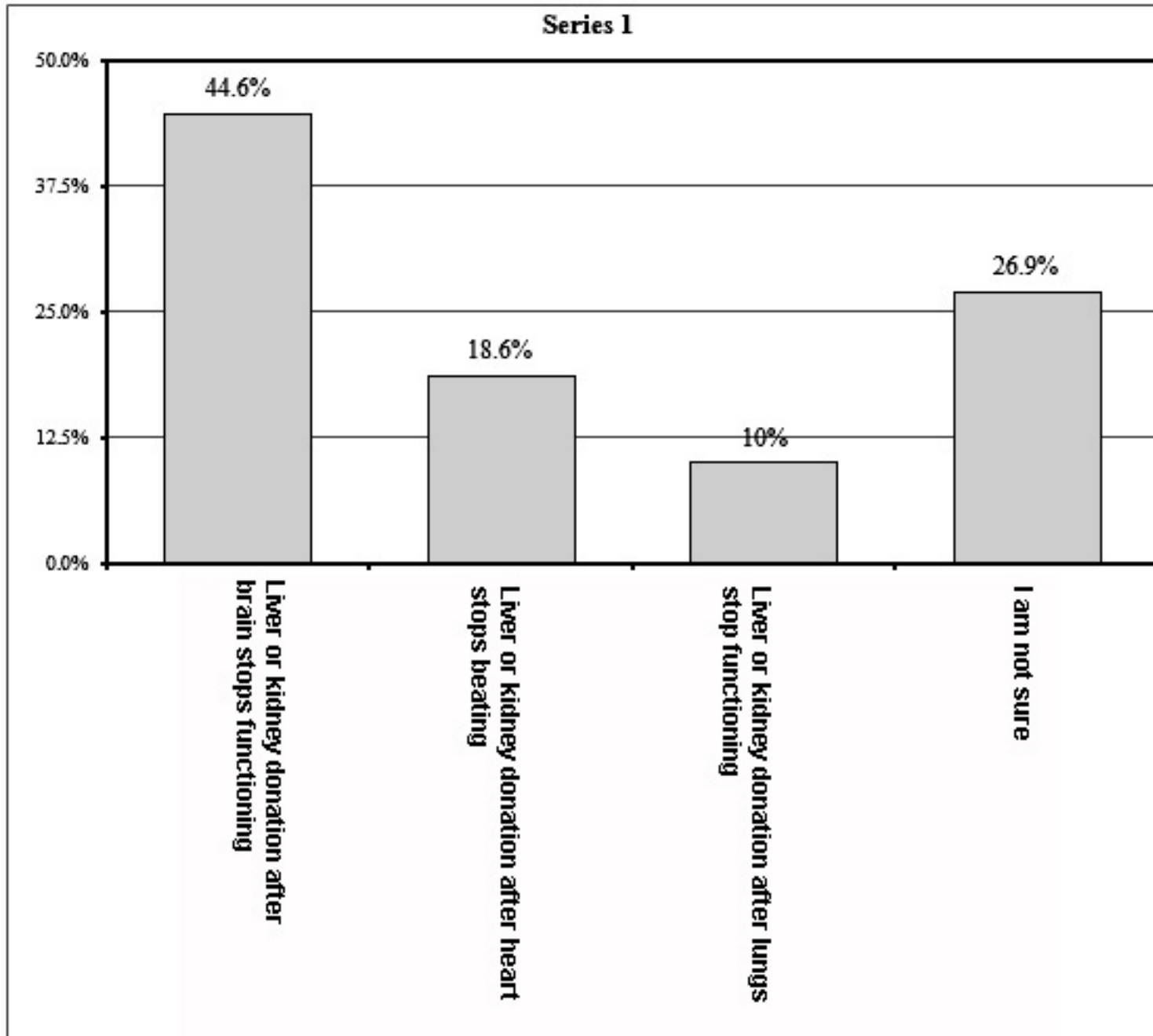


Table 2: Liver and kidney donation willingness

Question	Yes	No	Not sure
		n (%)	
1. Have you ever heard about liver donation?	856 (87.1)	81 (8.2)	46 (4.7)
2. Have you ever heard about kidney donation?	942 (95.8)	26 (2.6)	15 (1.5)
3. Have you ever donated an organ?	13 (1.3)	970 (98.7)	-
4. Have you ever received an organ from a donor?	18 (1.8)	965 (98.2)	-
5. Are you registered with any program for organ donors?	169 (17.2)	814 (82.8)	-
6. Would you be willing to donate your liver or kidney for unknown patients?	232 (23.6)	307 (31.2)	444 (45.2)
7. Would you be willing to donate your liver or kidney for a close family member or friend in need?	699 (71.1)	73 (7.4)	211 (21.5)
8. Would you be willing to donate the liver or kidney of your family member for unknown patients?	303 (30.8)	261 (26.6)	419 (42.6)
9. Would you be willing to donate the liver or kidney of a family member for a close family member or friend in need?	560 (57)	124 (12.6)	299 (30.4)
10. Would you be willing to accept donated liver or kidney (if needed) from an unknown donor?	573 (58.3)	122 (12.4)	288 (29.3)
11. Would you be willing to accept donated liver or kidney (if needed) from a close family member or friend donor?	665 (67.7)	87 (8.9)	231 (23.5)
12. Do you think liver or kidney donation is allowed in Islam?	720 (73.2)	53 (5.4)	210 (21.4)
13. Do you think liver or kidney donation is allowed by your country's law?	897 (91.3)	14 (1.4)	72 (7.3)
14. Liver can only be donated before the death of a donor?	672 (68.4)	70 (7.1)	241 (24.5)
15. Liver can only be donated after the death of a donor? (False)	478 (48.6)	140 (14.2)	365 (37.1)
16. Kidney can only be donated before the death of a donor?	680 (69.2)	73 (7.4)	230 (23.4)
17. Kidney can only be donated after the death of a donor?	460 (46.8)	151 (15.4)	372 (37.8)
18. Are you familiar with brain death?	912 (92.8)	34 (3.5)	37 (3.8)
20. Is brain death reversible? (No)	124 (12.6)	531 (54)	328 (33.4)
23. If you are given a chance to donate part of your liver or kidney during your life, would you donate?	423 (43)	168 (17.1)	392 (39.9)
26. Do you think there should be more awareness campaigns about liver or kidney donation for the community?	791 (80.5)	55 (5.6)	137 (13.9)
27. Would you be interested to attend an educational session to increase your knowledge about liver or kidney donation options?	534 (54.3)	230 (23.4)	219 (22.3)

Figure 4: Familiarity of the participants with living liver or kidney donation

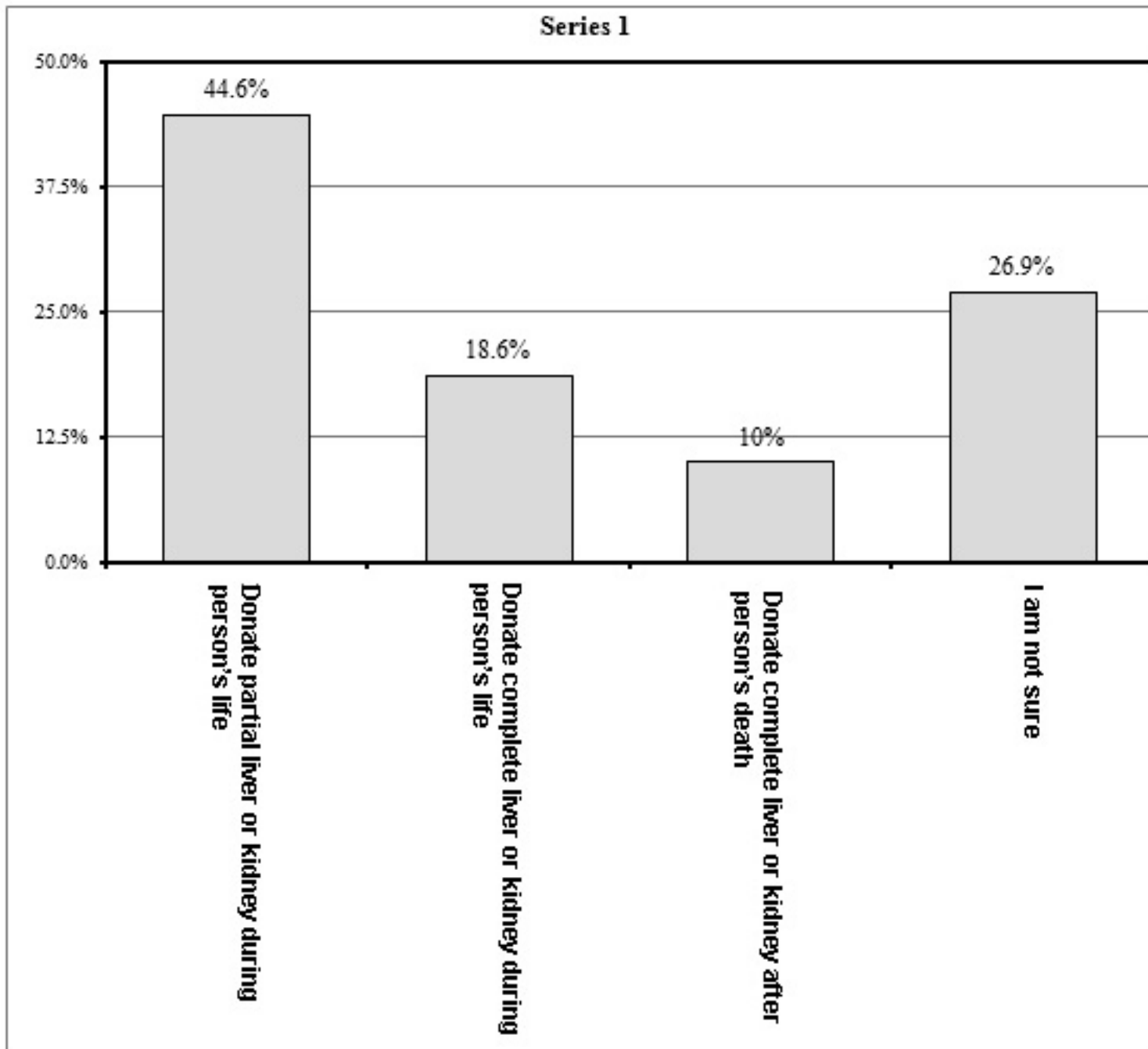


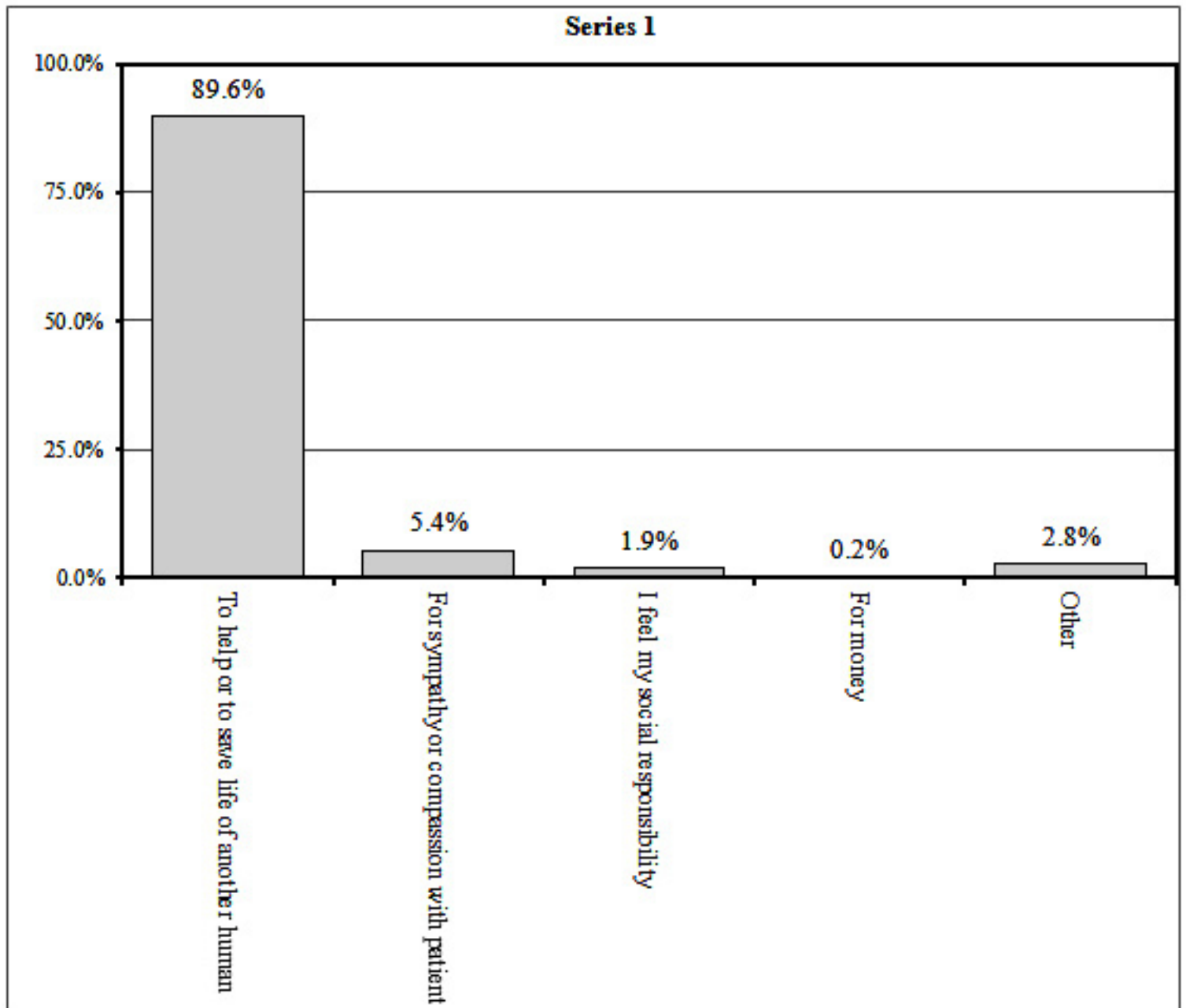
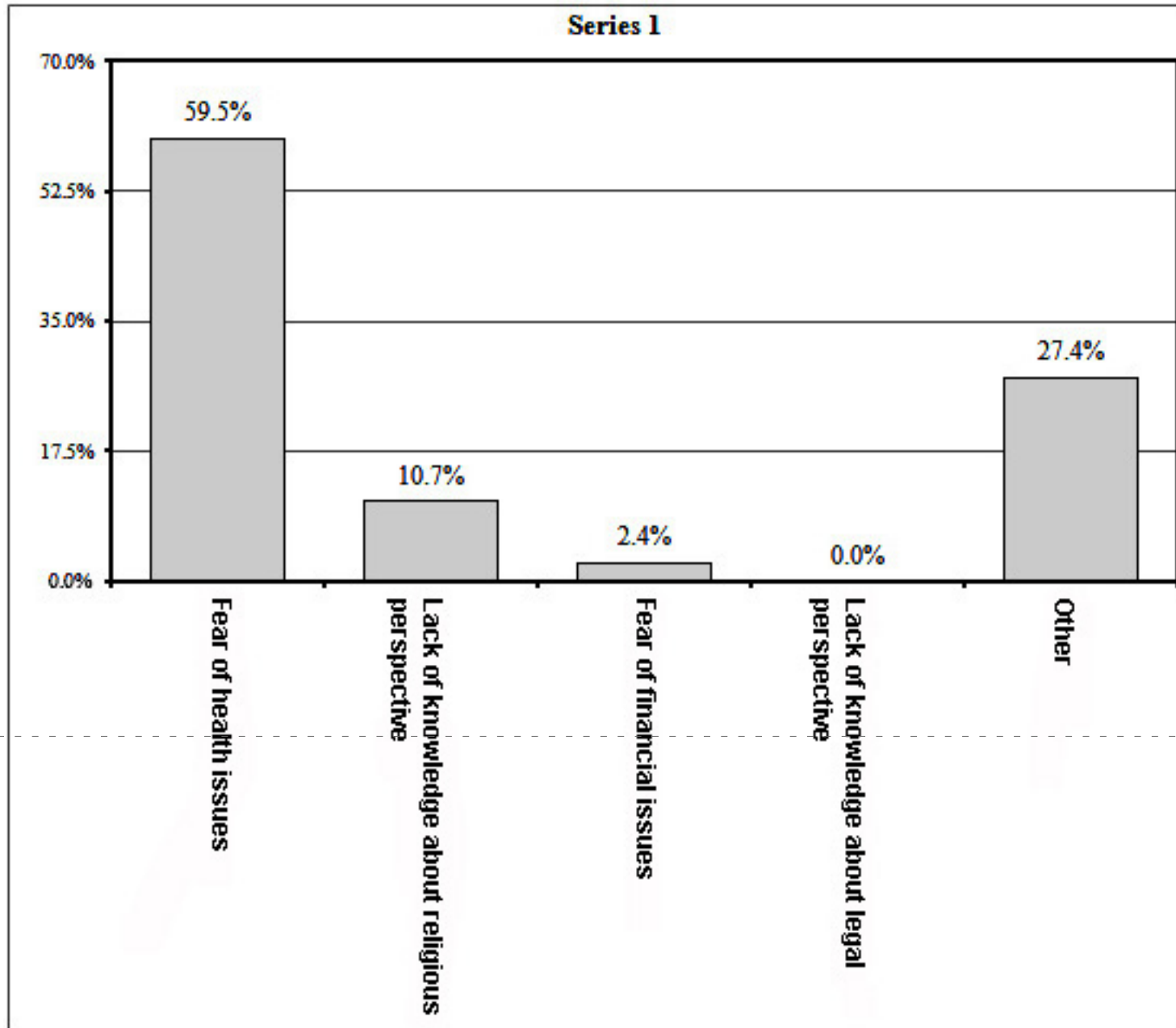
Figure 5: Participants' most important reason for donating part of their liver or kidney during their life (n=423)

Figure 6: Participants' most important reason to not donate part of their liver or kidney during their life (n=168)

Factors associated with Liver and Kidney donation willingness

Gender was significantly associated with willingness of donation for an unknown patient ($P < 0.05$); females had higher willingness to donate for unknown patients compared to males whereas gender was not significantly associated with willingness of donation for a close family member or a friend. Age groups, marital status and occupational status were found to be significant with donation for both unknown patients and close family members or friends ($P < 0.05$). Average monthly income was found to be significant with donation for unknown patients ($P < 0.05$).

Participants within the age group of (18 – 30) had the highest willingness to donate for unknown patients while participants aged more than 70 years had the highest level of willingness to donate for close family members or friends. Single participants had the highest level of willingness to donate for both unknown patients and close family members or friends. In regards to occupational status; students had the highest level of willingness to donate for both unknown patients and close family members or friends. Participants with monthly income of less than 5,000 SAR or more than 20,000 SAR had the highest level of willingness to donate for unknown patients. Education and nationality were not found to be with any of it. Table 3 shows the details of the association between socio-demographic characteristics and the willingness to donate a kidney or a liver (Table 3).

Table 3: Association between Liver and Kidney donation willingness and different socio-demographic factors

Variable	Category	Willingness to donate your liver or kidney?			
		For unknown patients	P value	For a close family member or friend	P value
		% of answer (Yes)			
Gender	Male	17.2%	< 0.001	71%	0.749
	Female	26.6%		71.2%	
Age (years)	18-30	28.1%	< 0.001	77.5%	< 0.001
	31-40	13.4%		66.4%	
	41-55	13.2%		46.3%	
	56-70	13.8%		48.3%	
	> 70	0%		100%	
Marital status	Single	29%	< 0.001	78.7%	< 0.001
	Married	15.9%		60.2%	
	Divorced	9.5%		57.1%	
	Widowed	0%		28.6%	
Nationality	Saudi	23%	0.154	70.9%	0.294
	Non-Saudi	35.6%		75.6%	
Education	Primary	0%	0.451	42.9%	0.089
	Intermediate	15.8%		63.2%	
	Secondary	18.9%		64.3%	
	Bachelor	25%		73.7%	
	Other	26.2%		67.7%	
Occupational status	Student	28.3%	< 0.001	79.6%	< 0.001
	Employed	17.7%		67.9%	
	Unemployed	22.6%		67.7%	
	Private business	25.9%		51.9%	
	Retired	10.5%		39.5%	
	Other	17.5%		49.1%	

Table 3: Association between Liver and Kidney donation willingness and different socio-demographic factors (continued)

Average monthly income (SAR)	< 5,000	26.4%	0.017	74.7%	0.067
	5,000 - 9,999	19.5%		65.4%	
	10,000 - 14,999	15%		64%	
	15,000 - 19,999	16%		60%	
	> 20,000	26.3%		68.4%	

Discussion

This study aimed at investigating the level of willingness to donate liver and kidney among the general population in Saudi Arabia.

In our study, we found that participants' willingness to donate a kidney or a liver was 23.6 percent for unknown patients and 71.1 percent for close relatives. These figures are comparable to previous estimates from Japan (41.9%) (46), Syria (62%), and the Middle East (49.8%) (48). Overall, the general public's willingness to donate organs is not particularly high in this study, and policymakers and scientists should take targeted measures to improve the situation.

We also wanted to emphasize that people are more willing to donate for a close relative than for an unknown patient. In their report, Crouch and Elliott concluded that living organ donation for related family members, particularly children, can never be considered an autonomous decision because the family is a social structure that does not absolve its members of responsibility (49).

The vast majority of patients stated that organ donation is permissible in Islam (73.2 percent). Many Muslims are still divided on the issue. Despite numerous rulings in support of organ donation, there is still a lack of agreement among Muslims in their communities about its compatibility with Islam.

Gender was found to be strongly related to someone's willingness to donate a kidney or a liver, with females reporting a higher percentage. Gender stereotypes may influence gender influence. This may be because women are more empathic, sensitive, and caring by nature. As a result, emotional quotient may play a larger role in women's responses, especially during adversity or crisis. Women are thought to be more willing to make sacrifices and to respond more positively to organ donation, particularly if a need arises within their families. Men are generally thought to be more hesitant to donate their organs than women, whose decision is heavily influenced by their parents, spouses, or both.

Marital status was also observed to be significantly related to willingness for transplantation, with married participants being less willing than unmarried participants. This finding is consistent with Abukhaizaran and Yan's (50, 51) research, but not with Iliyasu's (52). More research is required to investigate this connection.

The desire to help was the most common reason for organ donation, with financial considerations motivating only 0.2 percent of those polled. This could be explained by the belief that getting paid to do good diminishes the good deed and that profiting from organ donation is a form of organ trafficking. Religious beliefs (36%) and a lack of financial incentives (44%), according to a Jordanian study, are important reasons for people to refuse organ donation (53). According to another Saudi Arabian study, the most important reasons for accepting organ donation are humanitarian (68%) and religious (62%) reasons, with money accounting for only 0.6 percent (54). Religion was cited as a reason for refusal to donate organs by 27.5 percent of respondents in the same study.

87.1 percent and 95.8 percent of participants said they had heard about organ and tissue donation, respectively. This is consistent with previous research findings (55-56). According to an Egyptian study, 89 percent of participants have heard of organ donation, and 53 percent can identify the organs that could be transplanted (55).

The most significant limitation of this study is the results' generalizability to the Saudi population. Because the sampling method used does not guarantee generalizability, further research using a randomized sampling approach is required.

Conclusion

Our study showed that the willingness of the participants to donate a kidney or a liver was 23.6% and 71.1% for unknown patients and close ones, respectively. Gender, marital status, age income and occupation were found to be associated significantly with willingness to donate an organ. Further studies are needed to confirm the relationship between donation willingness and above listed socio demographic factors.

Recommendations:

We recommend conducting more research with different types to establish a causal relationship between gender, marital status, age, income, occupation and donation willingness. Furthermore, we need to investigate other factors rather than socio demographic variables, like health status of participants.

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Physicians awareness of Celiac disease screening in high risk pediatric age groups in King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia

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Abstract

Background: Celiac disease (CD) is an autoimmune disease triggered by a permanent sensitivity to gluten, causing a significant disturbance to the small intestines and multiple other organs. We aim in this study to assess physicians' knowledge, practice and attitude towards celiac disease screening. Assessing the physicians' knowledge will help us to understand how we can improve the practice regarding celiac disease.

Methodology: A cross-sectional study using a validated questionnaire from previous studies distributed electronically among primary care and pediatric physicians. The questionnaire consisted of: 7 questions about physicians characteristics, 15 questions about knowledge, 15 questions about attitude and 5 practice questions. Respondents were asked to identify any queries they had about the questions. Time needed to fill the questionnaire was approximately 10 minutes.

Results: The final sample was 264 participants with mean age of 32.31 years old where 79.9 % of the participants were aged under 40 years old. Moreover, 52.3 % of the participants were females. Considering specialty, we found that 48.5 % of the participants were family medicine physicians while 47.0 % were general pediatrics. Chronic/ intermittent diarrhea and weight loss were the most commonly known symptoms among the participants (85.1 % and 85.6 % respectively) followed by abdominal pain (78.1 %). Considering the best first line screening tool of celiac disease, 78.1 % of the participants

successfully identified Anti-tissue transglutaminase antibody and 85.6 % of them were able to identify bowel biopsy as the best tool in order to confirm the diagnosis of CD, however only 20.9 % correctly identified Anti-endomysium antibody as the best tool for follow-up.

Conclusion: We found that there is a deficiency in knowledge about CD among physicians with no significant difference between pediatrics and family medicine physicians. The physicians had moderate knowledge considering symptoms and risk factors of CD with good knowledge considering the diagnosis tool. More educating courses should be provided to the physicians about the diagnosis and management of CD.

Key words: awareness, Celiac disease, pediatric age group, Saudi Arabia

Introduction

Celiac disease (CD) is an autoimmune disease triggered by a permanent sensitivity to gluten, causing a significant disturbance to the small intestines and other multiple organs. Celiac arises in people carrying the class II alleles HLA-DQ2 or HLA-DQ8. It is characterized by a variable combination of elevated titers of celiac-specific autoantibodies, leading to inflammatory enteropathy with various gastrointestinal and extra-intestinal manifestations [1,2].

It is considered one of the most common autoimmune diseases worldwide, with a prevalence of 0.5-1% of the general population of the world [3]. Furthermore, the prevalence of celiac among the general healthy Arab adult population was found to range from 0.14% to 3.2%, with Saudi Arabia having the highest prevalence (3.2%) and Tunisia being the lowest (0.14%). In Arab children, the estimated prevalence was found to be ranging from 0.6% to 1.5%. Studies conducted in Saudi Arabia estimated the disease's frequency in children to be 1:250-100. A Meta-Analysis of Prevalence of Celiac disease in Saudi Arabia showed that the highest prevalence of CD in Saudi Arabia was in Al-Qaseem region (3.2%). However, Riyadh and Jeddah had the least prevalence (1.5%) [4].

Celiac disease can present at any age starting from early childhood to adulthood, with two peaks of onset; one occurs after weaning from gluten in the first two years, and the other one in the second or third decades of life [3]. In general, celiac can present with the "classical triad" symptoms such as chronic diarrhea, weight loss, and abdominal bloating. Some patients can present with atypical "non-classic" symptoms such as abdominal pain, chronic migraine, anemia, and others [1,5,6]. The absence of the classic symptoms led to celiac disease being significantly under diagnosed [4].

There are specific risk groups in which celiac is common. These risk groups include individuals with diabetes mellitus type 1 with a prevalence range from 5.5% to 20%, autoimmune thyroiditis, Down's syndrome, Turner syndrome, and first and to a lesser extent second relatives of celiac patients [4,7,8]. About 50% of the children with a first degree relative with CD develop the disease at the age of three years [7].

A study done in the eastern region of Saudi Arabia stated that gastroenterologists diagnosed about 56% of celiac patients, while other physicians 33%, and primary healthcare physicians diagnosed about 10% of the cases [5]. It has been proven that primary health care physicians' play an essential role in detecting patients' celiac disease earlier. Therefore, instructing primary health care physicians about celiac disease screening and diagnosis is crucial [9]. A study done at King Khalid University Hospital and King Saud University to assess the knowledge of CD among the medical professionals showed poor knowledge and the need to improve awareness of CD in the healthcare profession and the public too [9].

In 2018, a study was done in the US among general physicians which found that physicians tend to order unnecessary celiac serological testing, and that is overutilization of hospital resources. Also, it may lead to a false-positive result in which physicians tend to ask for a more diagnostic test, start the patient on a specific diet, and treat as a celiac disease patient [10]. In many studies, the biopsy-sparing approach showed decreases in the rate of complications of anesthesia and cost. European Society of Pediatrics Gastroenterology, Hepatology, and Nutrition (ESPGHAN) 2012 guidelines recommended against biopsy if:

- TGA-IgA is ten times more than the upper limit of normal.
- EMA-IgA test is positive in the second blood sample.
- HLA DQ 2 or DQ8 is detected [1,11].

In fact, there is little evidence from the United States Task Force about the benefits or harm of celiac screening in asymptomatic individuals. They recommend further studies to recognize the ideal screening approach and its value [11].

However, in 2018, a study conducted in New York determined the overall poor adherence to the guidelines of screening celiac disease. Additionally, it showed that if we educate the primary health care physician about the importance of testing first-degree relatives, we might increase the adherence to the guidelines [10]. On the other hand, 75 to 90% of celiac patients in western countries are unrecognized. This under diagnosis may happen due to the physician's poor awareness of the variety of the clinical presentations of celiac disease [12]. Late diagnosis has shown to have greater morbidity and mortality than the general population [3,5,7,13]. Delay in diagnosis can lead to a variety of complications such as intestinal lymphoma, small bowel adenocarcinoma, refractory celiac disease, and others [3]. Besides, it may also predispose to a low quality of life [13].

We aim in this study to assess physicians' knowledge, practice and attitude towards celiac disease screening. Moreover, we aimed to compare between specialties considering their knowledge of celiac disease screening. Assessing the physicians' knowledge will help us to understand how we can improve the practice regarding celiac disease.

Material and Methods

Study Area/Setting:

All King Abdulaziz Medical City, National Guard Health Affairs in Riyadh, Saudi Arabia and related Primary Health Care Centers (Health Care Specialty Center, King Abdulaziz City Housing, King Saud City Housing, National Guard Comprehensive Specialized Clinic, Prince Bader Residential City Clinic)

Study Subjects:

All physicians working in KAMC-NGHA from family medicine and pediatrics (Resident, Staff, Consultants) were included in the study. Pediatrics gastroenterologists and physicians who have a child with celiac disease were excluded.

Study Design:

A cross-sectional study using a validated questionnaire from previous studies was distributed electronically among primary care and pediatric physicians. It is a quantitative, observational cross-sectional study.

Sample Size:

412 physicians were included in this study; 276 Family Medicine physicians, 67 residents, 55 Consultants, and 154 Staff Physicians, in addition to, 136 Pediatric physicians, 103 residents, 23 General pediatrics consultants, and 10 Pediatricians working under the family medicine department. The total number of physicians was 412. We targeted all the study population without sampling. We assumed a total physician population of 1000 for the sake of the statistical significance. Sample size is 278 with CI 95% using the equation $Sample\ size\ n = [DEFF * Np(1-p)] / [(d2/Z21-\alpha/2*(N-1)+p*(1-p)]$. We used 50% anticipated frequency, 5% confidence interval and 1 for design effect.

Data Collection Methods, Instrument Used, Measurements:

An online survey was distributed by e-mail. The questionnaire was constructed by the authors of this study after extensive literature research. The validity of the questionnaire was ensured by exploring extensive literature review that addressed the topic of the study. After constructing the questionnaire, it was reviewed by 2 experts in the field of family medicine and pediatrics.

The questionnaire consisted of: 7 questions about physicians characteristics, 15 questions about knowledge, 15 questions about attitude and 5 practice questions. Respondents were asked to identify any queries they had about the questions. Time needed to fill the questionnaire was approximately 10 minutes.

Data Management and Analysis Plan:

Data was stored in Excel file electronic version; data was revised for errors. Excel files were stored in a password protected folder. Only the investigators had access to the data. Data was analyzed using Statistical Package for the Social Sciences (SPSS). All statistical tests were conducted at significance level ($\alpha=0.05$). Quantitative

variables were reported in the form of mean and standard deviation. T-test and ANOVA were used to compare means. Qualitative variables, were in the form of frequency and percentages. Chi-square was used to compare categorical variables.

Results

The total collected sample was 372 responses, however, 108 responses were excluded because they were a gastroenterologist, or one of their children had been diagnosed with celiac disease and because they were outside the Riyadh region. Therefore, the final sample was 264 participants with mean age of 32.31 years old where 79.9 % of the participants were aged under 40 years old. Moreover, 52.3 % of the participants were females. Considering specialty, we found that 48.5 % of the participants were family medicine physicians while 47.0 % were general pediatrics. Moreover, 61.4 % of the participants were residents while 17.8 % of them were consultants. Furthermore, 60.6 % of the participants reported that primary health care was their practice setup while 39.4 % reported specialized pediatric clinics. Only 15.2 % of the participants reported using guidelines for the diagnosis and treatment of celiac disease where 35 % of them used ACG while 17.5 % used British society of gastroenterology guidelines (Table 1).

Considering the knowledge of the participants about the symptoms of celiac disease, we found that chronic/intermittent diarrhea and weight loss were the most commonly known symptoms among the participants (85.1 % and 85.6 % respectively) followed by abdominal pain (78.1 %) with no great difference between the different specialty of the participants. However, only 28.4 % and 27.9 % knew that recurrent nausea, recurrent vomiting and chronic constipation are symptoms of celiac disease. On the other hand, 13.5 % of the participants falsely thought that acute bloody diarrhea is one of celiac disease's symptoms. Moreover, considering the difference between the different specialty of participants, we found that the general practitioners had the lowest knowledge considering the main three symptoms including chronic diarrhea (80.0 %), weight loss (70.0 %) and abdominal pain (60 %) while the pediatric physicians had the highest level of knowledge (Figure 1).

Moreover, weight loss was the most common clinical situations that raise the suspicion of celiac disease in a pediatric patient for 70.4 % of the participants, followed by stunted growth/short stature (63.3 %), and unresponsive iron-deficiency anemia (50.7 %). On the other hand, more than half of the sample failed to identify other situations. Considering the difference between specialties, we found that pediatrics tend more to consider weight loss as common symptoms that increased suspicion of CD, higher than other specialties, stunted growth/short stature for general practitioners and unresponsive iron-deficiency anemia for family medicine physicians (Figure 2).

Table 1: The general characteristics of the participants

		Count	Column N %
Age category	< 40	211	79.9 %
	> 40	53	20.1 %
Gender	Male	126	47.7%
	Female	138	52.3%
Specialty:	Family Medicine	128	48.5%
	General Practitioner	12	4.5%
	General Pediatrics	124	47.0%
Position:	Resident	162	61.4%
	Staff	29	11.0%
	Associate consultant	11	4.2%
	Assistant consultant	15	5.7%
	Consultant	47	17.8%
What is your practice setup?	Primary health care	160	60.6%
	Specialized pediatric clinics	104	39.4%
Did you use any guidelines for the diagnosis and treatment of celiac?	Yes, (please specify)	40	15.2%
	No	224	84.8%
Yes, (please specify)	AAFP	6	15 %
	ACG	14	35 %
	British Society of Gastroenterology	7	17.5 %
	Other	13	32.5 %

Figure 1: The knowledge of the participants considering symptoms of celiac disease

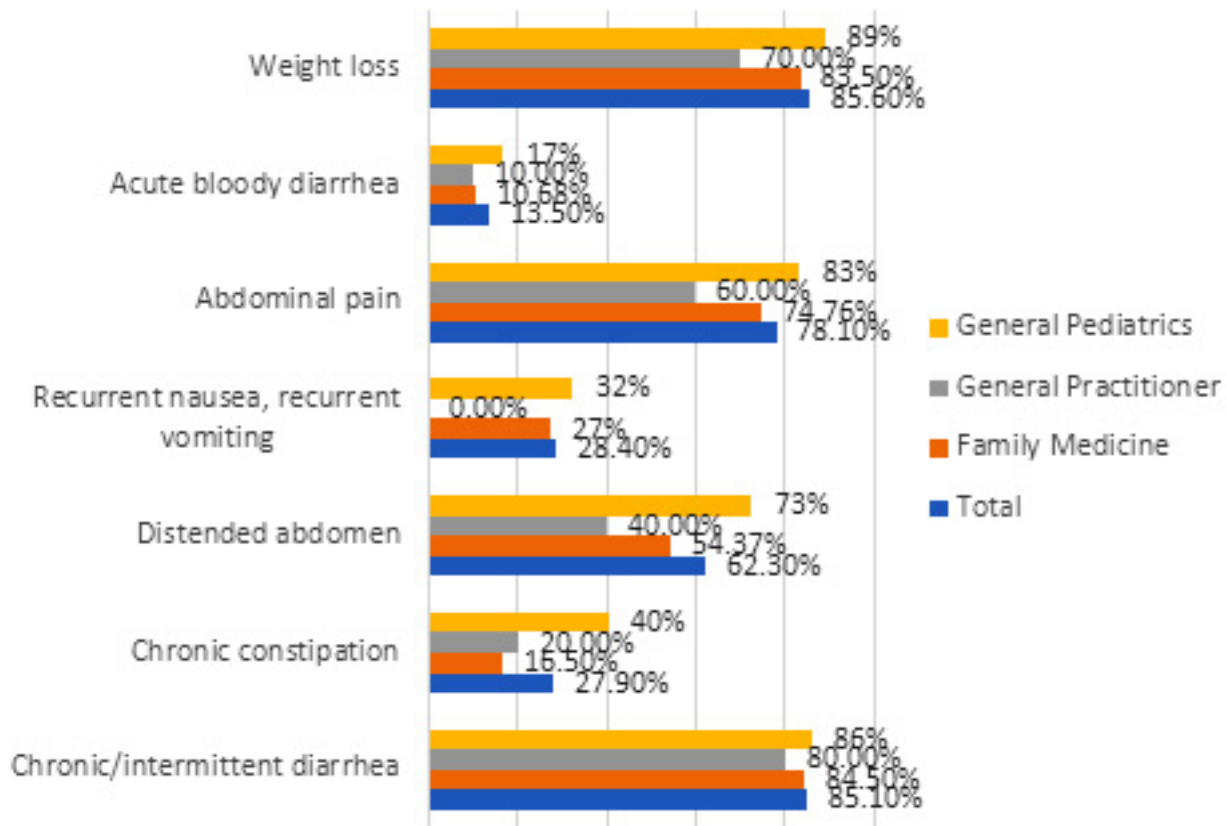
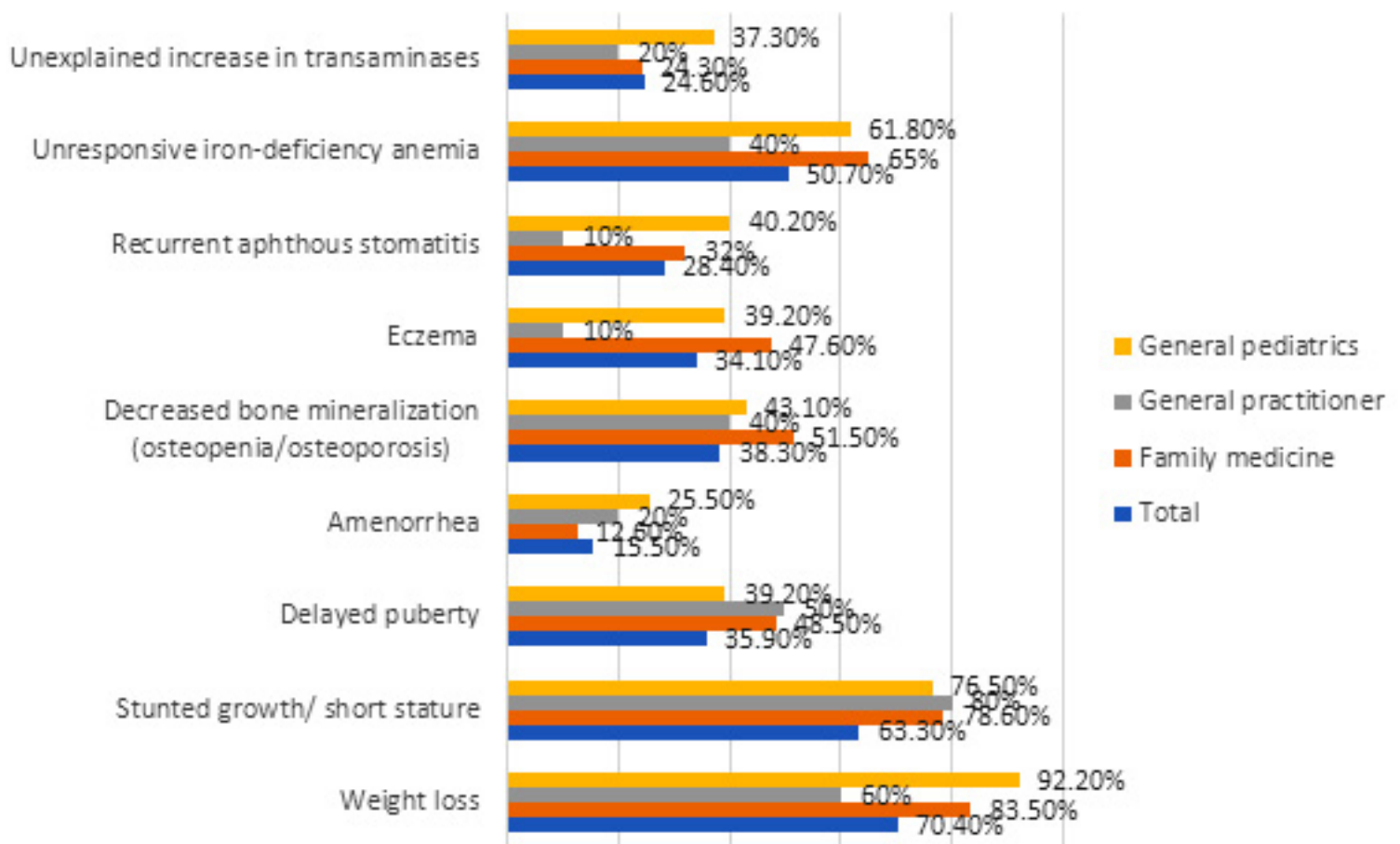


Figure 2: Clinical situations that raise the suspicion of celiac disease in pediatric patient



Moreover, 72 % of the participants knew that children with a first-degree relative with CD should be screened for CD followed by those with type 1 Diabetes mellitus (63.0 %), autoimmune thyroiditis (50.8 %), autoimmune hepatitis (45.8 %) and Down syndrome (32.6 %) (Figure 3).

It was found that general practitioners tend more to exclude Down syndrome as a risk group that was targeted for screening while pediatrics were the highest groups considered those with type 1 diabetes mellitus, autoimmune thyroiditis, Down syndrome and those with IgA deficiency as targeted groups while family medicine practitioners were more likely to be interested in those with a family history of CD (Figure 3).

Moreover, we found that 51.8 % of the participants knew that intestinal lymphoma is one of the malignancies related to CD as well as small bowel adenocarcinoma (43.9 %). Considering the best first line screening tool of celiac disease, 78.1 % of the participants successfully identified Anti-tissue transglutaminase antibody and 85.6 % of them were able to identify bowel biopsy as the best tool in order to confirm the diagnosis of CD however, only 20.9 % correctly identified Anti-endomysium antibody as best tool for follow-up. Moreover, 79.1 % of the participants knew that low total IgA level could lead to a false negative result in celiac screening while 64.7%

knew that Celiac disease can be diagnosed without duodenal biopsies in cases of symptomatic children and 74.9 % of them knew that age of onset of Celiac disease often started as early as six months. Moreover, 51.2 % of them knew that gluten-free diet is not recommended before intestinal biopsy and 52.1 % knew that it should be recommended only after results of biopsy are reported. Furthermore, 79.5 % of the participants knew that first degree relatives of CD should be screened and 84.7 % knew that patients should have regular follow-up by specialists in gastroenterology (Table 2).

Figure 3: Clinical situations in which screening for celiac disease in pediatrics patients

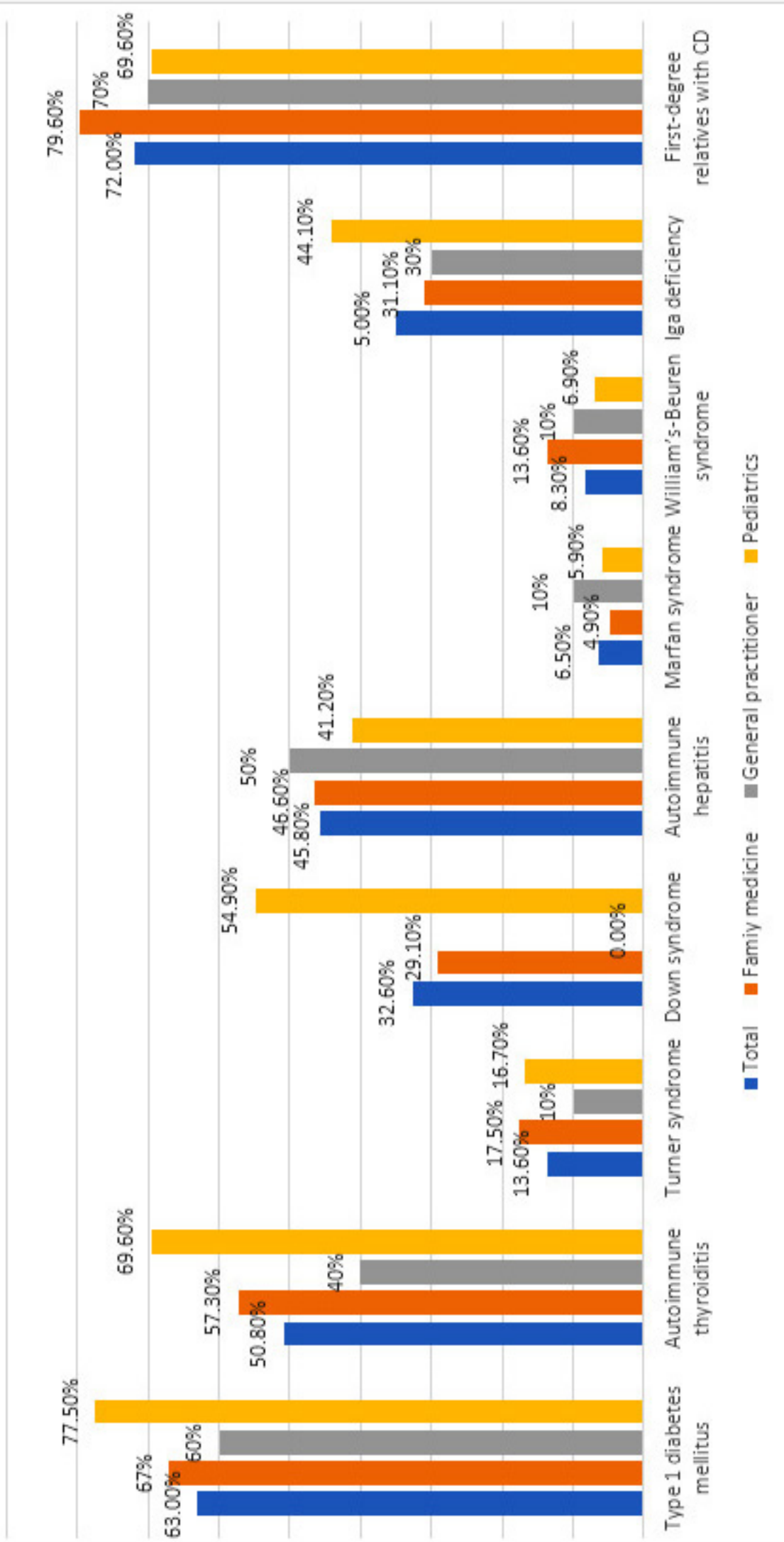


Table 2: The knowledge of the participants considering diagnosis of CD

		Count	Column N %
Which of the following malignancies are related to celiac diseases?	Hepatocellular carcinoma	23	8.7%
	Intestinal lymphoma	137	51.8%
	Small bowel adenocarcinoma	116	43.9%
Which of the following investigations, is the best as the first-line for the screening of celiac disease?	Anti-tissue transglutaminase antibody (Correct answer)	168	78.1%
	Anti-endomysium antibody	20	9.3%
	Total IgA	13	6.0%
	Abdominal ultrasound	2	0.9%
	HLA DQ 2 or DQ8	5	2.3%
	Bowel biopsy	7	3.3%
Which of the following investigations, is the best to confirm the diagnosis of celiac disease?	Anti-tissue transglutaminase antibody	9	4.2%
	Anti-endomysium antibody	10	4.7%
	Total IgA	6	2.8%
	Abdominal ultrasound	2	0.9%
	HLA DQ 2 or DQ8	4	1.9%
	Bowel biopsy (Correct answer)	184	85.6%
Which of the following investigations, is the best to follow up after diagnosis of celiac disease?	Other (please specify)	7	3.3%
	Anti-tissue transglutaminase antibody	106	49.3%
	Anti-endomysium antibody (Correct answer)	45	20.9%
	Total IgA	25	11.6%
	Abdominal ultrasound	3	1.4%
	HLA DQ 2 or DQ8	8	3.7%
	Bowel biopsy	21	9.8%
Low total IgA level could lead to a false negative result in celiac screening?	Yes (Correct answer)	170	79.1%
	No	45	20.9%
In symptomatic children, Celiac disease can be diagnosed without duodenal biopsies?	Yes (Correct answer)	139	64.7%
	No	76	35.3%
In asymptomatic children, Celiac disease can be diagnosed with duodenal biopsies?	Yes	144	67.0%
	No (Correct answer)	71	33.0%
The age of onset of Celiac disease often starts as early as six months?	Yes (Correct answer)	161	74.9%
	No	54	25.1%
Do you recommend a gluten-free diet before intestinal biopsy?	Yes	105	48.8%
	No (Correct answer)	110	51.2%
Do you recommend a gluten-free diet only after the intestinal biopsy?	Yes (Correct answer)	112	52.1%
	No	103	47.9%
First degree relatives of celiac disease patients should be screened?	Yes (Correct answer)	171	79.5%
	No	44	20.5%
Celiac disease patients should have regular follow-up by specialists in gastroenterology?	Yes (Correct answer)	182	84.7%
	No	33	15.3%

Moreover, most of the participants had a positive attitude toward the best care that can be provided to Celiac disease patients while more than half of the participants thought that CD is a serious disease. Moreover, most of the participants thought that a gluten-free diet in CD is challenging (39.4 % strongly agree and 43.3 % were agree) and most of them thought that CD affects the social life of the patients. Only 16.7 % of the participants reported a type of agreement considering that patients had enough awareness, and the same low agreement was reported considering the ease of finding gluten-free products in their country. Moreover, 46.3 % of the participants did not think that CD could be managed after diagnosis by clinical dietitians only and most of them thought that physicians in the hospital could diagnose and treat CD easily. Moreover, most of the participants did not think that CD is a curable condition and most of them thought that there are no adequate resources about CD in Arabic language (Table 3).

Table 3: Attitude of the participants toward screening and management of patients with CD

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1- Celiac disease patients are getting the best care in my hospital.	28.1%	41.4%	22.7%	5.9%	2.0%
2- Celiac disease is not a serious illness.	3.9%	14.8%	19.2%	36.9%	25.1%
3- A gluten-free diet in celiac disease is challenging.	39.4%	43.3%	11.8%	4.4%	1.0%
4- Celiac disease affects the social life of the patient.	40.4%	45.3%	9.9%	3.0%	1.5%
5- The celiac disease has enough awareness in my community.	3.9%	12.8%	30.5%	38.4%	14.3%
6- Patients with celiac disease can easily find gluten-free products in my country.	2.5%	21.2%	20.7%	35.5%	20.2%
7- Celiac disease can be managed after diagnosis by clinical dietitians only.	3.9%	11.8%	20.7%	46.3%	17.2%
8- Physicians in my hospital are able to diagnose and treat celiac disease properly.	27.1%	45.8%	21.2%	4.9%	1.0%
9- Celiac disease has a negative financial effect on the hospital and the family budget.	24.1%	46.8%	21.7%	6.4%	1.0%
10- Celiac disease support groups are essential.	35.0%	44.3%	15.8%	3.9%	1.0%
11- Celiac disease is curable.	1.5%	12.3%	24.1%	42.9%	19.2%
12- Social media contains false beliefs about celiac disease.	14.8%	34.0%	43.8%	7.4%	0.0%
13- There are no adequate resources about celiac disease in the Arabic language.	18.2%	37.4%	29.1%	13.3%	2.0%
14- A gluten-free diet can be a healthy choice for everyone.	10.3%	24.1%	33.5%	25.1%	6.9%
15- Celiac disease stigma has decreased nowadays.	9.4%	37.9%	42.9%	8.4%	1.5%

Furthermore, we found that 48.0 % of the participants reported a frequency of 1-2 times per year of seeing patients with CD while 18.7 % of them have never seen any patients with CD. Almost a third of family medicine practitioners reported never seeing a case with CD (30.1 %) compared with 22.2 % in general practitioners and 7.3 % among pediatric physicians ($P=0.000$). Moreover, 85.9 % of the participants would refer patients to Gastroenterology in case of positive serological tests for final diagnosis and 90.4 % of them would refer patients to a dietitian for a gluten free diet. A significant difference between specialists was reported in their tendency to refer patients where pediatric physicians were found to have a higher tendency to refer patients than other specialists ($P=0.005$, 0.027). Furthermore, 54.5 % of them would provide CD health education to every patient and 58.6 % would follow-up celiac disease patients, with no significant difference between different specialists (Table 4).

Table 4: Practices of the physicians considering patients with CD

		Count	Column N %
How often do you see celiac disease patients per year?	1-2 times per year	95	48.0%
	3-5 times per year	48	24.2%
	> 6 times per year	18	9.1%
	Never	37	18.7%
Do you refer the patient to gastroenterology in cases of positive serological tests for final diagnosis?	Yes	170	85.9%
	No	28	14.1%
Do you refer celiac disease patients to dietitian for a gluten free diet?	Yes	179	90.4%
	No	19	9.6%
Do you provide celiac disease health education to every patient you encounter?	Yes	108	54.5%
	No	90	45.5%
Do you follow-up celiac disease patients?	Yes	116	58.6%
	No	82	41.4%

In considering the effect of the demographic factors of the participants toward knowledge of CD, we found that there is a significant difference in level of knowledge depending on age of the participants ($P=0.000$). Younger participants seemed to have a significantly lower level of knowledge whereas 73.7 % of participants younger than 40 years had low knowledge compared with 45 % of those older than 40 years old. Moreover, we did not find a significant difference between genders however, males seem to have slightly higher knowledge with 36.1 % compared with 27.1 % of females ($P=0.156$). Furthermore, we did not find a significant difference between the different specialties of the participants ($p=0.584$) however, it seems that general pediatrics had slightly higher level of knowledge with 34.3 % compared to with 30.1 % of family medicine physicians and 20.0 % of general practitioners. Consultants seem to have the highest level of knowledge significantly ($P=0.021$) with 51.4 % compared with 25.9 % of residents. Moreover, we found that those who reported depending on guidelines for diagnosis and treatment of celiac disease had a significantly higher level of knowledge with 71.9 % compared with 24.6 % of those who did not depend on any guidelines ($P=0.000$) (Table 5).

Table 5: The relation between the level of knowledge and demographic factors

		Knowledge				P-value
		Low knowledge		High		
		Count	Row N %	Count	Row N %	
Age	< 40	129	73.7%	46	26.3%	0.000*
	> 40	18	45.0%	22	55.0%	
Gender	Male	69	63.9%	39	36.1%	0.156
	Female	78	72.9%	29	27.1%	
Specialty:	Family Medicine	72	69.9%	31	30.1%	0.584
	General Practitioner	8	80.0%	2	20.0%	
	General Pediatrics	67	65.7%	35	34.3%	
Position:	Resident	100	74.1%	35	25.9%	0.021*
	Staff	12	57.1%	9	42.9%	
	Associate consultant	6	66.7%	3	33.3%	
	Assistant consultant	11	84.6%	2	15.4%	
	Consultant	18	48.6%	19	51.4%	
Did you use any guidelines for the diagnosis and treatment of celiac disease?	Yes	9	28.1%	23	71.9%	0.000*
	No	138	75.4%	45	24.6%	

Discussion

Celiac disease had been considered an uncommon serious problem in infancy and childhood. However, recent data shows that it is one of the most common diseases affecting 0.5-1% of the population with a wide clinical spectrum. They can be symptomatic (classic, non-classical), sub-clinical (asymptomatic) or potential (latent) [2]. However, many individuals experience non-classical symptoms such as anemia, severe weakness, osteoporosis, ulcers, increased liver enzymes, rashes, migraine headaches, menstrual irregularities, and infertility as well as vomiting, dental caries, and short stature which are additional manifestations in pediatrics. Delays in diagnosis can lead to further developmental delays in children. There is a lack of information about knowledge of CD by a healthcare professional. Poor knowledge can translate into a delay in investigation because the condition is going unrecognized. In our study, 68.4 % of the participants had a low level of knowledge and failed to answer more than 60 % of the questions correctly which is alarming considering CD is a common disorder where the pediatric physicians were the most knowing group while general practitioners were the least knowledgeable group. In a recent study of CD awareness among clinicians, most clinicians considered CD a rare disease and emphasized the need for increased awareness of rare clinical symptoms, especially in clinicians outside of gastroenterology [14]. In another questionnaire based on physicians' understanding of CD, the authors noted a need for increased awareness of CD among family physicians and internists, with CD present in 11% of family physicians and obstetricians and 65% in gastroenterologists [15].

In our study, chronic diarrhea and weight loss were the two most common conditions in which CD action was found necessary, with 85.1% and 85.6% of clinicians, respectively. Chronic diarrhea is a common symptom of CD presentation [16]. It comes with malabsorption and secondary weight loss (20). Initially, in up to 80% of patients who were identified with CD, 25 of the patients continued to have diarrhea even after starting a gluten-free diet, despite the reduced severity [17]. In recent years, when there are rare clinical manifestations of CD, abnormal presentation of CD has become common, but the incidence of chronic diarrhea has decreased [18].

The incidence of chronic diarrhea and weight loss is also twice as common in patients with abdominal pain, iron deficiency anemia, osteoporosis, elevated liver enzymes, dermatitis herpetiformis, thyroid disorders and Down syndrome, chronic diarrhea and weight loss than among the general population [19].

Several groups of patients are at increased risk of developing celiac disease, including type 1 diabetes, Sjögren's syndrome, Down syndrome, thyroiditis, immunoglobulin A (IgA) deficiency, and a family history of celiac disease [20–24]. Diabetes mellitus Type I is a common disease initially managed by primary care physicians, and a prevalence of celiac disease has been

reported to be in 3% to 8% of these patients; However, only 58.3 % of the participants in this study were aware of this association. It is important to note that the association of IgA deficiency is important, and it should be considered that negative tests for anti-endometrial IgA and anti-tumor IgA antibodies do not abrogate the diagnosis in this population [9]. Iron deficiency anemia or folate deficiency is a common complication of celiac disease and presents in more than 50% of patients [25–28]. Less than two thirds of the participants in our study were aware of this association and could identify those patients with high-risk CD.

The most recommended serotype test in order to diagnose CD and which should be performed in cases of CD presumption is t TG serotype IgA with sensitivity and specificity of about 95 % [19]. In our analysis, 78.1 % of the physicians knew that Anti-tissue transglutaminase antibody should be considered in screening for CD where family medicine physicians were the most knowledgeable group (83.5%) followed by general pediatricians (75.5%) and general practitioners (50.0 %). Moreover, determination of IgA and IgG DGP are still used in children younger than 2 years with symptoms of CD [33] however, 6 % of the physicians depended on them. Moreover, for confirming of CD diagnosis, 85.6 % of the physicians knew that biopsy is the best test. This is higher than reported by a previous study where only a third of the physicians knew that biopsy is used for confirming the diagnosis of CD [34].

In this study, almost all of the participants were able to identify that there is higher risk for developing intestinal lymphoma and small bowel adenocarcinoma in patients with CD than those in general populations. In a previous study, half of the physicians participating in the study showed moderate to high risk of malignancy in patients with CD [9,29]. It is known that chronic inflammation in patients with CD despite the gluten-free diet is associated with increased susceptibility for gastrointestinal neoplasia [30]. On the other hand, there is no increased risk for development of colorectal cancer in those patients, suggesting the likelihood of untreated CD to protect against colon cancer because of the poor absorption and rapid excreting of co-carcinogens [31].

In patients with CD, it is mandatory to have a gluten-free diet and is often recommended based on positive CD serology which is one of the relatively frequent errors in daily clinical practice when conducted before intestinal biopsy [32]. In the current study, at least half of physicians considered strict gluten-free diet a prerequisite for CD patients. Moreover, half of the physicians knew that gluten-free diet should only be recommended after biopsy results. However, most of the participants in this study reported that it is difficult to find a gluten-free diet in our market. Therefore, increasing public awareness and making this type of diet available to these patients is critical.

In the current study, 85 % of physicians were not aware of guidelines on diagnosis, management and follow up of CD. Nonetheless, awareness of guidelines had significant impact on practice patterns other than improved utility of diagnostic intestinal biopsy for serology positive patients.

Depending on guidelines was found to increase the level of knowledge among the participants significantly which indicates the importance of increasing the knowledge and awareness of the physicians about these guidelines.

We could not find a significant difference between general pediatrics and family medicine physicians in their knowledge considering CD with slightly more favourable results among pediatrics.

Most cases with CD are children and infants which are proposed to be managed by pediatric physicians who are supposed to have a significantly higher level of knowledge. The insignificance between the two categories indicates that there is a deficiency among pediatrics about CD.

This study had some limitations including the small sample size which could affect the significance of some of our results and did not enable us to generalize the results. Therefore, we recommend conducting multiple province studies that include greater sample sizes. Moreover, the study depended on self-reported questionnaire which could lead to some personal bias where some participants may answer some questions randomly. Finally, CD is a condition which generally occurs among children thus, the name of the questionnaire may be more considered by pediatric physicians and family medicine physicians leading to some sampling bias toward these groups.

In conclusion, we found that there is a deficiency in knowledge about CD among physicians with no significant difference between pediatrics and family medicine physicians. The physicians had moderate knowledge considering symptoms and risk factors of the CD with good knowledge considering the diagnosis tool. More educational courses should be provided to the physicians about the diagnosis and management of CD.

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Prevalence and risk factors of diaper dermatitis among newborn babies to two years of age in Al-Baha region, Saudi Arabia

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Abstract

Introduction: Diaper dermatitis is the most common dermatological condition which affects the pediatric age group. A variety of factors contribute to the pathophysiology. Diaper dermatitis presents as an erythematous rash, papules, scaling, and erosions around the thighs, scrotum, suprapubic area, and buttocks, characteristically where skin creases. The primary treatment is to keep the skin around the diaper area as dry as possible by frequent diaper changes together with careful selection of the diaper type. Some creams (barrier creams) and mild topical corticosteroid treatments are also available to protect the infant's thin skin and to reduce any inflammation.

Methods: This was a cross sectional study of 389 parents using structural questionnaires. The study was conducted in the Al-Baha region, Saudi Arabia from January to July 2022. We used bivariate and multivariate logistic regression analyses to analyze our data and test the association between the prevalence of diaper dermatitis and its possible risk factors.

Results: The prevalence of diaper dermatitis was 39.33% (153/389). The highest prevalence was among children who were 19-24 months old (65%). When comparing gender groups, females had a higher prevalence (44.4%) compared to males (34.7%) ($p=0.005$). Preterm babies had a slightly lower prevalence than term babies.

Conclusion: Multiple factors are involved in diaper dermatitis which most commonly affect infants and toddlers. The highest prevalence was among children who were 19-24 months old and there was more prevalence among females.

Keywords: Diaper dermatitis, Prevalence, Al-Baha, Saudi Arabia

Introduction

Diaper dermatitis is a dermatological condition that affects the diaper area. It manifests as skin eruptions such as an erythematous rash, papules, scaling, and erosions around the thighs, scrotum, suprapubic area, and buttocks (1). More than 50% of infants experience diaper dermatitis at least once during their diaper-wearing phase (2).

Although diaper dermatitis has a complex pathophysiology, it could be a type of irritant contact dermatitis. This type of dermatitis develops in areas covered by the diaper as a result of prolonged skin contact with faeces as the primary factor and urine as a secondary factor. Most diaper dermatitis patients experience mild symptoms; only 5% of cases are severe (3).

Generally, skin eruptions in the diaper area are cases of irritant contact dermatitis and are treated with topical treatments in conjunction with parental education about proper diaper use. Therefore, it is important to distinguish whether a skin eruption in the diaper area is directly caused by improper diaper use and resembles a flare-up of a more diffuse diaper-induced skin condition or is caused by a condition that has accidentally appeared in the diaper area but is unrelated to it (4).

The prevalence of diaper dermatitis varies greatly in different studies and countries. In the United States, diaper dermatitis is the most common skin disease that affects infants, accounting for over 1 million hospital visits per year, and less than 10% of those affected experience severe diaper dermatitis (5).

The prevalence of diaper dermatitis among children was found to be 87% in Japan, 75% in the United States, 25% in the United Kingdom, and 15% in Italy (6).

Previous studies have shown that diaper dermatitis is more common in children aged 1–24 months, with most cases occurring in infants younger than 1 year (2,7). Two recent studies from Ethiopia and Thailand demonstrated that the risk factors of diaper dermatitis have a strong correlation to parental factors (8,9).

Poor compliance to treatment advice is the main cause of failure in diaper dermatitis management. There are different causes of non-compliance, including apprehension about possible side effects, under prescription, the inability to promptly refill prescribed drugs, insufficient time, and a child's rejection of the treatment (1).

The most significant risk factors for diaper dermatitis include parents with low educational levels, parents who are unemployed, and individuals who belong to low socioeconomic classes (9-11).

According to a previous study, mothers have insufficient knowledge of diaper dermatitis prevention and management in infants. This study demonstrated a statistically significant improvement in mothers' knowledge after the administration of a structured teaching programme. A comparison of the pre-education and post-education

programme test results revealed a significant difference in mothers' general knowledge of diaper dermatitis (1).

Therefore, the goal of this study aimed to determine the prevalence of diaper dermatitis, levels of parental knowledge, attitudes toward the disease, and the risk factors associated with the disease in society.

Subjects and Methods

Study Setting

A total of 389 parents from Al-Baha region, the capital of Saudi Arabia's southern province, participated in this cross-sectional survey from January to July 2022.

Sampling Method

The sample size was calculated using the Fisher sample size formula ($N = Z^2 P(1 - P)/d^2$) with a 95% confidence interval and a 5% margin of error. A minimum sample size of 384 parents was requested based on the population of Al-Baha region (487,108), with a 5% margin of error and a 95% confidence interval. This sample size is appropriate for determining the prevalence of diaper dermatitis and its causative factors in children aged 0 to 24 months in Al-Baha region of Saudi Arabia. The ethical conduct of this study was approved by the Scientific Research and Ethics Committee of the Faculty of Medicine at Al-Baha University.

Data Collection

We used a structured electronic survey for data collection. The participants were informed about the objectives of the study before enrolment. In this study, an anonymous self-administered, reliable, prevalidated, and modified electronic questionnaire was obtained from previous studies and used to collect data (12,8). Parents who agreed to participate in the study were asked to complete the questionnaire assessing their knowledge and attitude toward diaper dermatitis. The questionnaire was translated into Arabic. We assessed the associations between diaper rash as a dependent variable and sociodemographic, socioeconomic, educational, and child health status as the independent variables. This study only included parents who had a child aged 0–24 months, parents who lived in Al-Baha region of Saudi Arabia, and parents who agreed to participate in the current survey. This study excluded parents who had not completed the questionnaire, parents who had children older than 24 months, parents who did not live in Al-Baha region, and parents who did not consent to participate. Parents whose responses met at least one of the exclusion criteria were not considered for this study.

Questionnaire Development and Testing

We used a reliable, prevalidated, and modified electronic questionnaire from previous studies (8,12). The questionnaire was divided into two sections. The first section consisted of sociodemographic and personal clinical questions. The second section consisted of 15 questions that assessed diaper dermatitis prevalence in infants (0–24 months), its risk factors, and its related parental factors.

Study Variables

The independent factors in this study included the caregiver's gender, child's gender, child's age, child's weight, child's nationality, caregiver's educational level, child's gestational age, presence of congenital abnormalities, and child's skin type and colour. Contrarily, the dependent variable was diaper rash.

Statistical Analysis

Microsoft Excel 16.0 was used to enter, manage, and code the data. Statistical analyses were performed, and tables were created using IBM SPSS 25.0 (Statistical Package for the Social Sciences (Inc, Chicago, IL, United States). For descriptive data, frequencies and percentages were used to present the information. In order to investigate potential correlations between the categorical variables, Pearson's Chi-square test was used. The relationship between diaper dermatitis and other risk factors was assessed using mixed-model logistic regression analysis. Statistical significance is defined as a value of 0.05 or lower.

Results

A cross-sectional survey was conducted on 389 parents from Al-Baha region to determine the prevalence of diaper dermatitis, parents' attitudes toward the disease, and its risk factors.

Sociodemographic Characteristics

This study included 389 children aged 0–24 months, of which 202 (51.9%) were males and 287 (48.1%) were females. Almost half of the children (43.2%) were under 24 months old, while the remaining (56.8%) were over 24 months old. The Fitzpatrick scale for skin type revealed that 57.6% of the children had type III skin, whereas 33.2% had type IV skin (Table 1).

Characteristics of the Childcare Providers

Most of the participants (98.2%) claimed to be the primary childcare provider, while the remaining participants claimed that their housekeepers or relatives were the primary childcare providers. Most of the parents (75.6%) had a university degree, 17.5% had only a high school degree, 3.3% had only an intermediate school degree, and the remaining parents were either illiterate or had only an elementary school education (Table 2).

The practice of childcare provider regarding diaper and cleaning agent use

Approximately half of the childcare providers (48.3%) changed their child's diaper more than three times per day, followed by 126 childcare providers (32.4%) who changed it three times per day, 61 childcare providers (15.7%) who changed it twice per day, and 14 childcare providers (3.6%) who changed it once per day. Furthermore, 183 childcare providers (47%) used only water as a cleaning agent, followed by 97 (24.9%) who used water and tissue paper or wet wipes, 71 (18.3%) who used water and soap, and finally 7 (1.8%) who used only alcohol sanitizers. Additionally, 138 childcare providers (35.5%) used a combination of regular moisturizers, Vaseline,

baby powder, and diaper creams in the diaper area, and 46 childcare providers (11.8%) used nothing in the diaper area (Table 3).

Prevalence of diaper dermatitis among children

The prevalence of diaper dermatitis was 39.33% (153/389). Children aged 19–24 months (65%) had the highest prevalence, followed by children aged 0–6 months (37.5%), children aged 7–12 months (61.5%), and children aged 13–18 months (53.1%). Children older than 24 months (28.1%) had the lowest prevalence (Figure 1). Regarding gender, females had a higher prevalence (44.4%) than males (34.7%) ($p = 0.005$). Children born before the 37th week of gestation had a slightly lower prevalence (34.7%) than those born at or after the 37th week of gestation (40.9%). In terms of whether or not the child had an existing skin disease, there was no significant difference in diaper dermatitis prevalence between the two groups. Children with no known allergic diseases had a slightly lower diaper dermatitis prevalence than those with an existing allergic disease (Table 4).

Children without prior episodes of diaper dermatitis were highly associated with a low prevalence ($p \leq 0.001$). In terms of the frequency of diaper changes at night, there was no significant difference in prevalence between the groups. However, in terms of diaper change during the day, children who had their diapers changed twice had a low prevalence ($p = 0.019$). At the time of diaper dermatitis, children who consumed a regular mixed diet had a low diaper dermatitis prevalence ($p = 0.008$); however, there was no significant difference in diaper dermatitis prevalence between children who were exclusively breastfeeding, exclusively formula milk, breastfeeding and formula milk, or on a regular diet with milk (Table 4).

Other factors listed in Table 4 that have no association with increased prevalence of diaper dermatitis include the childcare provider, educational level of the childcare provider, underlying gastrointestinal disease, cleaning agents used, agents used on the diaper area regularly, and Fitzpatrick skin type.

Bivariate logistic regression results

Bivariate analysis revealed that diaper dermatitis was highly related to four factors: gender, the number of prior incidents of diaper dermatitis, the frequency of diaper change during the day, and the food consumed by the child at the time of diaper dermatitis.

Multivariate logistic regression

Forward logistic regression was used to fit the bivariate logistic regression factors with p -values of <0.05 into multivariate logistic regression. Only two of the four factors were significantly linked to diaper dermatitis: the child's gender ($p = 0.025$) and the food consumed by children when they developed diaper dermatitis ($p = 0.015$) (Table 5).

Table 1: Participants' demographic characteristics

Variable	N=389	%
Age of child in months		
0-6 months	40	10.3
7-12 months	39	10
13-18 months	49	12.6
19-24 months	40	10.3
Older than 24 months	221	56.8
Sex of the child		
Male	202	51.9
Female	187	48.1
Fitzpatrick skin type		
Type I	0	0
Type II	2	0.5
Type III	224	57.6
Type IV	129	33.2
Type V	33	8.5
Type VI	1	0.2

Table 2: Characteristics of childcare provider

Variable	N=389	%
Main childcare provider		
Parents	382	98.2
Housemaid	4	1
Brothers	3	0.8
Educational level		
Uneducated	3	0.8
Elementary school	11	2.8
Intermediate school	13	3.3
High school	68	17.5
Higher education	294	75.6

Table 3: Practice of childcare provider's diaper and cleaning agents use

Variable	N=389	%
Frequency of diaper change during daytime		
Once	14	3.6
Twice	61	15.7
Three times	126	32.4
More than three times	188	48.3
Frequency of diaper change during nighttime		
Once	152	39.1
Twice	159	40.9
Three times	58	14.9
More than three times	20	5.1
Cleaning agents		
Water	183	47
Paper tissue or wet wipes	31	8
Water and paper tissue or wet wipes	97	24.9
Water and soap	71	18.3
Alcohol sanitizers	7	1.8
Agents applied on diaper area regularly		
Nothing	46	11.8
Generic moisturizers or Vaseline	71	18.3
Baby powder	39	10
Diaper creams	95	24.4
More than one	138	35.5
Number of previous diaper rash episodes		
Once	62	15.9
Twice	75	19.3
More than twice	109	28
None	143	36.8
If your child has a diaper rash, when will you take them to the doctor?		
As soon as possible	75	19.3
If it does not improve within 2 days	180	46.3
If it does not improve within 7 days	105	27
If it does not improve within 14 days	29	7.5
How do you treat diaper rash for your child?		
Doctor's prescription	157	40.4
Vaseline	151	38.8
Baby powder	88	22.6
Topical zinc oxide cream	167	42.9
Topical dexpanthenol ointment	8	2.1
Topical cornstarch	25	6.4
Topical olive oil	19	4.9
Nothing	13	3.3

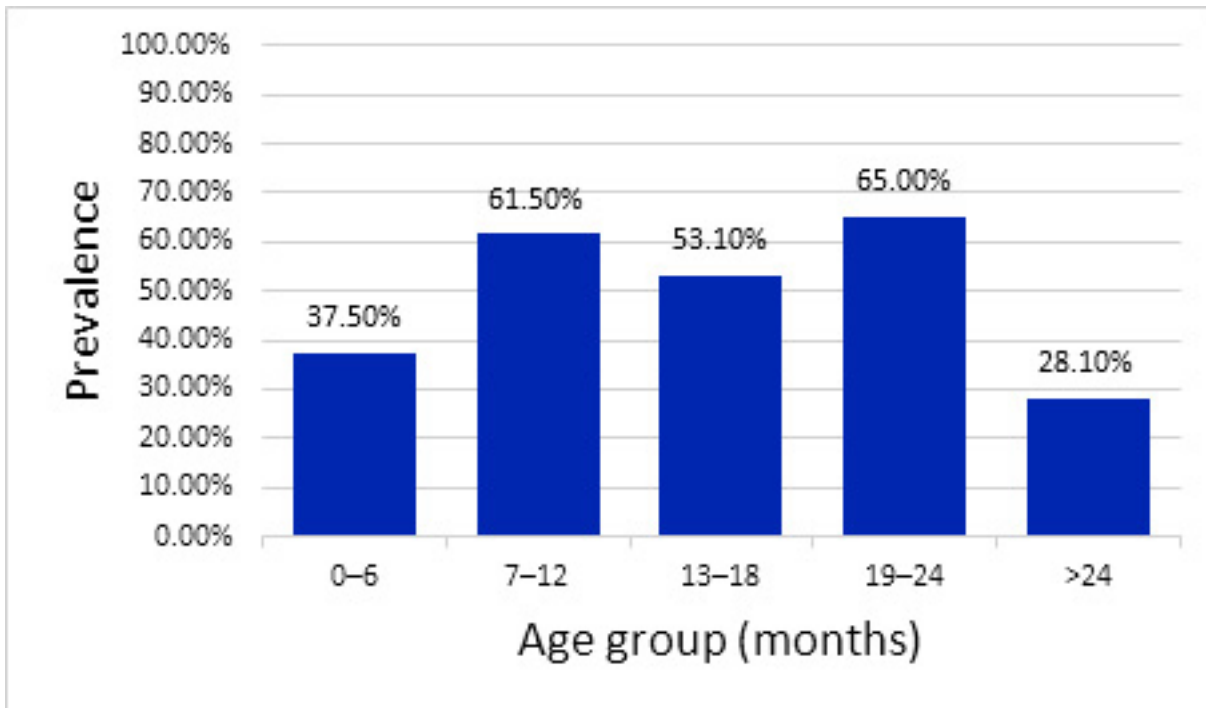
Figure 1: Prevalence of diaper dermatitis among different age groups

Table 4: Summary of the risk factors for diaper dermatitis in the study population.

Variable	Diaper dermatitis		Bivariate logistic regression		
	No n=236	Yes n=153	Odds ratio	95% Confidence interval	p-value
Age					
0-6 months	25 (62.5)	15 (37.5)	1		
7-12 months	15 (38.5)	24 (61.5)	1.19	0.29, 4.87	0.814
13-18 months	23 (46.9)	26 (53.1)	0.63	0.17, 2.35	0.489
19-24 months	14 (35)	26 (65)	2.31	0.52, 10.21	0.279
Older than 24 months	159 (71.9)	62 (28.1)	0.325	0.10, 1.02	0.054
Gender					
Male	132 (65.3)	70 (34.7)	1		
Female	104 (55.6)	83 (44.4)	2.61	1.34, 5.10	0.005*
Birth gestational age					
< 37 weeks	64 (65.3)	34 (34.7)	1		
≥ 37 weeks	172 (59.1)	119 (40.9)	0.830	0.38, 1.81	0.640
Children with birth defects					
No	233 (61.5)	146 (38.5)	1		
Yes	3 (30)	7 (70)	3.32	0.29, 37.64	0.334
Childcare provider					
Parents	230 (60.2)	152 (39.8)	1		
Housemaid	4 (100)	0 (0)	0	0, 0	0.999
Brothers	2 (66.7)	1 (33.3)	4.63	0.05, 442.74	0.510
Educational level of the childcare provider					
Uneducated	2 (66.7)	1 (33.3)	1		
Elementary school	8 (72.7)	3 (27.3)	0.15	0, 16.24	0.428
Intermediate school	8 (61.5)	5 (38.5)	1.84	0.01, 287.83	0.813
High school	39 (57.4)	29 (42.6)	0.15	0, 12.40	0.401
Higher education	179 (60.9)	115 (39.1)	0.07	0, 5.3	0.226
Children with underlying skin disease					
No	215 (62.1)	131 (37.9)	1		
Yes	21 (48.8)	22 (51.2)	0.64	0.17, 2.32	0.493
Children with underlying allergic disease					
None	183 (65.1)	98 (34.9)	1		
Skin	30 (48.4)	32 (51.6)	1.64	0.54, 5.03	0.385
Respiratory	23 (50)	23 (50)	1.58	0.60, 4.18	0.355
Previous episodes of diaper dermatitis					
Once	29 (46.8)	33 (53.2)	1		
Twice	29 (38.7)	46 (61.3)	1.49	0.56, 2.64	0.627
More than twice	37 (33.9)	72 (66.1)	2.45	0.92, 4.21	0.079
None	141 (98.6)	2 (1.4)	0.01	0, 0.03	<0.001*

Table 4: Summary of the risk factors for diaper dermatitis in the study population (continued)

Variable	Diaper dermatitis		Bivariate logistic regression		
	No n=236	Yes n=153	Odds ratio	95% Confidence interval	p-value
Diaper dermatitis appeared with a GIT disease					
No	188 (67.6)	90 (32.4)	1		
Yes	48 (43.2)	63 (56.8)	1.16	0.58, 2.30	0.679
Frequency of diaper change during daytime					
Once	9 (64.3)	5 (35.7)	1		
Twice	38 (62.3)	23 (37.7)	0.076	0.01, 0.65	0.019*
Three times	77 (61.1)	49 (38.9)	0.243	0.03, 1.85	0.172
More than threetimes	112 (59.6)	76 (40.4)	0.250	0.03, 1.85	0.175
Frequency of diaper change during nighttime					
Once	84 (55.3)	68 (44.7)	1		
Twice	107 (67.3)	52 (32.7)	0.90	0.44, 1.18	0.757
Three times	33 (56.9)	25 (43.1)	1.17	0.42, 3.22	0.766
More than threetimes	12 (60)	8 (40)	1.90	0.30, 12.06	0.498
Food consumed by child at time of diaper rash					
Exclusive breastfeeding	39 (73.6)	14 (26.4)	1		
Exclusive formulamilk	32 (54.2)	27 (45.8)	0.27	0.07, 1.10	0.068
Breastfeeding and formula milk	17 (65.4)	9 (34.6)	0.43	0.09, 2.17	0.307
Milk and normal diet	81 (50.6)	79 (49.4)	0.37	0.11, 1.28	0.117
Normal diet	67 (73.6)	24 (26.4)	0.17	0.05, 0.64	0.008*
Cleaning agents used					
Water	112 (61.2)	71 (38.8)	1		
Paper tissue or wet wipes	20 (64.5)	11 (35.5)	0.27	0.07, 1.10	0.994
Water and paper tissue or wet wipes	65 (67)	32 (33)	0.43	0.9, 2.17	0.170
Water and soup	36 (50.7)	35 (49.3)	0.37	0.11, 1.28	0.972
Alcohol sanitizers	3 (42.9)	4 (57.1)	0.17	0.05, 0.64	0.525
Agents applied on diaper area regularly					
Nothing	33 (71.7)	13 (28.3)	1		
Generic moisturizers or Vaseline	44 (62)	27 (38)	1.47	0.45, 4.87	0.527
Baby powder	26 (66.7)	13 (33.3)	1.11	0.27, 4.52	0.886
Diaper creams	57 (60)	38 (40)	1.68	0.57, 4.94	0.350
More than one	76 (55.1)	62 (44.9)	1.96	0.69, 5.59	0.210
Fitzpatrick skin type					
Type III	135 (60.3)	89 (39.7)	1		
Type IV	82 (63.6)	47 (36.4)	0.65	0.33, 1.28	0.213

*p-value <0.05 was considered statistically significant.

Table 5: Factors associated with diaper dermatitis on multivariate logistic regression.

Variable	Multivariate logistic regression		
	Odds ratio	95% Confidence interval	p-value
Gender			
Male	1		
Female	1.92	0.11, 0.17	0.25*
Previous episodes of diaper dermatitis			
Once	1		
Twice	1.71	-0.03, 0.23	0.130
More than twice	2.16	0.03, 0.27	0.016
None	0.01	-0.62, -0.39	<0.001
Frequency of diaper change during daytime			
Once	1		
Twice	0.18	-0.42, 0.04	0.108
Three times	0.25	-0.35, 0.09	0.239
More than three times	0.34	-0.31, 0.12	0.400
Food consumed by child at time of diaper rash			
Exclusive breastfeeding	1		
Exclusive formulamilk	0.68	-0.17, 0.13	0.761
Breastfeeding and formula milk	0.50	-0.27, 0.10	0.386
Milk and normal diet	0.75	-0.13, 0.12	0.927
Normal diet	0.26	-0.30, -0.03	0.015*

*p-value <0.05 was considered statistically significant

Discussion

Diaper dermatitis is an inflammatory skin eruption that develops in the diaper area. It typically affects infants and toddlers, but it can affect anyone who wears a diaper (1). It has been noted that more than 50% of infants are likely to experience at least a single episode of diaper dermatitis (2).

The primary factor that contributes to the etiology of diaper dermatitis is prolonged skin contact with faeces, and the secondary factor is prolonged skin contact with urine.

Many studies have suggested that low parental educational status, unemployment, and belonging to a lower socioeconomic class are related to the incidence of diaper dermatitis (9-11).

This study is the first to examine the prevalence and risk factors of diaper dermatitis in Al-Baha children. In this study, we assessed diaper dermatitis prevalence among children younger than 24 months because diaper dermatitis can result from poor parental education and knowledge. We studied the risk factors for diaper dermatitis as well as parental knowledge and practice regarding diaper dermatitis.

Diaper dermatitis prevalence has been reported in numerous studies in the literature. In our study, the prevalence of diaper dermatitis reached 39.33% (153/389). Our study findings revealed that diaper dermatitis prevalence in Al-Baha is lower than that in the United States (75%), Mauritius (79.7%), Japan (87%), and Ethiopia (62.5%). Our study findings also revealed that the prevalence of diaper rash is higher than that reported in similar studies that were conducted in Italy (15%), the United Kingdom (25%), and Kenya (27.3%) (9).

Another study that included the entire population of Saudi Arabia discovered that children aged 0–24 months old who were diaper-dependent during the study had a diaper rash prevalence of 44%. This percentage is significantly higher than the prevalence percentage of children older than the age of 2 (12).

Several studies have claimed that there is no significant difference in diaper dermatitis prevalence between genders, while other studies have claimed that diaper dermatitis is significantly more common in females. In our study, females had a higher diaper dermatitis prevalence (44.4%) than males (34.7%) (p=0.005). Contrary to our study, some other studies have reported that there is no significant difference in diaper dermatitis prevalence

between male and female children (8,15,17). In another study, female gender was considered an independent risk factor for diaper dermatitis ($p = 0.001$) (12). There is no conclusive evidence in the literature that suggests a rationale for the difference in the prevalence of diaper dermatitis between genders; however, differences in research outcomes could be related to differences in the number of participants.

In terms of age, most studies have agreed that diaper dermatitis is more prevalent in children younger than 24 months than in older children. However, many studies have disagreed about the most common age group for children younger than 24 months. In this study, our analysis results revealed that children aged 19–24 months had the highest prevalence (65%), which is consistent with the results of another study conducted in China (7). Some studies from Saudi Arabia and Indonesia have reported that the most common age group is children younger than 12 months (12,17). Two studies from Thailand and Kenya reported that the most common age group is under 7 months old (8,9), whereas a study from Ethiopia reported that the most common age group is 13–18 months old (9).

Consistent with this study, previous studies have also revealed that infants with a history of skin allergies or a gestational age older than 37 weeks have a relatively high prevalence of diaper dermatitis (2,12).

The analysis of diaper dermatitis in relation to the Fitzpatrick skin type revealed that infants with Fitzpatrick type III had the highest prevalence of diaper dermatitis, followed by those with types I, II, and IV, which is consistent with a previous finding (18). Nevertheless, our study findings were not statistically significant.

Infants who were exclusively breastfed during the time of this study had the lowest diaper dermatitis prevalence. This prevalence was similar to that of infants fed with a regular diet, as shown in Table 4. Additionally, other studies in the literature support the idea that infants who are exclusively breastfed have a low incidence of diaper dermatitis. Two previous studies conducted in the United States and Turkey have shown that infants fed with milk formula have a significantly higher prevalence of diaper dermatitis than those who are exclusively breastfed (3,15).

In fact, studies have shown that infants who are exclusively breastfed have low levels of organisms that contain the urease enzyme. Additionally, these infants have a relatively low pH and low levels of faecal protease and lipase enzymes. Therefore, their diaper areas exhibit less irritation.

Furthermore, we evaluated how changing an infant's diaper during the day versus changing it at night affects the prevalence of diaper dermatitis. We discovered that infants whose diapers were changed more than three times during the day had a significantly lower prevalence of diaper dermatitis than infants whose diapers were changed less than three times during the day. This finding is consistent

with a previous finding that revealed that diaper dermatitis is reduced by frequent diaper changes (8). However, the increase in the diaper-changing frequency at night did not exhibit an increase in diaper dermatitis prevalence.

This study has some limitations since it is the first in the area and is one of the few studies conducted across the country. Additionally, all the factors associated with diaper rash may not have been considered. However, there is no doubt that this study will contribute to the literature and provide epidemiological data on the prevalence of diaper dermatitis and its associated risk factors.

Conclusion

The findings of this study, which is the first report on the prevalence of diaper dermatitis in Al-Baha, demonstrated a high prevalence of diaper rash in children aged 0–24 months. Children aged 19–24 months were found to have the highest diaper dermatitis prevalence, followed by children aged 7–12 months.

This study demonstrated that diaper dermatitis is significantly linked to four factors: gender, the number of prior episodes of diaper dermatitis, the frequency of diaper change during the day, and the food consumed by children at the time of diaper dermatitis. Thus, campaigns, hospital visits, and educational materials could all be used to educate parents and caregivers about the modifiable risk factors of diaper dermatitis.

Ethical approval and consent to participate

The study was approved by the research ethics committee in the Faculty of Medicine, Al-Baha University (Number of approval REC/MED/BU-FM/2022/14). Written informed consent was obtained from all participants included in the study.

Data availability

All data associated with this study are included in the article. Further inquiries can be directed to the corresponding author.

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Sleep patterns and predictors of disturbed sleep among medical students at Imam Mohammad Ibn Saud Islamic University in Riyadh, Saudi Arabia, in 2022

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Abstract

Background: Sleep is a natural need and a biological necessity for human beings (5) and is significant for the maintenance of favorable physical, mental, and emotional wellbeing. Sleep deprivation may have serious health consequences, and it is becoming more common in both developing and developed societies ranging from 22% to 65% of the general population. University students reported to have two times more difficulty in sleep in comparison to the general population. Aim: Determine the sleep patterns and predictors of disturbed sleep among medical students at Imam Mohammad Ibn Saud Islamic University in Riyadh, Saudi Arabia.

Methods: A cross-sectional study was conducted at Imam Mohammad Ibn Saud Islamic University. A total of 273 medical students were invited to respond to the questionnaire about the association between sleep disturbance and academic performance, by use of demographic questions and the Pittsburgh Sleep Quality Index.

Results: In this study, 279 responses were collected in response to our questionnaire. Females represented 77.4% of total sample and 56.6% of the participants were aged between 20-22 years. 63.8% of the students had poor sleep quality. Females had a higher risk of poor sleep than men by 1.54 times where 66.2% of female had poor sleep compared with 55.6% of male students (P=0.123). We noticed

that younger participants were found to have a higher prevalence of poor quality sleep where 73.7% of 18-19 year olds had poor quality of sleep compared with 56.3% of those who were older than 25 years (RR:2.17, 95 % CI: 0.52:9.01). Moreover, we found that poor quality of sleep was slightly higher in those who did not take naps during the day (68.7% compared with 59.5%) with a higher risk of 1.5 times more however, this is not significant (P=0.109). Consuming coffee or caffeinated drinks did not affect the quality of sleep significantly (P=0.689) however, we found that the prevalence of poor quality of sleep increases with an increase in coffee consumption.

Conclusion: We found that almost two third of the medical students at Imam Mohammad Ibn Saud Islamic University in Saudi Arabia experienced poor quality sleep. Female, younger students, with low incomes, higher GPA, who consumed caffeinated drinks and did not take naps during the day were associated with a high prevalence of poor sleep.

Key words: sleep patterns and predictors, disturbed sleep, medical students, Saudi Arabia

Background

Sleep is a natural need and a biological necessity for human beings [1], it is connected to the nocturnal period of the 24-hour time scale because of the intricate interaction or collaboration of two systems : a circadian timing system and a sleep homeostatic. The former advances alertness during the daytime and sleep around evening time. Conversely, the sleep homeostatic system is reliant upon the sleep wake history of the individual, with a drive for sleep (or sleep pressure) that develops during wakefulness [2]. Sleep is significant for the maintenance of healthy physical, mental, and emotional wellbeing. Furthermore sleep is critical for memory, learning, decision making and analyzing, and because of that sleep is considered important for the optimal activity of key mental capacities related to academic performance in advanced education [1].

Sleep deprivation may have serious health consequences, such as increased disease morbidity and mortality. It was posited that sleep deprivation may be associated with defects in the immune function and may be implicated in the pathogenesis of psychological problems and metabolic problems [3], and it is becoming more common in both developing and developed societies. The prevalence of sleep disorders in the general population has been calculated to range from 22% to 65% [4].

Many variables are responsible for any change in sleeping habits, including developmental changes that happen at puberty, which cause an adjustment in the circadian timing system [2]. The magnitude of the issue can be evaluated based on examinations that illustrate both lack of sleep and poor sleep quality are predominant in the college student population [1].

Based on a study which has been conducted in the United States [1], university students were reported to have two times more difficulty sleeping in comparison to the general population.

In a university environment, typically, students strive to achieve excellent grades in their particular courses. College students' sleep is frequently irregular in terms of duration and time [5].

Medical students are an example of a high stressed group who must undergo long and demanding academic years before coming physicians. Their focus on their studies means they may not consider sleep as a priority when faced with their academic demands. They may sleep less in order to have additional hours to study and to achieve high test scores [6]. As it is acknowledged that sufficient and quality sleep minimizes concentration difficulties [5] a lack of this and a prevalence of stress among medical students all around the world is an issue. It is characterized as the body's own mechanism of defense against pressure or unpleasant situations [6].

Many factors can result medical students being extremely stressed and include: extensive curricula and various academic requirements [6]. The extensive use of stimulants such as caffeine [7], physical, mental, and

environmental factors such as age, gender, job, lifestyle, emotional tension, and noise all influence sleep patterns and sleep problems [5]. Studies have discovered that students who lack regular sleep have unfortunate impacts on their assessments and were more depressed than their colleagues [6].

With this in mind, screening for sleep quality among medical students is critical to identify and manage a problem which may have an impact on the quality of patient care offered by future physicians [3].

In this study we aim to determine the sleep patterns and predictors of disturbed sleep among medical students at Imam Mohammad Ibn Saud Islamic University in Riyadh, Saudi Arabia.

Methodology

Study design and setting:

This cross-sectional study was conducted over 4 months at Imam Mohammad Ibn Saud Islamic University in Saudi Arabia.

Study subjects and size:

Participants in this study were undergraduate college students from different specialties and educational levels. A sample of 273 participants, with a 95% confidence level and a 5% margin error. All participants had to meet the following criteria: Medical student at Imam University, Adults ≥ 18 years old, Saudi, female, and male. Those who did not match the criteria were excluded.

Sampling technique, data collection method, the instrument used:

This study was conducted through an electronic self-administered questionnaire distributed randomly to determine the association between sleep disturbance and academic performance among medical students of Al-imam Mohammad bin Saud Islamic University. The authors used a scale adapted from multiple previous studies for the questionnaire, and a pilot study checked the validity and reliability of this questionnaire. The self-administered questionnaire contained three sections: a demographic section, a section about academic performance, and the Pittsburgh Sleep Quality Index.

Statistical analysis plan:

The quantitative data was analyzed using the Statistical Package for Social Sciences version 23 (SPSS 23.0). Frequencies and percentages were used to present qualitative data. Statistical significance was defined as $p < 0.05$. The data did not need to be cleaned because all of the questions in the Google form were multiple choice and had to be answered in order to submit so there was no error in the database.

Ethical consideration:

The study was approved by the Imam Mohammad Ibn Saud Islamic University's Institutional Review Board (IRB), and it was carried out according to the IRB's standards. The study goals were communicated to all participants, and their consent was obtained. All replies from this study are kept strictly secret, with full access granted only to the study's authors, and all participants' information is kept in strict confidence.

Results

In this study, 279 responses were collected in response to our questionnaire. Females represented 77.4% of total sample while 56.6% of the participants reported ages between 20-22 years and 30.8% were between 23-25 years old. 96.8% of participants were single and 46.6% of them had a monthly family income of more than 20,000 SR. 25.1% of the students were in their third year of studies, 23.7 % were in their fourth year and 21.9 % in their first year. Furthermore, 47.3 % of the participants reported GPA of 3.5-4.5 while 41.2 % reported having GPA higher than 4.5 (Table 1)

Table 1: Demographic factors of the participants (N=279)

		Count	Column N %
Gender	Male	63	22.6%
	Female	216	77.4%
Age	18-19	19	6.8%
	20-22	158	56.6%
	23-25	86	30.8%
	> 25	16	5.7%
Marital status	Single	270	96.8%
	Married	9	3.2%
Monthly income	< 10,000 SR	72	25.8%
	10,000-20,000	77	27.6%
	> 20,000 SR	130	46.6%
Year	First year	61	21.9%
	Second year	51	18.3%
	Third year	70	25.1%
	Fourth year	66	23.7%
	Fifth year	31	11.1%
GPA	<2.5	5	1.8%
	2.5-3.49	27	9.7%
	3.5-4.5	132	47.3%
	>4.5	115	41.2%

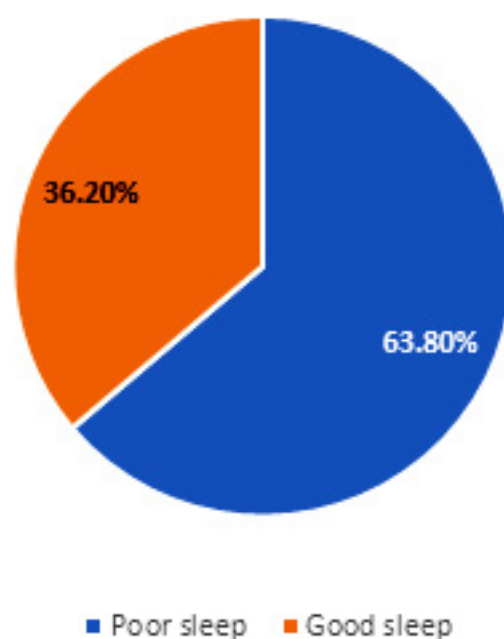
We found that 40.5% of the students reported spending 4-6 hours studying daily, 25.1% reported spending 2-4 hours daily and 23.3% reported spending more than 6 hours daily. 53.0% of the participants reported taking naps during the day. Among the participants, 14.3% reported not consuming caffeinated drinks while 36.6% reported having one cup a day. 78.1% of the participants recorded that they did not take regular exercise (Table 2).

Table 2: Daily lifestyle habits among students

		Count	Column N %
How many hours do you spend studying?	< 2 h	31	11.1%
	2-4	70	25.1%
	4-6	113	40.5%
	> 6	65	23.3%
Do you take naps during the day?	Yes	148	53.0%
	No	131	47.0%
Do you consume caffeinated drinks?	I do not drink coffee or caffeine	40	14.3%
	One cup a day	102	36.6%
	2-3 cups a day	100	35.8%
	More than 3 cups a day	37	13.3%
Do you exercise regularly?	Yes	61	21.9%
	No	218	78.1%

Using the developed questionnaire, we found that 63.8% of the students had poor sleep quality (Figure 1). In the questionnaire, only 14.7% of them evaluate their sleep as excellent and all participants reported sleeping more than 6 hours sleep daily. Moreover, 9.7% of participants reported taking medications to help them sleep. 66.7% of them reported that their activity had been affected by poor sleep and 40.5% reported suffering from sleep disorders such as bad dreams.

Figure 1: Distribution of the participants according to their sleep quality



In Table 3, we found that the gender of students had no significant effect on his/her sleep quality ($P=0.123$) however, we noticed that females had a higher risk of poor sleep than men by 1.54 times (66.2 % of females compared to 55.6% of males). We also found the age of participants had no effect on their sleep quality ($P=0.328$) however, we noticed that younger participants were found to have higher prevalence of poor quality of sleep where 73.7% of those 18-19 year olds had poor quality of sleep compared with 56.3% of those who were older than 25 years (RR:2.17, 95 % CI: 0.52:9.01). Moreover, we found that there is no significant difference considering quality sleep of students based on their marital status ($P=0.856$), family monthly income ($P=0.120$) nor their educational level ($P=0.521$). However, we noticed that those with an income lower than 10,000 SR had a significantly higher level of poor quality of sleep than those with income of more than 20,000 SR by 1.92 times (RR:1.92, 95% CI:1.02:3.60, $P=0.045$). Considering students' GPA, we found that sleep quality improved for those with a higher GPA (42.6% of those with GPA > 4.5 had good quality compared with 20.0% in those with GPA lower than 2.5) however, this is not significant (Table 3).

Table 3: The relation between sleep quality and demographic factors of the participants

	Sleep assessment							
	Poor sleep		Good sleep		P-value	OR	Low 95 % CI	High 95 % CI
	Count	Row N %	Count	Row N %				
Male	35	55.6%	28	44.4%	0.123	Control		
Female	143	66.2%	73	33.8%		1.54	0.88	2.77
18-19	14	73.7%	5	26.3%	0.328	2.17	0.52	9.01
20-22	95	60.1%	63	39.9%		1.17	0.42	3.31
23-25	60	69.8%	26	30.2%		1.79	0.60	5.33
> 25	9	56.3%	7	43.8%		Control		
Single	172	63.7%	98	36.3%	0.856	Control		
Married	6	66.7%	3	33.3%		1.13	0.27	4.65
< 10,000 SR	53	73.6%	19	26.4%	0.120	1.92	1.02	3.60
10,000-20,000	48	62.3%	29	37.7%		1.13	0.63	2.03
> 20,000 SR	77	59.2%	53	40.8%		Control		
First year	34	55.7%	27	44.3%	0.521	Control		
Second year	34	66.7%	17	33.3%		1.58	0.72	3.41
Third year	47	67.1%	23	32.9%		1.61	0.79	3.30
Fourth year	45	68.2%	21	31.8%		1.71	0.82	3.51
Fifth year	18	58.1%	13	41.9%		1.1	0.45	2.63
<2.5	4	80.0%	1	20.0%	0.283	Control		
2.5-3.49	18	66.7%	9	33.3%		0.5	0.04	5.15
3.5-4.5	90	68.2%	42	31.8%		0.5	0.05	4.94
>4.5	66	57.4%	49	42.6%		0.33	0.03	3.1

There is no significant correlation between quality of sleep and duration of studying ($P=0.885$) however, we found that those who study for more than 6 hours and those with less than 2 hours reported a higher prevalence of poor quality sleep. Moreover, we found that the incidence of poor quality sleep was slightly higher in those who did not take naps during the day (68.7% compared with 59.5%) with a higher risk of 1.5 times however, this is not significant ($P=0.109$). Consuming coffee or caffeinated drinks did not affect the quality of sleep significantly ($P=0.689$) however, we found that the prevalence of poor quality sleep increases with an increase in coffee consumption. Moreover, 64.7% of those who reported not exercising regularly showed poor quality of sleep compared with 60.7% of those who exercised with no significant difference ($P=0.563$) (Table 4).

Table 4: The relation between daily habits and sleep quality

		Sleep assessment							
		Poor sleep		Good sleep		P-value	OR	Low 95 % CI	High 95 % CI
		Count	N %	Count	N %				
How many hours do you spend studying?	< 2 h	20	64.5%	11	35.5%	0.885	Control		
	2-4	43	61.4%	27	38.6%		0.87	0.36	2.11
	4-6	71	62.8%	42	37.2%		0.92	0.41	2.12
	> 6	44	67.7%	21	32.3%		1.15	0.46	2.82
Do you take naps during the day?	Yes	88	59.5%	60	40.5%	0.109	Control		
	No	90	68.7%	41	31.3%		1.5	0.91	2.45
Do you consume caffeinated drinks?	I do not drink coffee or caffeine	23	57.5%	17	42.5%	0.689	Control		
	One cup a day	64	62.7%	38	37.3%		1.24	0.59	2.62
	2-3 cups a day	65	65.0%	35	35.0%		1.4	0.64	2.90
	More than 3 cups a day	26	70.3%	11	29.7%		1.7	0.68	4.48
Do you exercise regularly?	Yes	37	60.7%	24	39.3%	0.563	Control		
	No	141	64.7%	77	35.3%		1.2	0.66	2.16

Discussion

This study aimed to assess the prevalence of poor quality of sleep among medical students at the Imam Mohammad Ibn Saud Islamic University in Saudi Arabia. The results of this study provided evidence of a high and alarming prevalence of poor sleep quality (63.8%). Many previous studies showed a different prevalence of poor sleep among medical and non-medical students. Our results was in agreement with some of the results of previous study including a study conducted by Siddiqui A et al., showed a prevalence of poor quality of sleep among almost three-quarters of medical students at King Khalid University, Saudi Arabia in the study group [1]. Moreover, other studies confirmed our results including the study of Lund H et al., who reported a prevalence of poor sleep of over 60% [8], and the study of Yassin A et al., who found that at least two thirds of the medical students in Jordan may have poor sleep [9]. However, our results are lower than reported in some previous studies including the study of Ibrahim NK et al., conducted among medical students at King Abdulaziz university, Saudi Arabia, where the authors reported a prevalence of 70.4 % [3]. Another study conducted by Almojali A et al, of medical students in King Saud bin Abdulaziz University, Riyadh region, Saudi Arabia, reported a prevalence of poor sleep of 76 % [6]. In addition, the study by Goweda R et al. showed that the prevalence of poor sleep among medical students at Umm Al-Qura University, Saudi Arabia was found to be higher than two thirds of the sample (73.8 %) [10]. Our results were higher than other studies including the study of Cheng S et al., of university students showing that 54.7% of the students had poor sleep [11], the study by Salama A which was conducted among medical students at Menoufia University, Egypt, which reported a prevalence of poor sleep of 58.5% [12]. These are in addition to other studies that were conducted in countries including Hong Kong (57.5%) [13], Lithuania (59.4%) [14], China (19%) [15] and Brazil (28.2%) [16] using a PSQI questionnaire. HLs discrepancy between studies in the prevalence of sleep quality may be due to the difference in sample sizes, race, target population and when the study was conducted as all these factors could affect the results of the study. Nowadays, there is a marked increase in the use of social media and online education during the 'night' hours because of the COVID-19 pandemic which may increase the risk of poor quality sleep among the participants as found in our study. Moreover, some previous studies had compared the prevalence of poor quality of sleep between medical and non-medical students showing that medical students had a higher level of poor sleep quality compared with other students [14,17]. This difference between medical and non-medical students could be due to a heavier academic load and their different lifestyles [17]. According to a previous study, medical students are one of the subgroups of the general population with a higher risk of poor sleep because of heavy clinical duties, long duration of study, challenging workplaces and different lifestyles [18]. These higher rates of poor sleep among medical students which were reported in studies conducted in different countries highlights the need to address with the stresses that face

medical students. It is possible these stresses could be improved through counselling and regular education to help medical students moderate their behaviours and lifestyles.

In our study, we found that females had a higher risk of poor sleep than men by 1.54 times however, this difference is not significant. This is similar to the results of the previous study by Almojali et al [6]. Many previous studies showed that the prevalence of poor sleep was significantly higher among female students than males [19–23]. The cause of this difference between the two genders unclear. However, it could be related to a higher prevalence of psychological problems such as stress and depression which are reported among females in higher education levels as these can be related to sleep disturbance [24]. However, a previous study conducted in India showed that males had a higher prevalence of poor sleep quality compared to females. This could be due to the high prevalence of addiction among males in this study which could increase the daytime sleepiness and poor quality of sleep at night [25].

In our study we found that younger participants had a higher prevalence of poor quality of sleep than older participants however, this is not significant. This result is in agreement with previous studies including the study of Brick et al from California University, USA [26], the results of a recent study in Egypt [23] and the study of Ibrahim NK et al. [3]. All these studies showed that there is negative association between age and poor quality sleep. This difference could be attributed to the high number of lectures and other study requirements during the early years of colleges. Young participants may not have adequately adapted to this increased work load compared to that in their secondary schools. Additionally, the anxiety and the pressure to pass the first years of medical school may play a significant role impacting the quality of sleep among those students [27].

Considering students' academic performance, we found that sleep quality improved in those with higher GPA however, this is not significant. This result is in disagreement with the results of previous study including the study of Bahammam et al., in Riyadh, Saudi Arabia [28] and the study of Ibrahim NK [3] which showed that better achievers (GPA > 4.5) had poorer sleep quality when compared with others.

The consumption of coffee or caffeinated drinks did not affect the quality of sleep significantly ($P=0.689$) however, we found that the prevalence of poor quality of sleep increased with an increase in coffee consumption. This result agrees with the results of another study conducted by Sanchez et al. [29] among students from a Peruvian College (Peru). Moreover, in our study, those who take naps during the days had slightly better quality of sleep with significant difference which is similar to the results of Ibrahim NK [3]. In our study exercise was not a significant factor affecting the sleep quality which is similar to results of previous studies [5,8].

This study had some limitations including the dependence on self-reported questionnaires which may lead to some personal bias. Moreover, the questionnaire was distributed online which may have caused a bias towards those who preferred using social media as this was associated with a high prevalence of poor sleep patterns. Finally, this study required respondents to recall events of the previous week, which may have led to some recall bias.

In conclusion, we found that almost two thirds of the medical students at Imam Mohammad Ibn Saud Islamic University in Saudi Arabia had poor quality of sleep. Female, younger students, with low incomes, higher GPA, who consumed caffeinated drinks and did not take naps during the day were associated with a high prevalence of poor sleep.

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Telemedicine Consultation: Geriatric Patients' Attitude at Primary Care Clinics in Security Forces Hospital in Riyadh, Saudi Arabia

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Abstract

Background: Telemedicine has been adopted to deliver healthcare services around the world in response to the COVID-19 pandemic.

Telemedicine was widely used due to its safety in providing healthcare services and screening for COVID-19 symptoms.

Objectives: To assess telemedicine consultations during the COVID-19 pandemic at primary care clinics for follow-up geriatric patients.

Materials and methods: A cross-sectional survey-dependent study was conducted at Security Forces Hospital in Riyadh, Saudi Arabia, from July to August 2021. Participants were selected using a non-randomized voluntary response sampling technique. Data were collected over telephonic interviews and analyzed using SPSS program version 23.

Results: A total of 518 respondents were included in the study. We found 90.73% of the participants thought that first time they have been consulted as a patient on the Telephone. And 91.89% of the participants thought that the majority agreed that it made healthcare services easier during the COVID-19 pandemic. their desire to in the future to have telephone Consultation (71.62%). Showed that the average attitude toward Telephone consulting

satisfaction score of respondents was 6.5 ± 1.0 , demonstrating that most participants revealed a good level of Attitude toward telephonic consultations during the pandemic. Satisfaction scores, gender, age and nationality of participants did not differ significantly.

Conclusion: The study concluded that geriatric patients had an excellent attitude toward telemedicine consultation during the pandemic at the Hospital's primary care clinic. Further studies are needed to address factors associated with attitudes toward telemedicine.

Keywords: Attitude, Telemedicine, Riyadh, geriatric patients, COVID-19

Background

A remote consultation between doctors and patients can use a video link (teleconsultation) or take place over the telephone at all levels of the system [1]. The COVID-19 pandemic has changed many aspects of the framework for patient-health-care professional relationships [2]. In previous times of crisis, the professional perspective was that the patient experience might need to be sacrificed in the interest of clinical effectiveness [3]. COVID-19 has introduced new healthcare scenarios of human interaction and has altered procedures established long ago [4].

Technological advancements paved the way to implement telemedicine for healthcare provision, especially for geriatric patients and may need special attention. Various healthcare systems integrated Internet of Things (IoT) in telemedicine to monitor and record individual health parameters regularly [5]. Evidence suggests that telemedicine can effectively manage chronic diseases in senior patients [6].

Telephone Consultation (TC) is considered the most common alternative form of telemedicine to face-to-face consultation in clinical settings [7]. However, the characteristics of TC to focus on the presenting symptoms and patients not being comprehensively assessed, is a drawback of telemedicine [8].

There was telephone were shorter time and fewer problems than face-to-face consultations. Satisfaction outcomes were similar in both consultation types. [9].

In addition, regarding the physician - patient relationship, there are issues concerning the quality of health information and organizational difficulties [10]. Nevertheless, TC thrived during the COVID-19 pandemic [10].

Public administrations around the world were investing in TC to manage COVID-19, aiming to reduce the volume of patients interacting with emergency departments [11]. The NHS in the UK provided online consultation in designated areas to avoid patient visits [12].

In June 2019, new telemedicine regulations were published in KSA, providing a comprehensive framework for all clinical staff, which is overseen by the Saudi Telemedicine Unit of Excellence (STUE). These regulations provide a foundation for video consultations [13].

A similar study by Álvarez et al., 2021 [14] reported a total of 5,031 telephone calls, differentiating between medical referrals, primary care visits, and outpatient consultations. The percentage of successful telematics was 53%.

In New Zealand Melian et al., 2021 [16] reported that patients who utilize telephone consultations are more likely to prefer it over in-person visits in the future. This increased preference suggests that teleconsultation has a role also in orthopedic surgery.

A study done by Alhumud et al., 2020 [17] in Riyadh measured satisfaction towards a tele-retinal screening program among people with diabetes attending endocrinology clinics. The study found that patients were highly satisfied with the program.

Also, Nasser et al., 2021 [18] revealed acceptable satisfaction of patients toward telemedicine programs in Saudi Arabia.

Multiple studies have been published to report the telemedicine experience of Saudi patients, however, the data related to geriatric patients in these studies are limited. Alhamam et al. carried out a study to infer the acceptance of patients affected with musculoskeletal disorders among the Saudi population towards telemedicine. In this study, geriatric patients were found to be less likely to have positive attitudes toward telemedicine as compared to younger patients. However, this study recruited only eight patients (1.3%) older than 55 years [19].

Similarly, Thirunavukkarasu et al. reported a significant correlation between poor satisfaction levels for telemedicine services and the increasing age of participants attending outpatient telemedicine clinics in Saudi Arabia [20].

According to a careful literature review, there is no published study from Security Force Hospital assessing patients' satisfaction with tele-consultation during COVID-19. This study aimed to assess the patient's satisfaction with their experience of using TC during the COVID-19 pandemic.

Objectives of the study:

- Evaluation of telemedicine consultation for follow-up geriatric patients during the COVID-19 pandemic in the primary care clinic in the Security Forces Hospital in Riyadh, Saudi Arabia, 2022.
- Research the attitudes of Security Force Hospital's primary care geriatric patients concerning the usage of TCs during the COVID-19 pandemic.
- Using tele-consultation techniques with primary care geriatric patients at Security Force Hospital, determine the relationship between the sociodemographic information of the participants and the degree of attitude.

Materials and Methods

Study Area/Setting:

This study was conducted at Security Force Hospital in Riyadh, Saudi Arabia.

Study Subjects:

The study was done on primary care geriatric patients who were followed up through TCs in a Security force hospital from July to August 2021. Patients who were 65 years of age or older and who participated in tele-consultations follow-up during COVID-19 were included.

Study Design:

This was a cross-sectional survey-dependent study.

Sample Size:

Was calculated using SPSS software.

Sampling Techniques:

Participants were selected consequently using a non-randomized voluntary response sampling technique. The sampling was done by using online and offline techniques. Online methods involved interacting with patients over the Telephone. Offline methods include face-to-face sessions and taking data from the attendees/ relatives of the patients.

Data Collection methods, instruments used and measurements:

A telephone interview questionnaire collected data. It was modified to elicit participants' sociodemographic data, attitudes toward tele-consultation follow-up, and their views on healthcare services in Saudi Arabia during the COVID-19 pandemic. The participants' attitude towards tele-consultations was detected using a four questions checklist with two responses; "yes/agree" given a 2 score and "no/disagree" given a 1 score. So, the attitude score ranged from 5 to 7.

Data Management and Analysis Plan:

Data were analyzed by SPSS program version 23, where quantitative data was expressed as numbers and frequencies. Also, we used mean and standard deviation (mean \pm SD) to measure the average and spread of participants' responses. One-way ANOVA and student T-test were used to test associations between variables. A p-value $<$ 0.05 was used as a cutoff point for statistical significance.

Ethical Considerations: Informed Consent

The Ethical clearance for the study was obtained from the Security Force Hospital Ethics committee (22-574-10). Confidentiality was assured to all participants who agreed to participate in the study. The respondents were given a brief description of the research and its objectives.

Results

In this study, a total of 518 participants were included. The individuals were selected based on their age. Any participant younger than 65 was rejected for the study. Female participants were more than males, i.e., 288 and 230, respectively. Females consisted of (55.60%) of the individuals who that participated. Participants from 65 years to 70 years were (22.97%), from 70 to 80 years were (36.10%) and participants aged more than 80 years were (40.93%). The highest percentage of participants aged more than 80 years (40.93%). Moreover, our findings revealed that most respondents were Saudis (96.53%), and only (3.47%) were non-Saudis. (Table 1 and Figure 1).

Telephone Consulting During COVID-19 Pandemic

Our results demonstrated that most respondents admitted that this was the first time they had been consulted as a patient on the telephone, i.e., 470 (90.73%) out of 518. Almost the same agreed that TC made healthcare service easier today was 476 (91.89%). In addition, 451 (87.07%) of respondents thought they might have to miss work to see a therapist if telephone services were unavailable. (Table 2). Our findings showed that most of the respondents 191 (36.87%) would use alternative medicine if the telephone was not available for consultation, and the lowest percentage 66 (12.74%) would have to not go to see any of the participants' doctors. 166 (32.05%) of respondents demonstrated that they would have to drive for 30 minutes - 1 hour to receive medical care, and 159 (30.69%) would have to drive for more than two hours. (Table 2) Furthermore, results indicated that participants preferred telephone consultation 371 (71.62%) over face-to-face consultation was 147 (28.38%). Most participants are not willing to participate in a telephone-only consultation for all routine check-ups was 398 (76.83%). The existence of the direct opposite answers to the question 7 and 8 leaves, in our opinion, some reasons and assumed limitations, such as the scarcity of service availability in some health centers, lack of training for staff and technical support on TC no good interaction between them and patients. It is also important to ensure privacy and confidentiality of communication and the diversity of TC authentication methods. (Table 2).

Table 1. Display the frequency of gender, age and nationality of individuals participating in the research

Variable	Category	Frequency	Percent
Gender	Male	230	44.40%
	Female	288	55.60%
Age	65 to 70	119	22.97%
	70 to 80	187	36.10%
	More than 80	212	40.93%
Nationality	Saudi	500	96.53%
	Non-Saudi	18	3.47%

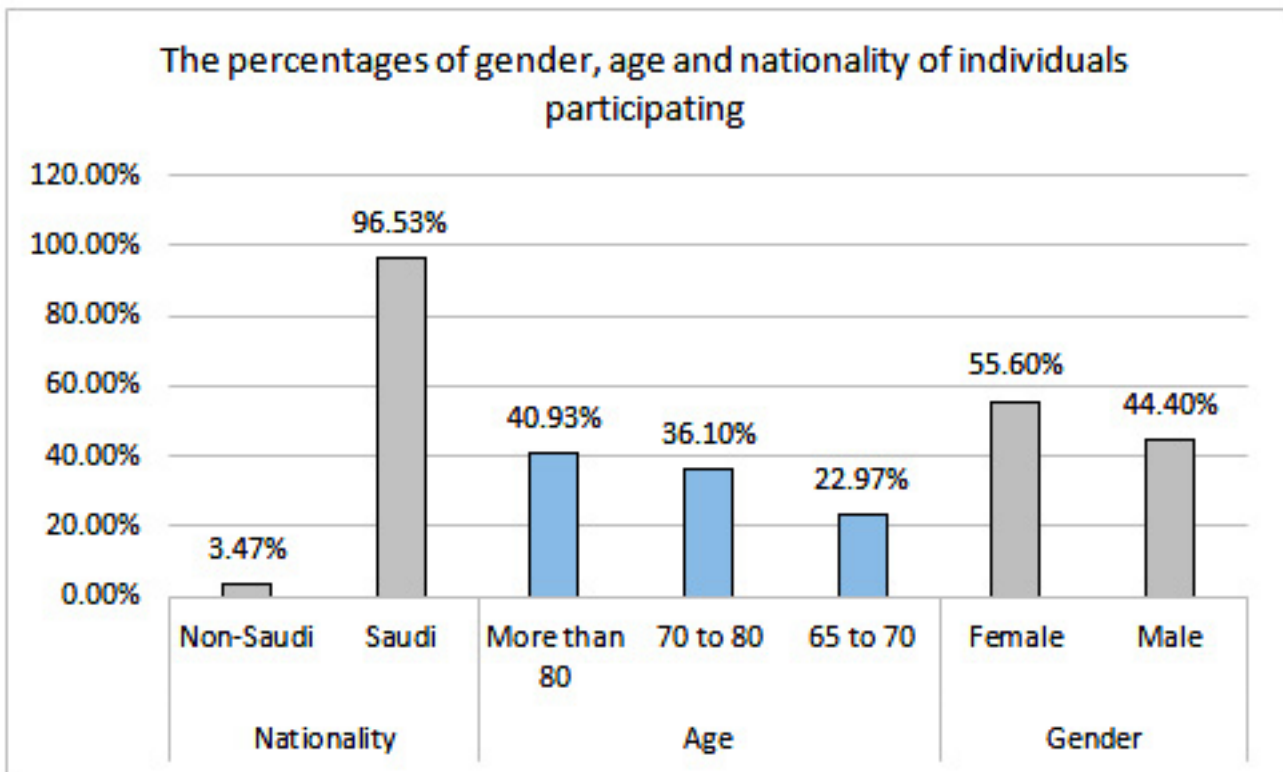
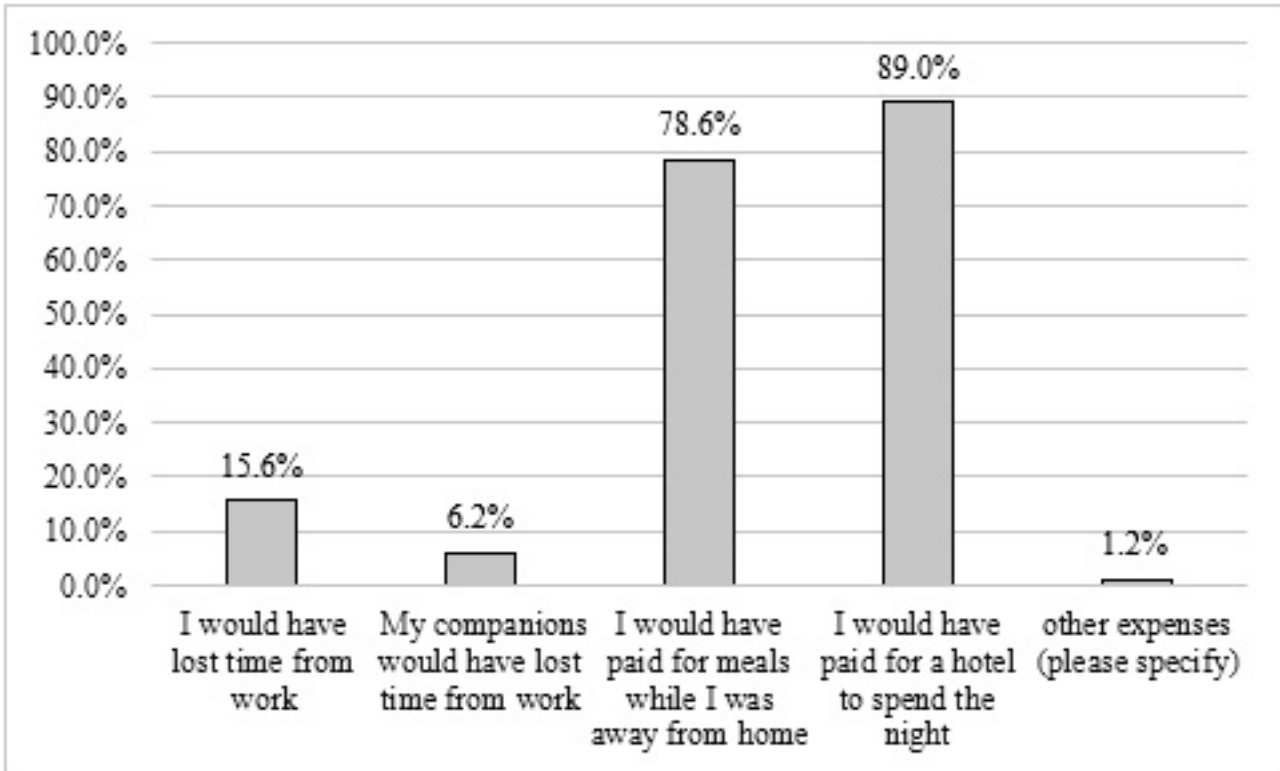
Figure 1. Histogram of percentages of gender, age and nationality of individuals participating

Table 2. Display of frequency of questions answered by participants

Is this the first time you have been consulted as a patient on the Telephone?	
Yes	470 (90.73%)
No	48 (9.27%)
Do you think telephone services made healthcare easier today during the virus COVID-19 pandemic?	
Agree	476 (91.89%)
Disagree	42 (8.11%)
If you need any healthcare services, do you think you might have to miss work / get things done to see a therapist if telephone services are unavailable?	
Agree	451 (87.07%)
Disagree	67 (12.93%)
If Telephone had not been available for your consult today, which of the following would have been your alternative plan of action?	
I would have contacted my local clinic to see if they could assist	139 (26.83%)
I would have driven to see the specialist face-to-face	122 (23.55%)
I wouldn't go see any doctor	66 (12.74%)
The use of alternative medicine (honey - nigella - Indian installment, etc.)	191 (36.87%)
If telephone had not been available for your consult today, how far would you have had to drive to receive care?	
Less than 15 minutes	60 (11.58%)
15 - 30 minutes	64 (12.36%)
30 minutes - 1 hour	166 (32.05%)
1-2 hours	69 (13.32%)
More than 2 hours	159 (30.69%)
In the future, which would you prefer?	
Face-to-face Consultation	147 (28.38%)
Telephone Consultation	371 (71.62%)
Would you be willing to participate in another telephone consultation?	
Yes	14 (2.70%)
No	398 (76.83%)
Not sure	106 (20.46%)
If telemedicine had not been available and you had to travel to meet face-to-face with the provider to receive care, which of the following would apply?	
I would have lost time from work	81 (15.6%)
My companions would have lost time from work	32 (6.2%)
I would have paid for meals while I was away from home	407 (78.6%)
I would have paid for a hotel to spend the night	461 (89.0%)
Other expenses (please specify)	6 (1.2%)

The histogram (Figure 2) below shows the multiple answer question that percentage of individuals that would go to lengths for their consultation. Of the 518 individuals, 461 (89%) agreed that they would stay in a hotel to spend the night if required for their consultation. They were followed by 407 individuals (78.6%) who were willing to pay for meals too.

Figure 2. Histogram of percentage of participants agreeing to the answers



Participant's suggestions for improving consultations

In an open-ended question on suggestions for improving consultations, the results of the analysis showed the top 8 cases in descending order. As follows, about 124 (25.9%) of the participants wanted ASK your patients to be surveyed or case dependent. Followed by 77 (16.1%) of the participants if the refill appointment is by telephone if the real appointment is video and sound with privacy. Thirdly, the telephone with some privacy 51 (10.6%), which outperformed the desire for video with privacy 31 (6.5%). In contrast, the face-to-face case and the case of family doctors did not feel the desire the least, 12 (2.5%) and 3 (0.6%). (Table 3).

Table 3. Display the frequency of the individuals who agreed to the suggestions

No.	Cases	Frequency	Percent
1	Survey and ask your patients or depend on case.	124	25.9%
2	If it is refill appointment with telephone if it a real appointment will be video and sound with keeping privacy.	77	16.1%
3	Telephone with some privacy.	51	10.6%
4	Video with privacy.	31	6.5%
5	At least by video with privacy or face to face not only phone or telephone.	15	3.1%
6	Face to face better.	12	2.5%
7	Family doctors is better.	3	0.6%
8	I don't know or haven't any suggestions.	166	34.7%
Total		479	100%

As explained in (Table 2), 371 (71.62%) participants agreed for another consultation was (telephone consultation). We put an open-ended question on cases or diseases that are not suitable for telemedicine, the results of the analysis showed the top 12 cases in descending order. Out of those 91 (18.1%) agreed for it depends on the cases. Followed by it depends on the doctors was 39 (7.8%). Then it depends on the department and the policy of hospital was 10 (2%) and 9 (1.8%). In contrast, lowest Obgyn cases in PCC, Orthopedic, ophthalmology and ENT cases should be seen, refill medications via TC and family physician should communicate with patients was 3 (0.6%). We do not know if any participant would agree for an appointment for a new consultation. Regarding participants' perceptions about cases unsuitable for Telephone, most respondents admitted that they did not know or haven't any idea or nothing was 321 (63.9%). (Table 4).

Table 4. Table showing the response of participants to different diseases.

No.	Cases	Frequency	Percent
1	It depends on the cases.	91	18.1%
2	It depends on the doctors.	39	7.8%
3	It depends on the department.	10	2%
4	It depends on the policy of hospital.	9	1.8%
5	All cases at family medicine should be seen.	7	1.4%
6	Any case needs physical examination.	7	1.4%
7	Any new complaints.	6	1.2%
8	Obgyn cases in PCC.	3	0.6%
9	Orthopedic, ophthalmology and ENT cases should be seen.	3	0.6%
10	Refill medications.	3	0.6%
11	Family physician should communicate with patients.	3	0.6%
12	I don't know or haven't any idea or nothing.	321	63.9%
Total		502	100%

Attitude toward Telephone Consulting satisfaction During COVID-19 Pandemic

Results showed that the average attitude score of respondents was 6.5 ± 1.0 out of Range 5-7 demonstrated that most participants had a good attitude toward Telephone consulting during the pandemic.

Factors associated with Attitude toward Telephone Consulting satisfaction during COVID-19 Pandemic

There was no statistically significant association exists between attitude toward Telephone consulting during the COVID-19 pandemic and participants' gender they have the same mean 6.5 with (P value =.433). Other sociodemographic variables did not significantly affect attitude toward Telephone consulting during a pandemic. Having previous Telephone consulting was associated with a higher attitude toward Telephone consulting satisfaction but without a significant difference (P value =.827). (Table 5).

Table 5. Display of factors affecting attitude toward telephone consulting

Variable	Category	Attitude toward Telephone Consulting satisfaction		P value
		Mean	SD	
Gender *	Male	6.46	.989	.433
	Female	6.53	1.013	
Age (years) **	65 to 70	6.57	.983	.758
	70 to 80	6.47	.973	
	More than 80	6.48	1.042	
Nationality *	Saudi	6.48	1.002	.135
	Non-Saudi	6.84	.992	
Having previous Telephone consulting *	Yes	6.50	1.010	.827
	No	6.47	.934	

* Independent t test, ** One way ANOVA.

Discussion

The World Health Organization (WHO) defines telemedicine as “the delivery of health care services, where distance is a key factor, by all medical care professionals using Information and Communication Technologies (ICTs), for the diagnosis, treatment and prevention of disease and disability.” Furthermore, WHO has included telemedicine as one of its recommendations for essential services, as it has played an important role during the COVID-19 pandemic. (20, 21). The study on 518 geriatric patients regarding telephone consultation found that (90.73%) of participants say yes that the first time you have been consulted as a patient on the Telephone that they high desire to take advice over the telephone providers in person. Also, found that (91.89%) of participants agreed that the telephone services made healthcare easier today during the virus COVID-19 pandemic Similar to the present research, Abdel Nasser, A. et al. also found that (84.9%) their study participants agreed that the telephone services made healthcare easier today. This high desire for ease of telephone services is due to the increasing awareness of the Arab community after the events of COVID-19 and

in support of development and sustainability. The present study depicted that only (2.70%) of the participants were willing to participate in another telephone consultation. However, an increased number of participants (71.62%) expressed their desire to in the future to have telephone Consultation. This interesting finding suggests that patients wish to transform their healthcare towards virtual care in necessary situations. (18). A previous study in Australia reported that more than half of respondents (n=369, 61.9%) stated that their telemedicine experience was “just as good as” or “better than” their traditional in-person medical care experience (23). In contrast, another study conducted in the USA, which revealed that (65.2%) of patients reported that they prefer in-person visits (24). On the other hand, a study done by Abdel Nasser, A. et al. in 2021 stated that healthcare providers envisage decreasing telephone consultation in the future (48.9%) (18). Similar to the current study findings, Thirunavukkarasu, A.et al. also reported that most participants wished to prefer telemedicine even post-COVID-19 (74.4%) (20). The different study settings, inclusion criteria, and departments could be the cause of this striking difference between the studies. According to the current study's participants (76.83 %), they would not

be interested in participating in another telephone consultation. In the same way, Nasser A. et al. and Thirunavukkarasu, A., et al. also reported that technical difficulties and the scarcity of service availability in some health centers, lack of training for staff and technical support on TC no good interaction between them and patients. It is also important to ensure privacy and confidentiality of communication and the diversity of TC authentication methods. were the most frequently cited limitation by patients (18,21). Female participants had a non-significantly higher mean attitude score than the other participants, indicating that there was no statistically significant correlation between satisfaction scores and gender. In addition, satisfaction scores and age and nationality of participants did not differ significantly. Comparative outcomes to the ongoing review discoveries, Abdel Nasser, A. et al. There was a non-significant difference in satisfaction between the gender of the participants and the scores. Our study executed this cross-sectional survey faces with some limitations. Firstly, our survey is a descriptive observational study, hence we could not establish a casual relationship. Secondly, recall bias is a possibility. Lastly, it is signifiant for the entire country because the study is based at a single center.

Conclusion

Our study found that geriatrics at the Security Forces Hospital in Riyadh, Saudi Arabia, had a positive attitude toward telemedicine consultation during the COVID-19 pandemic at the primary care clinic. More research is needed to address the factors influencing attitudes toward telemedicine consultation. Future surveys should also compare people's experiences with telemedicine to experiences with in-person visits based on the health service provided.

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Prevalence of bronchial asthma and its impact on secondary school students in Al Majardah governorate, Aseer region, Saudi Arabia

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Abstract

Bronchial asthma is a major public health problem. The Saudi Initiative for Asthma (2012) reported that the prevalence of asthma in Saudi adults is not well known, but the overall prevalence in Saudi children ranged between 8 to 25%. The current study aimed to assess prevalence, identify triggers and risks and evaluate degree of control among Saudi children. A cross sectional study was conducted among secondary school students in the Al Majaridah governorate, Aseer region, Saudi Arabia using a structured questionnaire.. Responses were received from 792 students of both genders. Asthma prevalence was found to be 9.7%. Many asthmatic students report smoking and contact with animals as major triggers of asthma symptoms and more than two thirds of students had poor asthma control. In conclusion, most asthmatic students are not controlled and further studies of current health education available for students and families are required to explore why this is the case.

Objectives: The current study aimed to estimate the prevalence, to identify triggers and risk factors of asthma and to assess the degree of control among Saudi children in the Al Majaridah governorate. Aseer region, Saudi Arabia.

Methodology: This cross sectional study was conducted using a structured questionnaire which was distributed to all secondary school students in the Al Majaridah governorate during 2021. The questionnaire consisted of many parts; socio-demographics, risk factors, triggers of asthma and asthma control test questions. Data entry and analysis were made using SPSS.

Results: Out of a total 1490 secondary school students, 792 students participated in this study giving a response rate of 53%. The mean age of the participants was 17 years and the majority of them were male (62.9%). The prevalence of bronchial asthma was 9.7%. Risk factors of asthma at home were animals or birds (7%), cockroaches (14%), heavy exercise (32%) and smoking (8%). More than two thirds of participants had poorly controlled asthma .

Conclusion: The prevalence of bronchial asthma among students in the Al Majaridah governorate was similar to that in previous national studies. Most asthmatic students have poor control of their condition and intensive health education of students and their families is needed. Further studies are suggested to explore the reasons behind poor control of asthma among asthmatic students.

Key words: Bronchial asthma, Aseer, Risk factors, Control

Introduction

Bronchial asthma is a chronic airway inflammatory illness marked by bronchial hyper-reactivity and varying degrees of airway blockage. Clinical history, physical examination, and pulmonary function tests, including reversibility testing and bronchial reactivity measurement, are used to diagnose it [1].

The most prevalent symptoms of asthma were nasal congestion, sleep disturbance, and chest tightness, followed by wheezing and dyspnea, with a combination of symptoms (ie, wheezing, breathlessness, chest tightness, and cough) affecting the highest proportion of people.[2]. Infections and endotoxin exposure, for example, may be protective or pose risk, depending on the timing of exposure in infancy and childhood. Some prenatal risk factors, such as maternal smoking, are well known, but other factors including diet and nutrition, stress, antibiotic usage, and delivery mode may also influence the early development of allergy and asthma. Exposure to allergens later in childhood, during nursing (which may initially protect but ultimately increase the chance of sensitization), family size and structure, and gender are all potential risk factors [3-4]. Recurrence of childhood asthma in adulthood may be just as likely as new-onset asthma with an occupational cause. [5]

Bronchial Asthma is a major public health problem that affects people all over the world, with varying levels of prevalence and severity. Over the last few decades, there have been significant increases in the occurrence and severity of asthma in various geographical regions around the world. Asthma is a common chronic respiratory condition that affects more than 300 million individuals worldwide.[6-8] According to estimates from developed countries, it affects 11 and 20 % of all school-aged children. Asthma is one of the most frequent chronic diseases in children, with a higher prevalence in children than in adults [9].

In the past three decades, there has been an increase in the incidence of allergic disorders, including bronchial asthma. Asthma prevalence among children has also increased in the last two decades, including in Saudi Arabia [10].

Several cross-sectional studies conducted over the last 20-30 years showed an increased prevalence of allergic respiratory diseases worldwide, particularly among children in high-income countries, such as the United Kingdom (29%) Australia (30%), New Zealand (30%), and the United States of America (21%) [7-8]. In terms of asthma prevalence, clinical presentation, and natural history, there are significant differences between countries.

The incidence rate in children aged 6 to 10 years was reported to be less than 10% in some countries, such as Austria, Belgium, Finland, France, Italy, and Switzerland, while it was higher in others, such as the Czech Republic (14.7 %), Norway (13.6 %), Bulgaria (14.5 %), and Ireland (17.4 %). In Kuwait, asthma was present in 17% of the population. Asthma prevalence was reported to be 4.8%

- 7.7% in Egyptian infants and children under the age of four years.

The aim of the study is to find out the prevalence of bronchial asthma, the risk factors and the degree of symptom control among secondary school students of Al Majardah governorate, Aseer region, Saudi Arabia.

Subjects and Methods

This cross-sectional study was conducted among secondary school students in Al Majaridah governorate, Aseer region, Saudi Arabia. Al Majaridah, is a governorate of low altitude area (around 580 m above sea level); its climate is generally hot during summer time, warm during winter. The total population is about 53,418 residents.

The study was conducted over a period of 6 months, between March and September 2021.

In the Al Majaridah governorate there are nine secondary schools and approximately 1490 secondary school students who were invited to participate in this study.

In order to achieve the objectives of the study the questionnaire was constructed by the panel of experts based on relevant literature review. The questionnaire composed of questions regarding demographic variables, variables related to bronchial asthma risk factors, control and impact on health. [26]

The questionnaire was sent to students through school supervisors using a Google form that included instructions and information advising that informed consent should be secured before completing the questionnaire.

Ethical approval from the Regional Committee for Research Ethics in Aseer was obtained (REC-NO : 11-3-2021) Data was coded and entered in the SPSS ver.20 software for analysis. Descriptive (mean, S.D , frequency and percentages) of the variable's was computed, and for inferential statistics t tests and chi-square tests were used to measure the degree of association between variables and to assess the significant differences. P-value is considered significant if less than 5%.

Results

Out of a total 1490 secondary school students in the Al Majaridah governorate, 792 students participated in this study giving response rate of 53%. The mean age of the participants was 17.16 Most of them were male (62.9%). The average weight of the respondents was 58.6 kilogrammes and their average height was 162.02 centimeters.

Table 1 depicts the socio-demographic characteristics of students and finds that out of total 792 respondents 37.1% of the respondents were female while 62.9% were male. Most parents were educated (85%), most of the fathers were working in government sectors (29.4% in the army while 31.9% were in civilian jobs). Most of the mothers were not working (75.6%) and more than 25% of the students family income exceed 10000 SAR monthly.

Table 1: Socio demographic characteristic of secondary school students (in Al Majaridah 2021)

Sex		
	Frequency	Percent
Male	498	62.9
Female	294	37.1
Father's education level		
Father is dead	46	5.8
Illiterate	64	8.1
Middle	115	14.5
Primary	138	17.4
Secondary	215	27.1
University	214	27.0
Father's job		
Army	233	29.4
Government	253	31.9
No working	241	30.4
Special Duty	65	8.2
Monthly household income (Saudi riyal)		
From 5000 to 10000	250	31.6
less than 5000	332	41.9
More than 10000	210	26.5
Mother's education level		
	Frequency	Percent
Mother is dead	15	1.9
Illiterate	186	23.5
Middle	94	11.9
Primary	131	16.5
Secondary	177	22.3
University	189	23.9
Mother's work		
No Working	599	75.6
Working	193	24.4
Nationality		
Non Saudi	11	1.4
Saudi	781	98.6
Total	792	100.0
Ranking among siblings		
Middle	470	59.3
Not bigger	184	23.2
only one	5	.6
Smaller	133	16.8
The number of bedrooms in the house		
1	4	.5
2	120	15.2
3	261	33.0
4	187	23.6
5	220	27.8

Table 2: Profile of risk factors of bronchial asthma among students (in Al Majardah 2021)

Are there animals or birds in the house?		
	Frequency	Percent
Animals	56	7
Birds	55	7
No pets	681	86
Are there cockroaches in the house?		
No	684	86
Yes	108	14
Do you do a lot of exercise?		
No	542	68
Yes	250	32
Do you smoke?		
No	730	92
Yes	62	8
Does anyone in the family smoke?		
No	506	64
Yes	286	36

Table 2 depicts domestic risk factors among students with bronchial asthma. 7% have animals in their house, 7% have birds, 14% have cockroaches, 32% do massive exercise and 8% were smokers.

Table 3: Profile of asthma related symptoms among students (in Al Majardah 2021)

1. Have you had wheezing in the chest in the past?		
	Frequency	Percent
No	683	86
Yes	109	14
2. Have you had wheezing in the chest in the past 12 months?		
	Frequency	Percent
No	47	5.9
Yes	57	7.2
3. How many bouts of wheezing in the past 12 months?		
	Frequency	Percent
1 to 3	48	6.1
4 to 12	14	1.8
More than 12	9	1.1
No	35	4.4
4. In the past 12 months, how disturbed have you been during sleep due to asthma?		
	Frequency	Percent
I didn't wake up with wheezing	58	7.3
One night in a week	21	2.7
One or more nights in a week	23	2.9
5. During the past 12 months, has your breathing been difficult enough to limit your ability to speak one or two words between inhalation and exhalation?		
	Frequency	Percent
No	55	6.9
Yes	49	6.2
6. Have you ever suffered from asthma (allergic chest) before?		
	Frequency	Percent
No	30	3.7
Yes	77	9.7
7. During the past 12 months, have you experienced wheezing in your chest during or after exercising?		
	Frequency	Percent
No	26	3.2
Yes	51	6.4
8. During the past 12 months, have you had a dry cough at night due to asthma?		
	Frequency	Percent
No	36	4.5
Yes	41	5.1

Table 3 depicts that approximately 14% of students had wheezing in the chest while 7.2% had experienced wheezing in the past 12 months. Most of them had 1-3 attacks. Sleep disturbance due to asthma in the past 12 months was 6% while severe difficulty in breath was reported by 6%. Wheezing due to exercise was 6.4% while a dry cough at night was around 5%.

Table 4 : Association between risk factors and wheezing among asthmatic students

		Wheezing		Total	Chi-square	P value
		Yes	No			
Animals or Birds	Yes	7 70%	3 30%	10 100.0%	5.11	p=0.02
	No	22 33%	45 67%	67 100.0%		
Exercise	Yes	19 56%	15 44%	34 100.0%	0.667	p=0.41
	No	20 47%	23 53%	43 100.0%		
Smoking	Yes	33 67%	16 33%	49 100.0%	4.40	p=0.03
	No	12 43%	16 57%	28 100.0%		

Table 4 shows the association between wheezing and some risk factors for asthma. It was found that there were associations between wheezing and history of contact with birds or animals and a history of smoking. No association was found between performing exercise and wheezing.

Table 5: Pattern of drugs used among asthmatic students

Are you using or previously used any bronchial asthma medication?		
	Frequency (out of 54)	Percent
Steroid tablets		
Once daily	6	11%
Twice daily	3	5%
When necessary	14	26%
Steroid inhaler		
3 times daily	7	13%
Once daily	2	3%
Twice daily	6	11%
When necessary	15	27%
Intramuscular steroid		
3 times daily	2	3%
Once daily	5	9%
Twice daily	3	5%
When necessary	16	29%
Salbutamol with inhaled steroid		
3 times daily	3	5%
Once daily	10	18%
Twice daily	7	13%
When necessary	15	27%
Salbutamol nebulization		
3 times daily	2	3%
Once daily	5	9%
Twice daily	6	11%
When necessary	25	46%
Salbutamol inhaler		
3 times daily	6	11%
Once daily	11	20%
Twice daily	7	13%
When necessary	23	42%
Salbutamol syrup		
3 times daily	3	5%
Once daily	4	7%
Twice daily	5	9%
When necessary	16	29%
Salbutamol tablet		
3 times daily	3	5%
Once daily	3	5%
Twice daily	3	5%
When necessary	15	27%

Table 5 illustrates that 54 (70%) of the children previously used some form of bronchial asthma medication. Out of this 54 students 26% took steroid tablets when necessary, 27% reported using a steroid inhaler when necessary, 29% had an intramuscular steroid when necessary, 27% used Salbutamol inhalers with steroids when necessary. **Salbutamol nebulization** was also used when necessary among 46% of the children, compared to 42% for a Salbutamol inhaler, 29% for Salbutamol syrup, and 27% for salbutamol tablets.

Table 6: Bronchial asthma control among affected students (total number of affected students is 77)

During the past 4 weeks, how often have you had shortness of breath?			
		Frequency	Percent
	More than once a day	12	15%
	Once a day	11	14%
	3 to 6 times a week	8	10%
	Once or twice a week	13	16%
	Not at all	33	42%
During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication?			
	3 or more times a day	10	12%
	1 to 2 times per day	7	9%
	2 to 3 times per week	16	20%
	Once a week or less	8	10%
	Not at all	36	46%
During the past 4 weeks, how often did your asthma symptoms wake you up at night or earlier than usual in the morning?			
	4 or more nights a week	7	9%
	2 to 3 nights a week	15	19%
	Once a week	10	12%
	Once or twice	12	15%
	Not at all	33	42%
How would you rate your asthma control during the past 4 weeks?			
	Not controlled at all	17	22%
	Poorly controlled	6	7%
	Somewhat controlled	6	7%
	Well controlled	24	31%
	Completely controlled	24	31%
In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?			
	All of the time	7	9%
	Most of the time	7	9%
	Some of the time	26	33%
	A little of the time	14	18%
	None of the time	23	29%

Table 6 shows that 58% of the students experienced shortness of breath at differing levels. 54% had used their rescue inhaler or nebulizer medication, and 58% were woken up at night or earlier than usual in the morning due to asthma symptoms. Regarding perceived asthma control, 22% thought that their asthma was not controlled at all, while 62% thought that their asthma was well / totally controlled. Regarding the affect of asthma on their daily life, school and work, 33% reported some affect, 9% were affected all time while 29% reported no affect.

Figure 1. Asthma control level based on asthma severity score among students

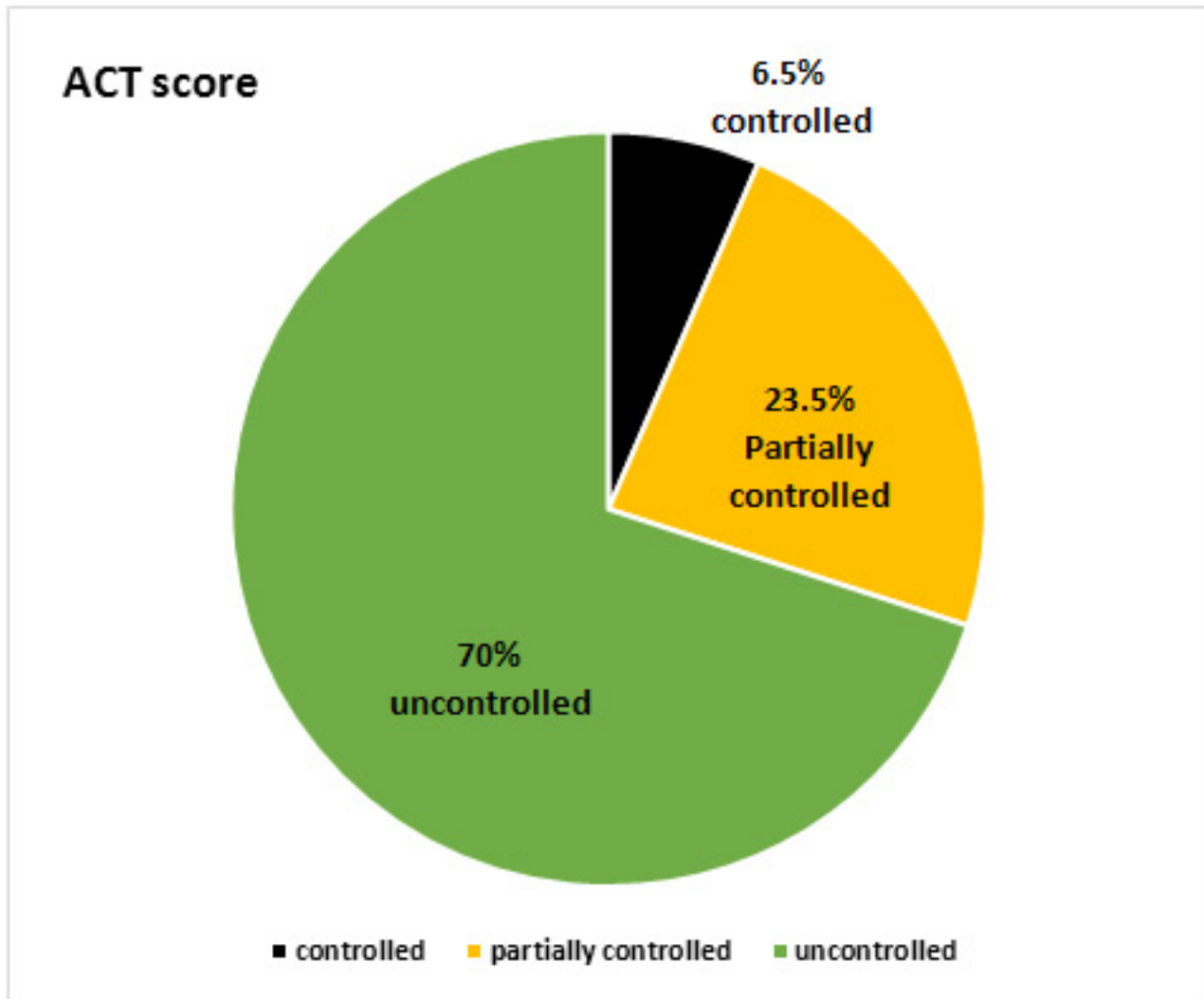


Figure 1 shows that the vast majority of the students (70%) had poor asthma control, (23.5%) reported partial control while (6.5%) reported good control.

Discussion

In Saudi Arabia, asthma is considered the 26th cause of mortality. [11] The prevalence of bronchial asthma is increasing in Saudi Arabia. [12]. The Saudi Initiative for Asthma (2012) reported that the prevalence of asthma in Saudi adults is not well known, but the overall prevalence in Saudi children ranged between 8 to 25 % [13].

The current study aimed to assess the prevalence, risk factors and impact of bronchial asthma on secondary school students in Al Majardah governorate, Aseer region, Saudi Arabia.

This study showed that 13.5% of the students had a history of wheezing while 9.7% of the students were diagnosed with bronchial asthma. This finding was consistent with other studies done in different regions of Saudi Arabia where the prevalence was 9.5% in al Khobar, [14] 9% in Abha, [15] 11.4% in Arar, [16] 13.1% in Al-Taif [17] and 14.1% in Jeddah. [18].

Many global studies reported different rates, for example in Oman 20%, [19] Qatar 19%, [20] and Iran 15.9%. [21] In English-speaking countries, the prevalence ranged from 17 to 30% in the United Kingdom, New Zealand and Australia [22]. In India, the prevalence of asthma varies greatly, ranging from 3.3 to 11.6% , It has been observed that urban areas have a higher prevalence than rural areas. [23] The reasons for such a wide variation in the estimated prevalence could be due to wide differences in samples, different methodologies, lack of consistency in age groups, rural-urban variation, study instruments, and criteria for a positive diagnosis.

In this study, we found that around 13% of all students were exposed to pets and insects, around 30% of students were involved in heavy exercise and around 8% were smokers. When studying the association between such triggers and the occurrence of wheezing, we found that smoking and contact with pets can have a positive association with wheezing attacks among students. In this regard, health education about such triggers is an important part of bronchial asthma management among students.

Regarding asthma control, the current study showed that more than two-thirds of the students had poor asthma control with less than one-third reporting good or partial control. This finding is accordance with other studies conducted in Saudi Arabia among 1009 patients which reported only 30% have controlled asthma. [24] More than half of the students had used their rescue inhaler or nebulizer medication, and also woken up at night or earlier than usual in the morning due to asthma symptoms. Regarding perceived asthma control, 22% thought that their asthma was not controlled at all, while 62% thought that their asthma was well/totally controlled .

Control of asthma is affected by many factors such as exposure to triggers, adherence of patients to their management plans and the use of appropriate anti-asthmatic drugs. In this regard, it is suggested that students with poor asthma control should undergo regular assessment and follow up appointments to identify the reasons and manage accordingly .

Concerning the effect of asthma on childrens' daily life, school, and work, about on third of students reported effects for some time, 9% reported asthma effects all the time and 29% reported no effects at all.

Regarding anti-asthma medications among affected students, we found that around one third had either used intra- muscular steroid injections, Salbutamol syrup or Salbutamol tablets. These findings could be due to a variety of causes such as doctors malpractice or self-prescribing by patients themselves from private pharmacies. This behaviour could explain poor control of asthma in the vast majority of students. In this regard it is suggested there is a need to increase health education for asthmatic students to address self-care issues and for medical practioners and pharmacists as recommended by SINA. [25]

The limitation of our study is that it is a cross-sectional study conducted in schools of one particular area. As a result, genuine prevalence and a direct causal link between risk variables within the community cannot be assumed. Similar studies could be conducted in other areas to gather consolidated data which would be helpful to plan national awareness programmes regarding asthma.

Conclusion and Recommendations

In conclusion, the prevalence of bronchial asthma among secondary school students in this study was within the estimated worldwide ranges despite the high variability for many factors . The students were exposed to some common risk factors like pets, smoking, exercise-induced, and air pollution. The vast majority of the students showed poor asthma control due to multiple factors such as a lack of adherence to medications, use of old medications that are prescribed either by patients themselves or non-updated doctors. This study identified some aspects of bad asthma management that needs urgent action to educate students and their families about the appropriate

management of asthma and to educate health care providers about evidence based guidelines of asthma management. Further studies are urgently needed to explore the magnitude and control of bronchial asthma among students in other governerates in the region.

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The effect of family support, knowledge, and socioeconomic status in controlling diabetes and its complications on the patient

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Abstract

Background: About 422 million people with diabetes worldwide live in low- and middle-income countries, and the disease directly causes 1.5 million fatalities yearly.

Objectives: to assess the impact of patients' knowledge and family factors in controlling (DM) and its complications.

Methods: a cross-sectional study was done on 137 DM patients. The Diabetes Care Profile (DCP) developed by the Michigan diabetes research and training center was used to measure the social and psychological factors of DM.

Results: 79.6% of the participants were checking their blood sugar and 39.5% were keeping a record of blood sugar test results. Of them, 23.4% had good DM education and 54.7% and 3.6% had fair and good DM understanding respectively. Almost 50% had good social support, 43.8 had good DM control and 56.2% had a good attitude toward DM. Of them, 47.4% had good diet adherence, 46% had long-term care benefit and only 27.7% had good monitoring and understanding management practice. Participants who had good DM understanding had a significantly higher percentage of those who were checking their blood sugar. A significant positive correlation was found between the Control Problems Scale and both the support scale and the

Diabetes Attitude Scale (DAS-3). A significant positive correlation was found between the support scale and the health status scale and the Diabetes Attitude Scale (DAS-3).

Conclusion: a relation between family support, knowledge, and socioeconomic status was found to have an effect on diabetes control and complications.

Keywords: support, knowledge, socioeconomic, controlling, diabetes, Saudi Arabia

Introduction

Diabetes mellitus (DM) is a collective name for a variety of metabolic abnormalities, the most common of which is chronic hyperglycemia. Poor insulin secretion, impaired insulin action, or both may be the root of the problem (1). Patients with prediabetes are at a greater risk of developing diabetes mellitus. Prediabetes is commonly described as blood glucose levels that are higher than normal but below diabetes thresholds (1).

The bulk of the approximately 422 million individuals with diabetes globally reside in low- and middle-income nations, and diabetes is directly responsible for 1.5 million fatalities annually (2). The prevalence of DM in Saudi Arabia's population is 8.5%, with men having a slightly higher prevalence than women (8.7% vs. 8.3%) (3). The incidence of DM rises with age, becoming particularly noticeable at 40 and older and peaking at 65, when it is 49.2% in the country. In Saudi Arabia, there are now 2,156,294 diabetic individuals who have been diagnosed and are over the age of 15 (3).

Poor management of DM might lead to problems. DM problems are typically brought on by persistently high blood sugar, which influences the body in two categories, macrovascular and microvascular, the latter of which is more noticeable than the former. Nerve damage, chronic kidney disease, and blindness are examples of microvascular consequences. Macrovascular problems, on the other hand, include primarily heart conditions, strokes, and reduced blood flow to limbs that results in their loss and eventual death (4).

The two main factors contributing to end-stage renal disease are diabetes and hypertension (5). DM doubles to triples the chance of having heart disease and stroke (6). DM can also lead to hypertension and speed up the development of atherosclerosis (7).

One billion people in the world are pre-diabetic, who may eventually end up with full-blown diabetes (8). Taking that into consideration, DM complications could decrease a patient's lifespan and have a detrimental influence on their lifestyle (9).

In Saudi Arabia, DM is linked to contemporary lifestyle practices such as inactivity, unhealthy food choices, obesity, and genetic factors (10).

The aim of this study was to assess the impact of patients' knowledge and family factors in controlling DM and its complications.

Subjects and Methods

A cross-sectional study was done in Saudi Arabia from May to August 2022. The inclusion criteria were DM patients > 24 years.

Sample size was obtained using a margin of error of 5% and a 95% coincidence interval and with the use of the following formula:

$$n = (z^2 \times p(1-p)) / \epsilon^2$$

where z is the z score= 95% confidence level is 1.96, ϵ is the margin of error = 5%, N is the population size and p is the population proportion=8.5% prevalence of DM in Saudi Arabia population is 8.5% according to general authority for statistics (3). The calculated sample size was 120 participants.

An online pre-designed questionnaire was used; the Diabetes Care Profile (DCP) is a survey method developed by the Michigan diabetes research and training center to measure the social and psychological factors of DM. The project described was supported by Grant Number P30DK020572 (MDRC) from the National Institute of Diabetes and Digestive and Kidney Diseases (11). The first section of the questionnaire included items to assess participants' demographics, DM history and blood sugar checkup. The second section included the following scales: health status scale, the Education / Advice Received scale, understanding scale, Support scale, Control Problems Scale, Diabetes Attitude Scale (DAS-3), Diet Adherence Scales, Long-term care benefits Scale and Monitoring Barriers and Understanding scale.

Ethical approval for the study was obtained from the research ethics committee of King Abdul-Aziz university hospital Jeddah, Saudi Arabia.

Data were analyzed statistically using (SPSS) version 26. To test the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test (χ^2) was used. Quantitative data was expressed as mean and standard deviation (Mean \pm SD), and non-parametric variables were tested using the Mann-Whitney test. Correlation analysis was performed using the Spearman's test, and a p-value of less than 0.05 was considered statistically significant.

Results

(Table 1) shows that the mean age of the participants was 52.18 ± 16.41 years and 55.5% were males. Of the participants, 73% were married, 92% had Saudi nationality and 50.4% had a bachelor's degree of education. More than half (57.7%) were living with ≥ 5 people; 35.8% had a 100001-15000 SR monthly income and 67.9% were unemployed. The mean DM duration was 12.03 ± 8.34 years; the mean days per week of testing blood sugar was 3.98 ± 2.62 days and the mean times of testing per day was 2.16 ± 1.96 times. Most of the participants (79.6%) were checking their blood sugar and 39.5% were keeping a record of blood sugar test results. The mean DM duration was 12.03 ± 8.34 years, the mean days of testing blood sugar weekly was 3.98 ± 2.62 days.

(Table 2) demonstrates that 38.7% of the participants had a good health status, 23.4% had good DM education and 54.7% and 3.6% had fair and good DM understanding respectively. Almost half of the participants (50.7%) had good social support, 43.8 had good DM control and 56.2% had a good attitude toward DM. Of them, 47.4% had good diet adherence, 46% had long-term care benefit and only 27.7% had monitoring and understanding management practice.

(Table 3 and 4) shows that a non-significant relationship was found between DM control and DM social support and participants' demographics, DM history and blood sugar checkup ($p > 0.05$). While participants who had a good DM understanding had a significantly higher percentage of those who were checking their blood sugar ($p < 0.05$) (Table 5).

(Table 6) shows that a non-significant relationship was found between DM control and all other scale results ($p > 0.05$).

(Table 7) shows that a significant positive correlation was found between the Control Problems Scale and the support scale ($r = 0.19$, $p\text{-value} = 0.024$), and a significant positive correlation was found between the Control Problems Scale and the Diabetes Attitude Scale (DAS-3). ($r = 0.18$, $p\text{-value} = 0.031$).

(Table 8) shows that a significant positive correlation was found between the support scale and the health status scale ($r = 0.17$, $p\text{-value} = 0.045$) and the Diabetes Attitude Scale (DAS-3). ($r = 0.25$, $p\text{-value} = 0.003$).

Table 1. Distribution of studied participants according to their demographics, DM history and blood sugar checkup (No.:137)

Variable	No. (%)
Age	52.18 ± 16.41
Gender	
Female	61 (44.5)
Male	76 (55.5)
Marital status	
Widow	4 (2.9)
Single	26 (19)
Married	100 (73)
Divorced	7 (5.1)
Nationality	
Saudi	126 (92)
Non-Saudi	11 (8)
Educational level	
Primary	8 (5.5)
Middle	5 (3.6)
Secondary	33 (24.1)
Bachelor's	69 (50.4)
Master	14 (10.2)
PhD	8 (5.8)
How many people live with you?	
One	7 (5.1)
Two	10 (7.3)
Three	13 (9.5)
Four	25 (18.2)
≥5	79 (57.7)
Lives alone	3 (2.2)
Monthly income	
<5000 SR	19 (13.9)
5000-10000 SR	25 (18.2)
100001-15000 SR	49 (35.8)
>15000 SR	44 (32.1)
Employment status	
Employed	44 (32.1)
Unemployed	73 (67.9)
Do you check your blood sugar?	
No	28 (20.4)
Yes	109 (79.6)
Do you keep a record of your blood sugar test results? (No. :109)	
Only unusual results	14 (12.8)
No	52 (47.7)
Yes	43 (39.5)
Diabetes duration	12.03 ± 8.34
How many days a week do you test your blood sugar?	3.98 ± 2.62
On the days you test, how often do you test your blood sugar during the day?	2.16 ± 1.96

Table 2. Distribution of studied participants according to results of used scales (Health status, Education / Advice Received, Understanding, Support, Control Problems Scale, Attitudes Toward Diabetes Scales, Diet Adherence Scales, Long-term care benefits Scale and Monitoring Barriers and Understanding) (No.:137)

Variable	No. (%)
HealthStatus	
Poor health status	84 (61.3)
Good health status	53 (38.7)
Education / Advice Received	
Poor education	105 (76.6)
Good education	32 (23.4)
Understanding	
Poor understanding	57 (41.6)
Fair understanding	75 (54.7)
Good understanding	5 (3.6)
Support	
Poor social support	68 (49.6)
Good social support	69 (50.4)
Control ProblemsScale	
Poor control	77 (56.2)
Good control	60 (43.8)
Attitudes Toward DiabetesScales	
Negative attitude	60 (43.8)
Positive attitude	77 (56.2)
Diet AdherenceScales	
Poor adherence	72 (52.6)
Good adherence	65 (47.4)
Long-term care benefitsScale	
Poor benefits	74 (54)
Good benefits	63 (46)
Monitoring Barriers and Understanding Management Practice	
Poor monitoring	99 (72.3)
Good monitoring	38 (27.7)

Table 3. Relationship between DM control and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Control Problems Scale		χ^2	p-value
	Poor control No. (%)	Good control No. (%)		
Age	54.01 ±15.52	49.82 ±17.33	1.38	0.166
Diabetes duration	12.84 ±8.26	10.98 ±8.39	1.49	0.136
How many days a week do you test your blood sugar?	4.14 ±2.82	3.8 ±2.38	0.26	0.794
On the days you test, how often do you test your blood sugar during the day?	2.21± 2.32	2.1 ±1.46	0.81	0.414
Gender				
Female	37 (48.1)	24 (40)	0.88	0.347
Male	40 (51.9)	36 (60)		
Marital status				
Widow	3 (3.9)	1 (1.7)	0.63	0.888
Single	14 (18.2)	12 (20)		
Married	56 (72.7)	44 (73.3)		
Divorced	4 (5.2)	3 (5)		
Nationality				
Saudi	72 (93.5)	54 (90)	0.56	0.454
Non-Saudi	5 (6.5)	6 (10)		
Educational level				
Primary	4 (50)	4 (6.7)	1.62	0.898
Middle	3 (3.9)	2 (3.3)		
Secondary	18 (23.4)	15 (25)		
Bachelor's master	41 (53.2)	28 (46.7)		
Master	8 (10.4)	6 (10)		
PhD	3 (3.9)	5 (8.3)		
How many people live with you?				
<5	31 (40.3)	27 (45)	0.31	0.577
≥5	46 (59.7)	33 (55)		
Monthly income				
<5000 SR	8 (10.4)	11 (18.3)	4.53	0.209
5000-10000 SR	28 (36.4)	16 (26.7)		
100001-15000 SR	30 (39)	19 (31.7)		
>15000 SR	11 (14.3)	14 (23.3)		
Employment status				
Employed	20 (26)	24 (40)	3.04	0.081
Unemployed	57 (74)	36 (60)		
Do you check your blood sugar?				
No	19 (24.7)	9 (15)	1.94	0.164
Yes	58 (75.3)	51 (85)		
Do you keep a record of your blood sugar test results? (No.:109)				
Only unusual results	10 (13)	4 (6.7)	4.19	0.241
No	27 (35.1)	25 (41.7)		
Yes	21 (27.3)	22 (36.7)		

Table 4. Relationship between social support and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Support		χ^2	p-value
	Poor social support No. (%)	Good social support No. (%)		
Age	51.49 ± 16.6	52.86 ± 16.31	0.7	0.478
Diabetes duration	11.55 ± 8.89	12.49 ± 7.79	1.15	0.247
How many days a week do you test your blood sugar?	4.41 ± 2.85	3.6 ± 2.36	1.27	0.201
On the days you test, how often do you test your blood sugar during the day?	2.37 ± 2.46	1.96 ± 1.36	0.09	0.922
Gender				
Female	34 (50)	27 (39.1)	1.63	0.201
Male	34 (50)	42 (60.9)		
Marital status				
Widow	1 (1.5)	3 (4.3)	1.32	0.722
Single	12 (17.6)	14 (20.3)		
Married	51 (75)	49 (71)		
Divorced	4 (5.9)	3 (4.3)		
Nationality				
Saudi	63 (92.6)	63 (91.3)	0.08	0.772
Non-Saudi	5 (7.4)	6 (8.7)		
Educational level				
Primary	4 (5.9)	4 (5.8)	0.98	0.964
Middle	2 (2.9)	3 (4.3)		
Secondary	18 (26.5)	15 (21.7)		
Bachelor's master	34 (50)	35 (50.7)		
Master	7 (10.3)	7 (50)		
PhD	3 (4.4)	5 (7.2)		
How many people live with you?				
< 5	31 (45.6)	27 (39.1)	0.58	0.444
≥ 5	37 (54.4)	42 (60.9)		
Monthly income				
<5000 SR	7 (10.3)	12 (17.4)	2.71	0.438
5000-10000 SR	20 (29.4)	24 (34.8)		
100001-15000 SR	28 (41.2)	21 (30.4)		
>15000 SR	13 (19.1)	12 (17.4)		
Employment status				
Employed	20 (49.4)	24 (34.8)	0.45	0.501
Unemployed	48 (70.6)	45 (65.2)		
Do you check your blood sugar?				
No	17 (25)	11 (15.9)	1.72	0.189
Yes	51 (75)	58 (84.1)		
Do you keep a record of your blood sugar test results? (No. :109)				
Only unusual results	2 (2.9)	12 (17.4)	1.08	0.28
No	25 (36.8)	27 (39.1)		
Yes	24 (35.3)	17 (27.5)		

Table 5. Relationship between DM understanding and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Understanding			χ^2	p-value
	Poor understanding No. (%)	Fair understanding No. (%)	Good understanding No. (%)		
Age	51.33 ± 16.47	52.71 ± 16.33	53.8 ± 20.2	2	0.584
Diabetes duration	12.06 ± 8.14	11.99 ± 8.33	12.2 ± 5.25	2	0.949
How many days a week do you test your blood sugar?	4.08 ± 2.56	3.94 ± 2.71	3.8 ± 2.16	2.3	0.905
On the days you test, how often do you test your blood sugar during the day?	2.39 ± 2.41	2.03 ± 1.71	2 ± 1.22	2.1	0.976
Gender				0.98	0.612
Female	27 (47.4)	31 (41.3)	3 (60)		
Male	30 (52.6)	44 (58.7)	2 (40)		
Marital status				7.26	0.297
Widow	2 (3.5)	1 (1.3)	1 (20)		
Single	12 (21.1)	13 (17.3)	1 (20)		
Married	39 (68.4)	58 (77.3)	3 (60)		
Divorced	4 (7)	3 (4)	0 (0.0)		
Nationality				2.57	0.277
Saudi	50 (87.7)	71 (94.7)	5 (100)		
Non-Saudi	7 (12.3)	4 (5.3)	0 (0.0)		
Educational level				5.95	0.819
Primary	3 (5.3)	4 (5.3)	1 (20)		
Middle	3 (5.3)	2 (2.7)	0 (0.0)		
Secondary	16 (28.1)	15 (20)	2 (40)		
Bachelor's master	26 (45.6)	41 (54.7)	2 (40)		
Master	5 (8.8)	9 (12)	0 (0.0)		
PhD	4 (7)	4 (5.3)	0 (0.0)		
How many people live with you?				1.01	0.602
< 5	27 (47.4)	29 (38.7)	2 (40)		
≥ 5	30 (52.6)	46 (61.3)	3 (60)		
Monthly income				5.63	0.566
<5000 SR	9 (15.8)	8 (10.7)	2 (40)		
5000-10000 SR	9 (15.8)	15 (20)	1 (20)		
100001-15000 SR	22 (38.6)	27 (36)	0 (0.0)		
>15000 SR	17 (29.8)	25 (33.3)	2 (40)		
Employment status				2.45	0.293
Employed	19 (33.3)	25 (33.3)	0 (0.0)		
Unemployed	38 (66.7)	50 (67.7)	5 (100)		
Do you check your blood sugar?				7.96	0.019
No	18 (31.6)	10 (13.3)	0 (0.0)		
Yes	39 (68.4)	65 (86.7)	5 (100)		
Do you keep a record of your blood sugar test results? (No. 109)				1.54	0.11
Only unusual results	2 (3.5)	10 (13.3)	2 (40)		
No	20 (35.1)	29 (38.7)	3 (60)		
Yes	17 (29.8)	26 (34.7)	0 (0.0)		

Table 6. Relationship between DM control and health status, education / advice received, understanding, support, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding (No.:137)

Variable	Control Problems Scale		χ^2	p-value
	Poor control No. (%)	Good control No. (%)		
HealthStatus				
Poor health status	41 (53.2)	43 (71.7)	4.82	0.128
Good health status	36 (46.8)	17 (28.3)		
Education / Advice Received				
Poor education	59 (76.6)	46 (76.7)	0.001	0.995
Good education	18 (23.4)	14 (23.3)		
Understanding				
Poor understanding	34 (44.2)	23 (38.3)	1.96	0.375
Fair understanding	39 (50.6)	36 (60)		
Good understanding	4 (5.2)	1 (1.7)		
Support				
Poor social support	42 (54.5)	26 (43.3)	1.69	0.193
Good social support	35 (45.5)	34 (56.7)		
Attitudes Toward Diabetes Scales				
Negative attitude	37 (48.1)	23 (38.3)	1.29	0.255
Positive attitude	40 (51.9)	37 (61.7)		
Diet Adherence Scales				
Poor adherence	43 (55.8)	29 (48.3)	0.76	0.382
Good adherence	34 (44.2)	31 (51.7)		
Long-term care benefits Scale				
Poor benefits	41 (53.2)	33 (55)	0.04	0.838
Good benefits	36 (46.8)	27 (45)		
Monitoring Barriers and Understanding Management Practice				
Poor monitoring	56 (72.7)	43 (71.7)	0.01	0.891
Good monitoring	21 (27.3)	17 (28.3)		

Table 7. Spearman's correlation analysis between Control Problems Scale scores and other scales scores (health status, education / advice received, understanding, support, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding)

Variable	Control Problems Scale	
	r	p-value
HealthStatus	-0.05	0.541
Education / Advice Received	0.01	0.91
Understanding	0.02	0.8
Support	0.19	0.024
Attitudes Toward Diabetes Scales	0.18	0.031
Diet Adherence Scales	-0.02	0.747
Long-term care benefits Scale	-0.01	0.844
Monitoring Barriers and Understanding Management	0.07	0.532

Table 8. Spearman's correlation analysis between support scale scores and other scales scores (health status, education / advice received, understanding, control problems scale, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding)

Variable	Support Scale	
	r	p-value
HealthStatus	0.17	0.045
Education / Advice Received	-0.17	0.079
Understanding	0.16	0.063
Attitudes Toward Diabetes Scales	0.25	0.003
Diet Adherence Scales	0.06	0.449
Long-term care benefits Scale	-0.13	0.123
Monitoring Barriers and Understanding Management	0.08	0.446

Discussion

The aim of this cross-sectional study was to identify the effectiveness of family support, knowledge, and socioeconomic status in controlling diabetes and its complications on the patient. In this part of the study, we will discuss the following measures: DM control, social support, and understanding level among multiple variables including age, gender, marital status, education level, number of people living with the patient, monthly income, employment status and the frequency of measuring blood glucose level.

The mean age of our patients was 52.18 ± 16.41 years, and this usually related to the fact that the patients who contributed to our research were 24 years old and above, so, most likely diagnosed with type 2 DM which affects older rather than younger age groups. The mean age of our patients is similar to that in other studies (12,13,14). Older aged patients had poorer control than younger aged patients, even though, the association isn't statistically significant as consistent with another study (15). Social support and understanding levels have not been significantly related to specific aged patients, as agreed with by this study (16). In fact, another study reached the conclusion that education programs about DM and its management should be started as young as possible in order to reflect good health outcomes for diabetic patients (17).

The majority of our patients were males (55%), moreover, the highest percentage of DM control was among males rather than females and this could be related to the fact that females have much less daily activity compared to males in Saudi Arabia, which has been denoted in studies done in Saudi Arabia (18,19). Another factor that helps males to have better control, is males are found to have more social support (60%) compared to female patients (40%). However, there is no significant relation between DM control and gender.

Social support and attitudes toward diabetes scales were significantly associated with the control scale, respectively. A cross-sectional study showed that social support reflected better self-management practices (17). The relation between education and understanding levels with DM control were similarly insignificant. Interestingly our analysis showed that Bachelor degree patients have more social support compared to lower and higher education levels in DM patients and this may be related to the fact that bachelor degree patients are in middle ages and mainly newly married so they have better social status and support which has been demonstrated by another study in which they found college degree patients had more social support compared to other levels (16). A cross-sectional study found that education levels with a college degree or more have superior glycosylated hemoglobin levels (7.0%) compared to those lower than college degree levels who had (7.3%) glycosylated hemoglobin level (20).

The number of people living with DM patients has been found to be associated with better social support, and patients who live with more than 5 people have better DM control and understanding levels. A cross-sectional study

among 405 adults attending diabetic outpatient clinics between May 2021 and June 2021 has implicated that the higher the number of family members, the more optimal self-management and control (21). Monthly income, employment status and frequency of measuring blood glucose level have not been found to be significantly associated with DM control.

Conclusion

This study has demonstrated the relation between family support, knowledge, and socioeconomic status and showed its effect on diabetes control and complications on the patient. Moreover, patients with diabetes should be evaluated in multiple social, educational, and economical aspects in order to preserve good diabetes control, decrease complications and reduce overall diabetes incidence and mortality.

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Determinants of and barriers to physical activity for women in Jeddah, Saudi Arabia

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Abstract

Background: Physical activity (PA) has been linked to a variety of health benefits, disease prevention, and treatment. Understanding cultural influences are important for the effective promotion of PA. This study examined PA among women in Jeddah, Saudi Arabia, and the determinants and barriers to it.

The research was conducted through a cross-sectional survey. The Arab Teens Lifestyle (ATLS) questionnaire was completed by 1238 randomly selected women in Jeddah. It includes the repetitions and average duration of different types of physical activities per typical week. In addition, the participants self-reported their anthropometric measurements.

Results: 76.4% met the minimum requirement for moderately vigorous physical activity (MVPA), but only 19.5% met both MVPA and muscle-strengthening activity (MSA). The two main barriers to participation in PA are the lack of sports facilities and time constraints. The number of comorbidities, calculated body mass index (BMI), and waist circumference were significant determinants of PA ($R^2 = .27$)

Conclusion: Women largely ignore MSA despite engaging in a high percentage of MVPA. The presence of comorbidities and obesity are the most important determinants of PA. Finally, these data can be used to develop early interventions to promote health instead of managing complications.

Keywords: Physical Activity, Obesity, Barriers, Determinants, Women, Sports, Saudi Arabia.

Introduction

Physical activity (PA) is defined as “any movement that requires energy expenditure”. Physical inactivity is a major public health concern around the world (1). Moreover, physical inactivity accounts for 0.3-4.6% of national healthcare spending (1). Inactive people have a 20-30% higher death rate (2). The WHO recommends 150-300 minutes of moderate activity per week or 75-150 minutes of vigorous activity per week for adults between 18 and 64. Further, two or more days of muscle-strengthening exercise per week are recommended for additional health benefits. Sedentary activity should also be limited. These recommendations apply to pregnant and post-partum women who have no obstetric contraindications.

Obesity and being overweight, diabetes mellitus, cardiovascular disease, mental disorders, osteoporosis, and cancer have all been linked to physical inactivity. (1,3,4). Regular physical activity has been shown to have significant benefits in reducing these complications (5). With relatively minor physical activity, significant health benefits can be obtained.6 MSA has a significant effect on improving muscular strength in healthy adult females. Training duration and repetition appear to be important determinants of muscular strength (7). In older women resistance training for a period of 8 weeks lowers inflammatory markers including high sensitivity CRP, IL6, TNF α , and TNF α gene expression and results in a change in body composition (8).

Physical inactivity is the most common noncommunicable disease risk factor among Saudis (9). It affects up to 85% of males and 91% of females (10). Physical inactivity affects 68% of females living in the western region of Saudi Arabia (11). The most common barriers to physical activity in middle-aged and older adults were identified as environmental factors and resources (12). Young females from the Middle East and North African countries engaged less in PA and reported significant barriers compared to young males (13).

Physical activity is the first step in preventing many diseases and promoting health and well-being. Despite the fact that there is a wealth of literature on PA behaviours in Saudi Arabia and other countries, (10,14) there is a lack of research on the prevalence of physical inactivity and the attitudes of women toward PA following a dramatic shift in physical activity and health promotion efforts by the Saudi government and health agencies. The purpose of this study is to assess physical activity among a spectrum of females from different age groups. In addition, to identify barriers, and determinants of physical activity five years after these regulations were implemented.

Materials and Methods

Study context and settings:

A cross-sectional study was conducted. A sample size of 378 was calculated, assuming a prevalence of physical inactivity of 43.3%, absolute precision of 5%, and a non-response rate of 10%.15 Women over the age of 18 who consented to participate in the study, residing in Jeddah City between November 2021 and September 2022, were included in the study. There were a variety of public places where participants could be approached, including parks, malls, and universities. They were asked to fill out a self-administered questionnaire. All participants provided written consent and were informed that their participation was entirely voluntary.

Data collection:

Basic demographic information, self-reported anthropometric measurements, information about obesity-related complications as per physician diagnosis, and their latest blood pressure reading were all requested in the questionnaire. Explanatory images were included to clarify waist circumference measurement and approximate pant size requested in the event that they did not remember their waist circumference. Following that, participants were asked to provide detailed physical activity types, average duration, and repetitions for a typical week. Additionally, the average time spent on TV/internet was examined. Responses ranges from (I don't use, 1-3 hours, >3-5 hours, > 5hours/day). Participants were asked about their motivation, barriers to physical activity, and preferences. With permission from the corresponding author, the questionnaire was adapted from the Arabic, validated Arab Teens Lifestyle (ATLS) questionnaire(16).

Data collection tool:

Walking, moderate-intensity sports (volleyball, table tennis, and bowling), swimming, household activities (gardening, car washing, and vacuuming) and dancing were all considered moderate-intensity activity and multiplied by four. High-intensity sports (soccer, tennis, handball, and basketball), self-defense exercises (kick boxing, judo, karate, taekwondo) and running, on the other hand, were considered high-intensity activities and multiplied by 8.17 The METs were then multiplied by the average duration of physical activity multiplied by the number of repetitions per week and expressed in METs-min/week.

Data analysis:

All data entered was compiled using the Statistical Package for Social Sciences (SPSS) version 20. For categorical and continuous variables, frequency, percentages, means, and standard deviations (SD) were used. Based on their total activity energy expenditure in METs-min/week, participants were divided into two groups. Physically inactive who had less than 600 METs-min/week (equal to 150 min/week of moderate physical activity), and physically active who had 600 METs-min/week or more. To compare the frequency and proportion of the two groups, cross-tabulation with Chi-Square tests was also used. Furthermore, linear regression analysis with the

enter method was used to predict the total time spent in PA. The following variables were entered in the regression analyses: age, BMI, waist circumference, systolic, diastolic blood pressure, and the number of comorbidities. Women were classified as non-active (PA < 600 MET/week), low level MVPA (PA > 600 but < 1,500 MET/week), moderate level MVPA (PA > 1,500 but < 3,000 MET/week), and high level MVPA (PA > 3,000 MET/week) in this questionnaire. The predictors of engaging in different levels of physical activities including high, moderate, and low levels were identified in comparison to the physically inactive group using multinomial logistic regression analysis. The level of statistical significance was set at $P < 0.05$.

Before beginning the study, the bioethical committee gave its approval.

Results

The characteristics of the study sample

The characteristics of the study sample are shown in Table 1. A total of 1238 women were included in the study (mean age=34.4± 13; mean BMI=26± 6.5). The vast majority (85.7%) of the sample were Saudi nationals. 54.5 % were married, 38.6 % were single, and the remainder were divorced or widowed. 63.3% had a bachelor's degree, while 29.5% had a secondary school education or below. The majority of participants (93.4%) were non-smokers. 23.5% and 28.1% were obese and overweight respectively and 67.1% achieved a minimum of 150 min/week (600 METs-min /week) of moderately vigorous physical activity (MVPA). Furthermore, active participants were divided into three categories: low level MVPA (37.9%) (600-1499 METs-min/week), moderate level MVPA (19.4%) (1500-2999 METs-min/week), and high level MVPA (9.9%) (>3000 METs-min/week). 21.9% of participants engaged in 2 or more days of MSA. While 19.5% meet both requirements of low level of MVPA and MSA.

Table 2 displays the barriers and preferences of participants toward physical activity. The most common barriers to exercise were a lack of time (38.4%) and a suitable facility (14.8%). More than half of the participants exercised alone, while (14%) exercised with friends. Around 30 % of respondents did not prefer a specific time to engage in physical activity, with night-time being preferred by 26% of women surveyed. 42.7% of participants practiced exercise at home, with 19.1% doing so in public places. Walking is the most popular form of physical activity among women, followed by jogging and muscle strengthening exercises.

Comparison between physically inactive and active groups

Table 3 contrasted groups that were physically active and inactive. In terms of socioeconomic factors, older people are more physically active than younger people. Single females are less physically active than married, divorced, or widowed women. Furthermore, higher educational attainment is common in physically active participants. In addition, public sector workers have

the highest percentage of physical activity (76%) while students have the lowest (57.4%). Additionally, (89.6%) of the respondents with more than two obesity-related comorbidities are physically active, compared to (59 %) of those who are disease-free. The level of physical activity did not differ between smokers and non-smokers. Physical activity is practiced by (78.8%) of obese participants and (68.1%) of participants with normal body weight.

Multinomial logistic regression classifying physical activity into non, low, moderate, and highly physically active

Model of multinomial logistic regression Table 4 shows that an increase in BMI is a significant predictor of engaging in a high and moderate level of MVPA, with (OR=1.2;95%CI: 1.06-1.39) and (OR=1.14;95%CI:1.03-1.26) respectively. Only the number of comorbidities was a significant predictor of high physical activity (OR= 2.79;95%CI: 1.56-4.97). Increased use of TV/computer, on the other hand, is a significant predictor of low physical activity (OR= 1.31; 95%CI:1.03-1.66).

Linear regression analysis, with outcome variable physical activity METs-min/week

Linear regression for predictors of total time spent in PA per week is displayed in Table 5. In descending order, the number of comorbidities, calculated BMI, and waist circumference were significant determinants for PA with (R= .524, R²=.274). This means that these determinants can explain 27% of the variance in the total time participants spent in PA.

Table 1: Characteristics of study sample(n=1238)

Variables	Mean (SD)
Age (years)	34.43 (12.976)
Weight(kg)	64.71 (15.817)
BMI	25.96 (6.477)
Physical activity (METs- min/week)	1339 (1352)
Time spent for physical activity (min/week)	264.90 (230.31)
Variables	Frequency (%)
Nationality:	
Saudi	1061 (85.7%)
Non-Saudi	177 (14.3%)
Social status:	
Married	675 (54.5%)
Single	478 (38.6%)
Widowed	25 (2.0%)
Divorced	60 (4.8%)
Educational level:	
Illiterate	15 (1.2%)
Secondary or below	365 (29.5%)
Bachelor's degree	784 (63.3%)
Post-graduate	74 (6.0%)
Smoking status:	
Smoker	82 (6.6%)
Non-smoker	1156 (93.4%)
Physical activity level:	
Physically inactive MVPA<600 METs-min/week	403 (32.6%)
Low level MVPA 600 -1499 METs-min/week	469 (37.9%)
Moderate level MVPA 1500-2999 METs-min/week	240 (19.4%)
High level MVPA 3000 or more METs-min/week	122 (9.9%)
Muscle strengthening MSA 2 or more days/week	270 (21.9%)
Meet both low level of MVPA and MSA	241 (19.5%)
BMI categories:	
Underweight(BMI<18.5)	108 (8.7%)
Normal weight(BMI 18.5-24.9)	457 (36.9%)
Overweight(BMI 25-29.9)	348 (28.1%)
Obese(BMI ≥30)	291 (23.5%)

Table 2: Barriers, and preferences of physical activity

Variables	Frequency (%)
Barriers to exercise*:	
Time limitation	476 (38.4%)
Other reasons	167 (13.4%)
Lack of suitable facility	183 (14.8%)
Afraid of criticism	36 (2.9%)
I think it is not important	31 (2.5%)
Have medical condition that limits PA	60 (4.8%)
Preferred exercise partner:	
Alone	671 (54.2%)
Friends	183 (14.8%)
Family members	154 (12.4%)
Work peers	15 (1.2%)
Other exercise partner	34 (2.7%)
Preferred time to exercise:	
No specific time	382 (30.9%)
Night	328 (26.5%)
Morning	169 (13.7%)
Evening	167 (13.5%)
Preferred place of exercise:	
Home	529 (42.7%)
Public spaces	236 (19.1%)
School	29 (2.3%)
Gym	145 (11.7%)
Others	78 (6.3%)
Preferred type of physical activity:	
Walking	467 (37.8%)
Jogging	189 (15.3%)
Muscle strengthening	125 (11%)
Moderate intensity exercise	87 (7%)
High intensity exercise	68 (5.5%)

*A list of common barriers was provided to participants who admitted to not doing any PA (they could select more than one barrier)

Table 3. Comparison between physically inactive and active groups

Variables	Physically inactive n=403(32.7%) N (%)	Physically active n=831(67.1%) N (%)	P value
Age			
≤ 40 years	302 (37.7%)	500 (62.3%)	< .01
> 40 years	101 (23.4%)	331 (76.6%)	
Social status			
Single	186 (39.0%)	291 (61.0%)	< .01
Married	192 (28.6%)	480 (71.4%)	
Widowed	7 (28%)	18 (72%)	
Divorced	18 (30%)	42 (70%)	
Occupation			
Health care worker	21 (29.6%)	50 (70.4%)	< .01
Student	152 (42.6%)	205 (57.4%)	
Housewife	99 (28%)	255 (72%)	
Public sector worker	59 (23.6%)	191 (76.4%)	
Private sector worker	31 (36%)	55 (74%)	
Educational level			
Illiterate	11 (73.3%)	4 (26.7%)	< .01
Secondary or below	115 (31.6%)	249 (68.4%)	
Bachelor's degree	260 (33.3%)	521 (66.7%)	
Post graduate studies	17 (23%)	57 (77%)	
BMI categories			
Underweight (18.5kg/m ²)	69 (53.6%)	52 (46.4%)	< .01
Normal (18.5 and 24.9kg/m ²)	174 (38.2%)	281 (61.8%)	
Overweight (25 and 29.9kg/m ²)	100 (28.9%)	246 (71.1%)	
Obese (≥30 kg/m ²)	62 (21.2%)	230 (78.8%)	
Presence of obesity related comorbidities			
None	345 (41.0%)	497 (59.0%)	< .01
1-2 comorbidities	51 (15.0%)	289 (85.0%)	
More than 2 comorbidities	5 (10.4%)	43 (89.6%)	
Smoking			
Smoker	22 (27.2%)	59 (72.8%)	.33
Non-smoker	381 (33%)	772 (67%)	

Activity classification based on above or below 150 min/week of total physical activity. To compare the two groups, the Chi-square test was used.

Table 4. Multinomial logistic regression classifying physical activity into non, low, moderate, and highly physically active

Variable	High level MVPA (>3000METs-min/week)		Moderate level MVPA (1500-2999METs-min/week)		Low level MVPA (600-1499METs-min/week)	
	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Calculated BMI	1.21 (1.06-1.39)	.01	1.138 (1.03-1.26)	.01	1.04 (.94-1.16)	.43
Waist circumference	1.04 (.99-1.08)	.08	1 (.97-1.03)	.99	.990 (.96-1.02)	.47
Number of comorbidities	2.79 (1.56-4.97)	.00	1.33 (.81-2.18)	.25	.753 (.46-1.25)	.27
Average time of watching TV/computer	.94 (.72-1.22)	.65	1.14 (.91-1.41)	.25	1.31 (1.03-1.66)	.03

Reference category: physically non-active

Table 5. Linear regression analysis, with outcome variable physical activity METs-min/week

Variables	Unstandardized coefficients		Standardized coefficients Beta	95% CI for B		P value
	B	Std. error		Upper bound	Lower bound	
Age	-8.86	7.92	-.08	-24.46	6.74	.26
Waist circumference	16.26	6.07	.18	4.31	28.22	< .01
Calculated BMI	75.53	20.07	.26	35.98	115.08	< .01
Number of comorbidities	534.94	94.79	.37	348.1	721.78	< .01
Systolic blood pressure	-12.4	7.99	-.1	-28.15	3.36	.12
Diastolic blood pressure	-2.90	10.78	-.02	-24.15	18.35	.79

Dependant variable: Total physical activity METs-min/week

Discussion

The current poll included 1238 women with a mean age of 34 years. Physically active people are older, have obesity and have obesity related comorbidities. Increasing BMI and the number of comorbidities is significant independent predictors of engaging in high physical activity. Almost one-third did not meet the minimum physical activity requirement, with only 10% achieving the cut-off of 3000 METs-min/week. Over the last 20 years, Saudi Arabia has had a high prevalence (43-91%) of physical inactivity among all adults, more markedly in women (18,19). According to a recent national survey, 51% of women met the recommended level of moderate to vigorous physical activity (20). This is consistent with a Jazan study that found 59% of females classified as physically active (21). Many factors contribute to our study participants' high level of physical activity when compared to other local studies. Initially, the PA assessing tool used by research (ATLS) included household chores, which are primarily performed by women. Secondly, there is increased awareness of the benefits of physical activity, as well as the availability of public spaces and fitness centres in Jeddah. This disparity

can also be explained by the season, as the current survey was conducted in the fall and winter seasons when the weather in Jeddah is pleasant.

Students and people of a younger age are less physically active than other groups of women. These findings are consistent with previous research that found a higher percentage of physical inactivity among female college students and office workers (46-61 percent).(22-24). Recent research indicates that physical activity fluctuates throughout life and decreases during some transitions. Subgroup support is therefore necessary in order to increase physical activity and decrease sedentary behaviours. Transitioning from childhood to adulthood is one of these transitions, where heavy workload is predominant and time constraints were the most common obstacle to PA.(25).

Walking is the most popular type of physical activity among participants, followed by jogging, and less frequently muscle strengthening. 21.9% of women practice two or more days per week of MSA and 20% only achieved both low-level MVPA and 2 or more days of MSA. Although the MSA in our study was higher than the reported national survey (19) which was less than 1%, it was far from

sufficient among study participants despite growing evidence of unique benefits for women (7,8). Physical inactivity among Saudi women can be attributed to a lack of understanding of the health benefits of PA (27).

Obesity and the presence of physical inactivity-related comorbidities are independent determinants of engaging in physical activity which is consistent with the local study (23). One explanation for these findings could be that many overweight/obese females are frequently involved in weight loss programmes involving physical activity and low-calorie diets.

In summary, the current study recruited a large number of women of various ages, socioeconomic backgrounds, and educational levels. A strength of the study is the use of valid, widely used tools that included both MVPA and MSA. Due to the random selection of participants the sample may not be representative. In addition, enrolling women in public spaces may inflate the results as a significant proportion of participants used to practice PA there. Secondly, responses were based on self-reported anthropometric measurements. A cohort study discovered that both genders tend to underreport their weight and overreport their height, causing BMI to be underestimated (28). The results of the study may not be generalizable as Saudi Arabia is a large country with varying weather, norms, and facilities and the findings may not be applicable to the entire population. More research is required to determine the influence of personal and virtual training on physical activity preference. Larger studies are needed to assess the impact of technology-assisted motivators, specifically the cross-country walking campaign Walk 30, which was launched by the Saudi Ministry of Health (MOH) in 2020 with the goal of achieving 8000 steps per day (29). It is a step counter feature of "Sehhaty," a Saudi Ministry of Health official smartphone application. More research on subgroups such as pregnant and postpartum women is required as well as postpartum women.

Conclusion

This research shed some light on the determinants and barriers to physical activity in a large group of women. The goal of this study was to identify key drivers of PA rather than to critically evaluate motivations and barriers. Obesity and the presence of comorbidities are the main determinants of engagement in PA. The findings of this study can be used to enhance awareness of physical activity in general, and MSA in particular for all women, as well as promote a reduction in sedentary behaviours. The benefits of an active lifestyle for all should be encouraged and should begin very early in life and across all weight categories. It should be recommended to all women, not just those who are sick or obese. Providing resources and activities for women that consider time, energy, and schedule constraints would be appropriate considerations as monitoring PA barriers is critical to the success of health-promoting initiatives.

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Vaccine Knowledge of Saudi Parents and Adherence to Immunization Schedule in Saudi Arabia

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Abstract

Objectives: Immunization is one of the best measures to limit the transition of infectious disease and disease severity. Despite that, vaccination programs are frequently affected by a delay in giving vaccines on time or ignorance and avoidance due to various reasons. Our study aimed to estimate the percentage of vaccination delay in our society and assess the level of parents' awareness about vaccine importance; finally, we will shed light on the effect of the coronavirus pandemic on the immunization schedule.

Methods: This cross-sectional study was conducted in Dawadmi, Saudi Arabia, from May 2022 to August 2022. Data were collected from parents using a structured questionnaire. Vaccinations were considered delayed if they occurred more than 30 days after the designated time. Parents residing outside Dawadmi or older than 65 years were excluded.

Results: Among 393 respondents, the majority were mothers, aged between 30-50 years. Overall, 88% adhered to the immunization schedule. Major reasons for delay were forgetting the vaccination date, unavailability of vaccines, and being busy at work. In comparison to the delayed group, parents who adhered to the immunization schedule were aware about its importance.

Conclusions: The majority of parents adhered to the immunization schedule. The most common reason was forgetting the vaccine date. Other reasons were the lack of vaccines in Primary Health Care. The commonly delayed vaccines were the 4 and 9-months vaccines. The pandemic affected adherence to vaccination schedules.

Keywords: vaccination, knowledge, Saudi parents, Immunization schedule

Introduction

Immunization programs are the cornerstone in fighting infectious diseases, and vaccines against infectious diseases are proven to reduce the severity of infections and limit the transmission of organisms. Therefore experts all over the world are encouraging health sectors to promote immunization programs and update them regularly. Vaccine-manufacturing companies are also being requested to supply enough quantities of vaccines worldwide. Despite all these efforts, there is a lack of vaccinations in certain countries. One of the major challenges to immunization programs is the adherence to the national immunization schedule by parents and caregivers. In Saudi Arabia, the aim of the National Immunization Program is specified in the vaccination certificate, from birth until the child starts his studying journey, to protect the children from various life-threatening diseases (1,2,3).

In this research, we aim to estimate the percentage of vaccination delays and to evaluate the parents' knowledge about vaccinating their children in the Dawadmi region. We also aimed to find out the obstacles to the children's timely primary vaccinations.

Methods

Study setting: This cross-sectional study was conducted in Dawadmi, Saudi Arabia between May 2022, to August 2022.

Study participants and Data collection: Parents residing in Dawadmi city were interviewed using a systematic questionnaire that included questions regarding socio-demographics, physical well-being of the child, status of vaccination, and the reasons for delaying vaccines. Parents were informed that any data supplied would be kept private. People residing outside Dawadmi or aged older than 65 years were excluded from participating in the survey.

The questionnaires used in the study were created using Google Forms and consisted of 40 items. The questions were written at a simple reading level in Arabic language. They contained 3 sections: (1) the child's personal information such as date of birth, gender, and nationality; (2) child vaccination status whether it is in regular time or delayed and if there is a delay, the reason for the delay; and (3) the parents' awareness of the type of vaccination for their child, the importance of vaccination, and the harmful effects of vaccination delay.

Assessment of delay: Vaccinations were considered delayed if they were received 30 days after the designated time, based on the national immunization schedule (3). This definition was similar to that used in other studies. Vaccinations in the first two years of life were assessed in this study. Parents were asked about the reasons behind each vaccine delay.

Sample Size: using Raosoft, Inc sample size calculator:

$$\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

N = population size • e = Margin of error (percentage in decimal form) • z = z-score
N= 314000 , e= 5% , Z= 95%=1.96 .This equal = 384

Analysis of data: IBM SPSS statistics, version 25, was used to enter and analyze data. Categorical variables were represented as percentages and frequencies. For comparisons, a Chi-square test of significance was used. P-values less than 0.05 were considered significant.

Ethical issues: the study protocol was evaluated and approved by the Biomedical Research Ethics Committee at Shaqra University. Approval Number (ERC_SU_20220056).

Results

Among the 393 respondents, 101 (25.7%) were males parents and 292 (74.3%) were females parents. Out of them, 15.8% were in the age group 20-29, 39.9% were in the age group 30-39, 32.3% were in the age group 40-49, and 12% of them were aged more than 50 years old. 95.7% of the participants were married, 3.3% were divorced, and 1% of them were a widow. Most of them had a bachelor's degree (74.3%), only 15.5% had diplomas, 5.3% had a Ph.D., and 4.8% had high school degrees. 63.4% of the participants were employed and 36.6 were not. Regarding the number of kids, 37.4% had one or 2 children, 31.6% had 3 or 4 and only 31% have more than 5 children. The majority of respondents were female 74% between the age group of 30-50, almost 96% were married, 74% had a bachelor's degree and 63% were employed (Table 1). 37.6% of the adherent group and 36.1% of the delayed group had 2 children or fewer. The adherent parents knew the type of vaccine (79.2%) and the importance of the vaccination program (92.2%) and the complication of delaying or missing vaccines (81.5%); 57.4% of the delayed parents did not know the importance of the vaccine (Table 1).

Table 1: Demographics

Bio-Demographics Data:	Characteristics	Adherence n (%) 346 (88%)	Delay n (%) 47(12%)	Participants =393 (%100)
Gender of Parents	Male	84 (24.3)	17 (36.2)	101 (25.7)
	Female	262 (75.7)	30 (63.8)	292 (74.3)
Age in groups	20 -29	57 (16.5)	5 (10.6)	62 (15.8)
	30 -39	138 (39.9)	19 (40.4)	157 (39.9)
	40 -49	106(30.6)	21 (32.3)	127 (32.3)
	=> 50	45 (13)	2 (12)	47 (12)
Marital Status	Married	329 (95.1)	47 (100)	376 (95.7)
	Divorced	13 (3.8)	0	13 (3.3)
	Widow	4 (1.2)	0	4 (1)
Educational Level	High school	17(4.9)	2(4.3)	19 (4.8)
	Diploma	52 (15)	9 (19.1)	61 (15.5)
	Bachelor	261(75.4)	31 (66)	292 (74.3)
	Master Degree/PhD	16 (4.6)	5 (10.6)	21 (5.3)
Employed status	Employee	213 (61.6)	37 (78.7)	250 (63.6)
	Non-Employee	133 (38.4)	10 (21.3)	143 (36.4)
Number of Children	1 or 2	130 (37.6)	17 (36.2)	147 (37.4)
	3 or 4	106 (30.6)	18(38.3)	124 (31.6)
	=> 5	110 (31.8)	12 (25.5)	122 (31)
Give vaccine as scheduled	Yes	NA	NA	346 (88)
	No	NA	NA	47 (12)

346 (88 %) of the respondents gave the vaccines at the scheduled time without delay, and 47 (12%) of the total respondents were late in giving their children vaccination on time. The most frequent cause was a missed immunization date, lack of vaccines in primary health care (PHC), and being busy at work, as shown in (Table 2).

Table 2: Type of Vaccine Delay

Type of vaccine	Delay total 47	The first common cause of delay (%)	The second common cause of delay (%)
Birth	0	NA	NA
2 months	35	Forgot the vaccine date (51.4)	Busy at Work (25.7)
4 months	36	Forgot the vaccine date (44.4)	Other (25)
6 months	31	Forgot the vaccine date (34.4)	Lack of vaccine in PHC (28.1)
9 months	36	Forgot the vaccine Date (44.4)	Lack of vaccine in PHC (33.3)
12 months	30	Other (30)	Forgot the vaccine date (26.7)
18 months	28	Forgot the vaccine date (46.4)	Other (28.6)
24 months	34	Forget the vaccine Date (35.3)	Other (35.3)

PHC= Primary Health Care

Table 3 represents the assessment of parents' knowledge in each group (adherent and delayed). We asked several questions regarding the vaccine knowledge: first question was whether there was a delay of the vaccines during the COVID-19 pandemic. A total of 70 parents (20.2%) of the adherent participants said their children's immunization were delaying during the COVID-19 pandemic compared to the delay group in which 42 (89.4%) had delayed immunization during the covid-19 pandemic. 28.9% of the adherent and 31.9% of the delayed group reported side effects in their children after the previous vaccination. 79.2% of the respondents of the adherent group compared to 46.8% of the delayed group knew the type of each vaccine, 92.2% and 57.4% of adherent and delayed group, respectively knew the importance of each vaccine, 81.5% of adherent group compared to 36.2% of delayed group knew the complications of delaying vaccines, 9.5% of the adherent group and 27.7% of the delayed group were reluctant to give further immunization to their children (Table 3).

Table 3: Assessments of parent's knowledge in each group

Item	Adherence (%)	Delay (%)
Delay vaccines during COVID-19 pandemic	70 (20.2)	42 (89.4)
Child had side effects from previous vaccines	100 (28.9)	15 (31.9)
Parents know the type of each vaccine	274 (79.2)	22 (46.8)
Parents know the importance of each vaccine	319 (92.2)	27 (57.4)
Parents know the complication of delaying vaccines	282 (81.5)	17 (36.2)
Parents reluctant to give future vaccines	33 (9.5)	13 (27.7)

Table 4 represents the comparison between the knowledge of parents with respect to age, employment status, and education level. Among the parents 112 had delayed immunization during the COVID-19 pandemic; out of those, 81 (72.3%) were employed, 72 (64%) were 40 years old or younger, and 88 (78.5%) had high education levels. out of 393 respondents, 115 (29.3%) reported the previous occurrence of side effects to vaccines; out of those, 72 (62.6%) are employed, 69 (60%) were 40 years old or younger, and 88 (76.5%) had high education levels. 296 (75.3%) of the parents know each type of vaccine 61.4% were employed, 55% of them were 40 years old or younger, and 81% had high education level. 88% of the parents knew the importance of the vaccines; the majority of them were employed, and aged less than 40 years with high education levels. 76.1% of the parents reported that they know the complications of delaying the vaccines, 63.2% of them were employed and 80% of them had high education. 46 parents (11.7%) were reluctant to give further vaccines to their children; majority of them were highly educated, 82.6% employed (Table 4).

Table 4 Comparing Knowledge in relation to age, employment status and education.

	Total 393 (100%)	Employed 250 (63.6%) (%)	Non- Employed 143 (36.4%) (%)	<40y years 219 (55.7%) (%)	>40y 174 (44.3%) (%)	Low Education level 80 (20.4%) (%)	High Education level 313 (79.6%) (%)
Delay vaccines during COVID-19 pandemic	112 (28.5)	81 (72.3)	31 (27.6)	72 (64)	40 (36)	24 (21.4)	88 (78.5)
Child had side effects from previous vaccines	115 (29.3)	72 (62.6)	43(37.4)	69 (60)	46 (40)	27 (23.4)	88 (76.5)
Parents know the type of each vaccine	296 (75.3)	182 (61.4)	114 (38.5)	163 (55)	133 (45)	56 (18.9)	240 (81.1)
Parents know the importance of each vaccine	346 (88)	220 (63.5)	126 (36.4)	193 (78.4)	153 (21.5)	68 (19.6)	278 (80.3)
Parents know the complication of delaying vaccines	299 (76.1)	189 (63.2)	110 (36.7)	165 (55.1)	134 (44.8)	60 (20)	239 (80)
Parents reluctant to give future vaccines	46 (11.7)	30 (65)	16 (34.7)	29 (63)	17 (37)	8 (17.3)	38 (82.6)

Discussion

Immunization programs carry a critical role in preventing and limiting the spread of infectious diseases. Successful immunization programs help in implementing the awareness and knowledge of populations toward these aims. In our study, we focused on assessing the level of awareness and knowledge of parents in Saudi Arabia about the national childhood immunization program and the level of adherence to its scheduled vaccines, in case of delaying the vaccines we aim to evaluate the reasons for delaying the vaccines and the impact of the coronavirus pandemic on vaccination program.

In our study, 88% of parents reported giving vaccines as scheduled, while 12% were delayed. Compared to previous studies in Saudi Arabia we have a lower percentage of delayed immunization (20%) and a higher percentage than a study conducted in northern Saudi Arabia in 2019 (9%) (4). Also our study had a higher percentage of delayed immunization than a study in western Saudi Arabia in 2002 (9%) (5), while our result was similar to Missed Opportunities for Immunization (12%) (6).

Approximately 78% of respondents reported that their children's vaccinations were up to date (7). The other 26% of parents did not vaccinate their children on time according to the national immunization schedule (8). International reports showed that there are variations between middle-income countries and high-income countries based on the percentage of immunization delayed or missed (7.6% vs 3%) (9).

The 4 months and 9 months vaccines were the most delayed vaccines 76.6% then the 2 months vaccine 74.5% , whereas the most missed or delayed vaccinations were at 24 months followed by the 9-month vaccinations in previous reports (7) and 18 months followed by 12months vaccines in other report (10) .

In one research conducted in Canada, we found overall 72.5% of all 2 years old with the incomplete immunization status, 16% of them in 2 months, 10.6% are in 4 months,14% at 6 months, and 31.8% at 12 months (11) most of the previous reports shows that parents tends to delay their children's immunization when they get older. Most on-time vaccines were the first dose vaccines and the delay started from 12-24months of age (12).

The most common cause of delayed vaccination was a forgotten vaccine date, followed by a lack of vaccines in primary health care centers and unavailability of time due to parents' employment, while in the other region of Saudi Arabia the most common cause was difficulties in the appointment (5).

Some studies investigated the effect of social media and information gathered from these platforms on immunization status and found that it has increased the odds of vaccines delay compared to official healthcare websites and institutions (7). Forgotten the vaccines time

is one of the major causes of vaccines delay followed by unavailability of the vaccines (13).

Marital status and the level of education did not impact the vaccination schedule in our study as most of our respondent had a bachelor degree. Our finding were aligned with earlier reports that shows no statistical significance between the level of educations and vaccination delay (14), whereas in International studies there were correlation between lower level of educations and increase in vaccines missing or delay (15).

There was no statistically significant deference in regard to vaccine delay and parental employments. Some international reports showed that maternal unemployment was associated with vaccines delay (15).

The majority of participants with delayed vaccination had 3 or more children (38.3%), while most of the non-delayed had 2 or less children (37.6%), which is consistent with several international and national reports that investigated the number of kids in relation to vaccination delay. Missed childhood vaccination was more common in households with more children. (8-10,15)

It was clear that the COVID-19 pandemic affected the health system worldwide including routine immunization and clinic visits (9, 16, 17) In our study the COVID-19 pandemic affected the parent's adherence to the immunization schedule. 89.4% of the delayed immunization occurred at the time of the COVID-19 pandemic.

Fear of contracting covid 19 during lockdown was one of the reasons for vaccine delay (10,14) , 38% of the parents were afraid of covid-19 [8] finding that was consistent in middle- and high-income countries (9).

Previous bad experience with vaccines was one of the reasons for delaying vaccines. In our study, we found that almost one-third of delaying vaccines was due to the previous side effect of vaccines. At the same time, almost a third of the children non- delayed group also developed some sort of side effect from vaccines. Comparing with a study conducted in the Aseer region shows that 42.8% of participants admitted that their children had side effects. Fear of the side effects of vaccines played a major role in the reluctance and delay in immunization. In one Italian study, 6% of parents refused to give their children vaccines because of the fear of side effects (13).

We found that almost half of the delayed group did not know the importance of immunization, and a third of them knew what are the complications and consequences of delaying the vaccines. Compared to a study conducted in Aseer, Saudi Arabia, shows a lower percentage of good awareness 75.5% (6).

When we asked about reluctance to give future vaccines, only 9% of the non-delayed group had no reluctance to give further vaccination but almost one-third of delaying parents were reluctant to give. No major difference was found in vaccine delay among the parents with respect to age.

Conclusion

In this study, we analyzed the parents' adherence to their children's immunization and the role of the Covid-19 pandemic in affecting the parents' adherence to child immunization. Most of the parents were adherent to the scheduled immunization program, but there was some delay in the immunization. The most encountered reason was forgetting the vaccine date. Other reasons were the lack of vaccines in PHC. The most delayed vaccines by the parents were the 4 and 9-months vaccines. The pandemic affected the adherence to immunization where nearly one-fifth of the adherent parents delayed the immunization because of the pandemic and almost all the delayed parents continued to delay during the pandemic. Poor knowledge about vaccine type was prevalent among the delayed parents. No major differences were found with respect to the different educational levels. More than half of the delayed parents did not know the complication of delaying the immunization and approximately more than two-fifths did not know its importance.

A noticeable low awareness from delayed parents, as well as the effect of the COVID-19 [Pandemic on the adherence of parents to their children's vaccines, was seen in our study. There is a need to increase the parents' awareness about vaccines, namely the types of vaccines, their benefits and how it is important to protect the child from serious infectious diseases and complications of delaying immunization.

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Understanding of risk factors and preventive measures of osteoporosis in postmenopausal women among the general population in Aseer region, Saudi Arabia

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Abstract

Millions of adults over the age of 50 suffer from devastating hip fractures each year, with millions more suffering from pelvic, spine, wrist, and shoulder fractures. Osteoporosis is a major public health concern around the world. In the United States, an estimated 10 million adults aged 50 and up had osteoporosis, with more than 5 million suffering from femoral neck osteoporosis, including 4.5 million women and 800,000 men.

Methods: In this cross-sectional study, data were collected by the purposely constructed questionnaire.

Results: Out of total 600 questionnaire distributed (Electronically and manually), 576 questionnaire were received , so the response rate was 96.0% , Cronbach alpha was 0.84. 42.6% were male respondents while 57.4% were females. Average age (S.D) was 35.6(12.5) .

Conclusion, Nursing staff should actively educate women, particularly postmenopausal women, about the importance of smoking cessation, walking/active lifestyle, and exercise regimens.

Keywords: preventive measures of osteoporosis, osteoporosis, postmenopausal women, Asir region, Saudi Arabia

Introduction

Millions of adults over the age of 50 suffer from devastating hip fractures each year, with millions more suffering from pelvic, spine, wrist, and shoulder fractures. These fractures are not an accident; the underlying cause is most likely osteoporosis. Osteoporosis is the most common type of bone disease, characterized by low bone mass and bone tissue loss, which can result in weak and fragile bones. People who have osteoporosis are more likely to suffer from broken bones and fractures.

Osteoporosis and osteoporosis-related fractures have consumed significant health resources over time and are now regarded as a public health concern. The first step in preventing and managing any health condition is to gain adequate knowledge and correct beliefs about the condition. Proper knowledge provides an excellent platform for sharing ideas between the healthcare provider and the patient, which is the foundation of any consultation's success. Inadequate knowledge about a health condition, on the other hand, puts patients at risk of complications and a poor prognosis of a condition that would otherwise be easily preventable or treated.

Advanced age, glucocorticoid use, nutritional factors, a low body mass index, and genetic factors are all risk factors for osteoporosis.

Osteoporosis is a major public health concern around the world. In the United States, an estimated 10 million adults aged 50 and above had osteoporosis, with more than 5 million suffering from femoral neck osteoporosis, including 4.5 million women and 800,000 men. Among Arab countries, Kuwaiti women aged 50 years or more had a high prevalence of osteopenia and osteoporosis (26.8 percent and 9.9 percent, respectively), with even higher figures reported in the Kingdom of Saudi Arabia (KSA) among women of the same age-group, where 31 percent had osteopenia and 40% had osteoporosis at the lumbar spine. These high rates in KSA highlight the importance of early detection of the silent disease and its underlying risk factors in order to plan preventive measures and control its progression.

Because osteoporosis is difficult to treat and still incurable, prevention is critical. It is, in fact, preventable by changing unhealthy lifestyle habits to increase bone mass density before it occurs. There is evidence that knowledge about osteoporosis is a major contributor to osteoporosis prevention behaviour. Estimating the population's level of knowledge can help guide public health programmes. The most important risk factors for osteoporosis are age, female sex, ethnic group, genetic factors, inherited factors, early menopause, slim silhouette and low body mass, diseases interfering with bone metabolism, some medications taken for a long time, insufficient physical activity, consumption of too little calcium and vitamin D, excessive alcohol, caffeine, cigarette smoking, and a protein-rich diet.

The main aim of this study is to find out the understanding of risk factors and preventive measures of osteoporosis in postmenopausal women among the general population in Aseer region, Saudi Arabia.

Methods

In this cross-sectional study, data were collected by a purposely constructed questionnaire. The questionnaire composed of the demographic items and items related to the understanding of risk factors and preventive measures of osteoporosis. The questionnaire was constructed after a series of discussions between a panel of experts. This panel was composed of a subject specialist, researcher, and language expert. Cronbach's alpha was calculated. The study was conducted in the Aseer region of Saudi Arabia.

After collection, data were coded and entered in the SPSS ver.20 software for analyses of descriptive statistics (mean standard deviation, frequencies, and %s were computed). To measure the significance differences t-test and chi-square test was used at 5% level of significance. Data was collected from the population who visited the primary health care centres. Ethical approval was obtained from King Khalid University, Saudi Arabia. The study duration was from January to April 2022.

Results

Out of total 600 questionnaires distributed (Electronically and manually), 576 responses were received, so the response rate was 96.0%, (Cronbach's alpha was 0.84). 42.6% were male respondents while 57.4% were females. The average age (S.D) of respondents was 35.6 (12.5).

In Table 2 we have compared demographic variables with the prevalence of osteoporosis. We found significant differences with gender, age and education status which have significant relationships while other variables have no significant relationships.

In Table 3 we have compared BMI and have observed that BMI does not produce any significant impact.

Table 1: Frequency of knowledge, awareness regarding osteoporosis

Do you think the taking hormone replacement therapy during the peri-menopausal period reduces the chance of developing osteoporosis?		
	Frequency	Percent
1	460	82.7
2	28	5.0
3	68	12.2
Do you think low intake of vitamin D in a diet & low vitamin D is a risk factor for osteoporosis?		
	Frequency	Percent
1.00	498	89.6
2.00	17	3.1
3.00	41	7.4
Do you think breast feeding increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	271	48.7
2.00	175	31.5
3.00	110	19.8
Do you think an inactive lifestyle increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	404	72.7
2.00	44	7.9
3.00	108	19.4
Do you think multiple births increase the chance of developing osteoporosis?		
	Frequency	Percent
1.00	371	66.7
2.00	71	12.8
3.00	114	20.5
Do you think low intake of calcium in a diet & low calcium is a risk factor for osteoporosis?		
	Frequency	Percent
1.00	472	84.9
2.00	34	6.1
3.00	50	9.0
Do you think reducing coffee / tea drinking is a preventative factor for osteoporosis?		
	Frequency	Percent
1.00	310	55.8
2.00	99	17.8
3.00	147	26.4
Do you think that quitting smoking is a preventative factor for osteoporosis?		
	Frequency	Percent
1.00	405	72.8
2.00	38	6.8
3.00	113	20.3
Do you think the early menopause increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	364	65.5
2.00	67	12.1
3.00	125	22.5

Table 1: Frequency of knowledge, awareness regarding osteoporosis (continued)

Do you think the excessive drinking of coffee/tea increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	249	44.8
2.00	161	29.0
3.00	146	26.3
Do you think exercising regularly and losing weight are preventing factor for osteoporosis?		
	Frequency	Percent
1.00	479	86.2
2.00	22	4.0
3.00	55	9.9
Do you think the long-term use of corticosteroids increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	254	45.7
2.00	30	5.4
3.00	272	48.9
Do you think the menopause increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	421	75.7
2.00	50	9.0
3.00	85	15.3
Do you think obesity increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	380	68.3
2.00	79	14.2
3.00	97	17.4
Do you think the seeing a doctor regularly in the peri-menopausal period has a role in preventing osteoporosis?		
	Frequency	Percent
1.00	449	80.8
2.00	23	4.1
3.00	84	15.1
Do you think smoking increases the chance of developing osteoporosis?		
	Frequency	Percent
1.00	374	67.3
2.00	41	7.4
3.00	141	25.4
Do you think taking calcium supplements and having a diet high in calcium during the peri-menopausal period reduces the chance of developing osteoporosis?		
	Frequency	Percent
1.00	403	72.5
2.00	39	7.0
3.00	114	20.5
Total	556	100.0

Table 2: Demographic variables

FHx of osteoporosis and Age					
		Age (years)			
		2.00	3.00	4.00	5.00
Do you have FHx of osteoporosis?	1.00	67	42	43	8
	2.00	188	63	39	4
	3.00	60	21	18	3
p=0.00001					
FHx of osteoporosis and educational status					
		Educational status			Total
		1.00	2.00	3.00	
Do you have FHx of osteoporosis?	1.00	3	56	101	160
	2.00	3	140	151	294
	3.00	3	44	55	102
p=0.042					
FHx of osteoporosis and marital status					
		Marital status		Total	
		1.00	2.00		
Do you have FHx of osteoporosis?	1.00	99	61	160	
	2.00	112	182	294	
	3.00	43	59	102	
Total		254	302	556	
p=0.00001					
FHx of osteoporosis and smoking habits					
		Smoking status			Total
		1.00	2.00	3.00	
Do you have FHx of osteoporosis ?	1.00	150	3	7	160
	2.00	254	10	30	294
	3.00	91	5	6	102
p=.109					
FHx of osteoporosis and average age of menopause					
		What is the average age of menopause ?			
		1.00	2.00	3.00	4.00
Do you have FHx of osteoporosis?	1.00	5	75	57	23
	2.00	2	141	111	40
	3.00	1	43	39	19
p=0.368					

Table 3: Comparison between BMI and Do you have FHx of osteoporosis?

Comparison between BMI and Do you have FHx of osteoporosis?									
Do you have FHx of osteoporosis?	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
BMI	1.336	.248	.094	452	.925	.13576	1.44409	-2.70	2.97

Figure 1: Prevalence of osteoporosis FHx of osteoporosis

Do you have FHx of osteoporosis ?

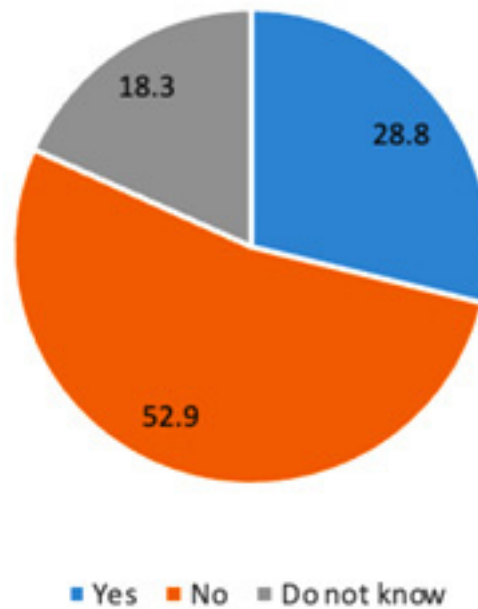


Figure 1 depicts that 28.8% have FHx of osteoporosis

Table 4: Views and practices of the respondents

		Do you think obesity increases the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	112	19	29
	2.00	203	47	44
	3.00	65	13	24
Total		380	79	97
p=0.280				
		Do you think the seeing a doctor regularly in the peri-menopausal period has a role in preventing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	125	5	30
	2.00	249	14	31
	3.00	75	4	23
Total		449	23	84
p=0.024				
		Do you think smoking increases the chance of developing osteoporosis ?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	105	8	47
	2.00	206	27	61
	3.00	63	6	33
Total		374	41	141
p=0.047				
		Do you think excessive drinking of coffee / tea increases the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	72	37	51
	2.00	139	98	57
	3.00	38	26	38
Total		249	161	146
p=0.001				
		Do you think exercising regularly and losing weight are preventing factors for osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	135	7	18
	2.00	260	10	24
	3.00	84	5	13
Total		479	22	55
p=0.564				
		Do you think the long-term use of corticosteroids increases the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	67	8	85
	2.00	146	19	129
	3.00	41	3	58
Total		254	30	272
p=0.115				

Table 4: Views and practices of the respondents (continued)

		Do you think the menopause increases the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	136	5	19
	2.00	214	35	45
	3.00	71	10	21
Total		421	50	85
p=0.005				
		Do you think taking calcium supplements and having a diet high in calcium during the peri-menopausal period reduces the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	118	9	33
	2.00	215	29	50
	3.00	70	1	31
Total		403	39	114
p=0.003				
		Do you think taking vitamin D supplements and a diet high in vitamin D during the peri-menopausal period reduces the chance of developing osteoporosis?		
		1.00	2.00	3.00
Do you have FHx of osteoporosis?	1.00	84	13	63
	2.00	189	22	83
	3.00	49	10	43
Total		322	45	189
p=0.023				
		Do you work or study in a health specialty ?		Total
		1.00	2.00	
Do you have FHx of osteoporosis?	1.00	52	108	160
	2.00	138	156	294
	3.00	39	63	102
Total		229	327	556
p=0.009				

Discussion

The main aim of the study was to find out the understanding of risk factors and preventive measures for osteoporosis in postmenopausal women among the general population in Aseer region, Saudi Arabia.

The current study found a link between the level of knowledge about osteoporosis and marital status, previous knowledge about osteoporosis, and the source of health information. According to the analysis, regardless of prior knowledge of osteoporosis, the majority of respondents had insufficient knowledge of osteoporosis and its prevention.

We discovered that less than half the patients could link caffeine, smoking, and alcohol consumption to an increased risk of osteoporosis. Smoking, caffeine and alcohol consumption have all been linked to lower bone mineral density. These findings suggest that raising awareness about risk factors for osteoporosis, such as low dietary calcium intake, caffeine consumption, early menopause, and sedentary lifestyle, may assist people at risk in taking steps to prevent disease occurrence. Individual and community awareness of all risk factors to the problem is critical for developing effective preventive methods for a specific disease.

Another significant finding reflected in the current study is the widely accepted fact that there is an inverse relationship between age and BMD in cases of osteopenia and osteoporosis, which is likely due to calcium mobilisation from bone. According to the current study, getting older increased the risk of osteopenia and osteoporosis.

In contrast to our findings, one Indian study discovered that in the views of the respondents there was no direct relationship between vitamin D levels and osteoporosis.

Women's health education campaigns demonstrating osteoporosis prevention measures, such as changing unhealthy lifestyles to maximize bone mass density, increasing calcium intake, and regular weight-bearing exercise, must be implemented.

This study recognises some limitations. However, the convenience sample is not representative of women outside of the selected region; additionally, the small sample size was another limitation that raised concerns about generalising its findings to Saudi Arabian women in general. It is suggested that future studies are conducted with larger sample sizes, including pre- and postmenopausal women from different regions of Saudi Arabia.

Conclusion

Osteoporosis is a serious public health issue that is currently causing worldwide concern. Because it is a silent and incurable disease, many people are unaware of it until complications arise. It is more prevalent in women after menopause. Because osteoporosis is difficult to treat and still incurable, prevention is critical. Overall, interprofessional team coordination is required to target the issue at the community level, which includes patient education and raising awareness through general practitioners. Social services can help reach out to specific populations and vulnerable groups.

Nursing staff should actively educate women, particularly postmenopausal women, about the importance of smoking cessation, walking/active lifestyle, and exercise regimens.

Referral to specialists is critical in preventing secondary osteoporosis in patients with non-modifiable risk factors, such as autoimmune diseases and long-term steroid use. Patient education and clear communication among members of interprofessional teams are critical for effectively assessing and evaluating women who present with this condition.

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Study epidemiology and determinants of COVID-19 infection among the population in Jeddah city, Saudi Arabia

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Abstract

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

Method: It was a cross sectional study of 405 subjects, who gave their responses through online Google form, as face to face interview of the subjects during outpatient clinic visits was not possible because of the pandemic of COVID-19 infection. Data was analyzed using SPSS software version 23. The level of significance was 0.05%.

Results: The prevalence of Covid-19 infection was 23.7%. The vaccination coverage by the Covid-19 vaccine was 90.4%. Those who got the infection before getting the vaccine were 76%; on the other hand those who got the infection after getting one dose were 17.7% of the cases, while 6.3% got the infection after getting two doses of the vaccine. Those with autoimmune disorders, kidney failure and obesity were reluctant to get the vaccine ($p < 0.05$). Married subjects, those with average income, and those who are employed were significantly more infected by COVID-19 ($p < 0.05$). Patients with asthma, with autoimmune disorders,

and those who did not take the COVID-19 vaccine, were significantly more vulnerable to COVID – 19 infection ($p < 0.05$). Post vaccination clinical manifestations were mainly feeling tired (90.2%), pain and swelling at the site of injection (76.9%), fever (65.9%) and headache (61.8%). Clinical manifestations associated with COVID-19 infection included fever (76.0%), headache (72.9%), loss of taste and smell (68.8%), body aches (67.7%), and sore throat (57.3%).

Conclusions: Prevalence of COVID-19 infection was 23.7%. About one third of the population did not accept the vaccine. Subjects with asthma, autoimmune disorders, and those who were unvaccinated were more likely to catch the infection. Increasing the knowledge of the people about the clinical aspects, and health impact of the COVID-19 virus on the community are important intervention tools to increase the acceptance rate of COVID-19 vaccination among the population.

Key words: COVI-19, clinical aspects and acceptance of COVID-19 infection.

Introduction

COVID-19 pandemic exposes and amplifies the existing inequalities in society (1-9). There are several risk factors for worse outcomes in patients with coronavirus 2019 disease (COVID-19) (10-20). COVID-19 vaccine is regarded as the most promising means of limiting the spread, or eliminating the pandemic. The success of this strategy will rely on the rate of vaccine acceptance globally (21). Most of the results indicated that most of the subjects agreed to get the vaccine for themselves and people under their care (22, 23). Most of the studies conducted among the general population revealed that gender, age, education, and occupation were some of the socio-demographic variables associated with vaccine acceptance. Variables such as trust in authorities, risk perception of COVID-19 infection, vaccine efficacy, current or previous influenza vaccination, and vaccine safety affected vaccine acceptance (24). Although there are reports of COVID-19 vaccine implementation in real-world populations, most of it came from high-income countries or from those with experience in messenger RNA technology vaccines; however, data on outcomes of vaccine deployment in low- or middle-income countries were lacking (25- 29). Thus, this study aimed to assess the burden and determinants of COVID-19 infection and vaccination in a primary health care setting in Jeddah, Saudi Arabia.

Methodology

It was a cross sectional study; the sampling method was a non-probability convenient one. Data was collected through online Google form, on 405 respondents residing in Saudi Arabia. Due to the restrictions on face to face interview with the outpatients due to the epidemic measures, data was collected via online route. Sample size was determined using G*power software, where $\alpha = 0.05$, Power = 0.95 effect size = 0.3, and degree of freedom= 5. The minimal sample size required was 277 (30). Data was collected on the respondents using structured questionnaire which provided information on socio-demographic, personal and clinical characteristics, as well as detailed information on COVID-19 infection and vaccination and its clinical symptoms and signs. The software SPSS (IBM compatible version 23), was used to analyze the data. Chi square test was used to analyze the data. The level of significance for the present study was 0.05. Availability of the data: the row data is available at the research center of ISNC and all results of the data are included in the paper.

Results

This study included 405 subjects with mean age of 30.05 years (SD: 13.536). The proportion of females was greater than that of males in the present study (59% and 41% respectively). The vaccination coverage by the COVID-19 vaccine was 90.4%. However, the occurrence of COVID-19 infection was 23.7%. Those who got the infection before getting the vaccine were 76%; on the other hand those who got the infection after getting one dose were 17.7% of the cases, while 6.3% got the infection after getting two doses of the vaccine.

Table 1 displays the relationship between personal characteristics and COVID-19 vaccine. No significant relationship was found between marital status, gender, nationality, education level, smoking and exercise and getting the vaccine ($p > 0.05$). On the other hand residence in rural areas or high monthly salary were associated significantly with acceptance of the vaccine ($p < 0.05$). Chronic morbidity was not significantly associated with taking the vaccine. On the other hand, those with autoimmune disorders, kidney failure and obesity were less likely to be vaccinated compared to the normal subjects (Table 2). Post vaccination clinical manifestations were mainly feeling tired (90.2%), pain and swelling at the site of injection (76.9%), fever (65.9%) and headache (61.8%), and to a lesser extent nausea (26.6%). Major manifestations like loss of consciousness (2.3%), and severe allergic reactions (4.6%) were also reported (Figure 1). Table 3 reveals that married subjects, those with average income, and those who are employed were significantly infected by COVID-19 compared to others. Table 4 reveals that patients with asthma, with autoimmune disorders, and those who did not take the COVID-19 vaccine, were significantly associated with COVID-19 infection ($p < 0.05$). Clinical manifestations associated with COVID-19 infection included fever (76.0%), headache (72.9%), loss of taste and smell (68.8%), body aches (67.7%), and sore throat (57.3%). Other manifestations included shortness of breath (47.9%), dizziness (37.5%), runny nose (37.5%), chest pain (34.4%), nausea and vomiting (29.2%), abdominal pain and diarrhea (28.1%) (Figure 2). Table 3 displays the relationship between personal characteristics and getting COVID-19 infection. No significant relationships were found between gender, area of residence and education level and getting the infection ($p > 0.05$). Manual workers were more vulnerable to infection ($p < 0.05$). Infection was higher among those with high monthly income ($p < 0.05$). Smoking was significantly associated with COVID-19 infection ($p < 0.05$). No significant relationship was found between exercising and getting the infection ($p > 0.05$). Marital status was significantly associated with getting the infection, ($p < 0.05$). Table 4 displays the relationships between co-morbidities and getting COVID-19 infection. No significant relationship was found between hypertension, ischemic heart disease and getting the infection ($p > 0.05$). On the other hand, autoimmune diseases were significantly associated with getting the infection ($p < 0.05$). The COVID 19 infection was significantly more common among the non-vaccinated subjects ($p < 0.05$).

Table 1: Distribution of studied subjects according to personal characteristics and COVID-19 vaccination

Variable	Category	Covid-19 Vaccine				Total		x2 (p)
		Yes		No		no.	%	
		no.	%	no.	%			
Gender	Female	212	57.9%	27	69.2%	239	59.0%	1.863 0.172
	Male	154	42.1%	12	30.8%	166	41.0%	
Nationality	Saudi	275	75.1%	27	69.2%	302	74.6%	0.648 0.421
	Non-Saudi	91	24.9%	12	30.8%	103	25.4%	
Residence	Rural	336	91.8%	31	79.5%	367	90.6%	6.288 0.012
	Urban	30	8.2%	8	20.5%	38	9.4%	
Education level	Less than University	126	34.4%	11	28.2%	137	33.8%	0.609 0.435
	University And above	240	65.6%	28	71.8%	268	66.2%	
Job	Unemployed	198	54.1%	20	51.3%	218	53.8%	6.682 0.035
	Manual worker	57	15.6%	12	30.8%	69	17.0%	
	Office job	111	30.3%	7	17.9%	118	29.1%	
Income per month	<5000SR	219	59.8%	24	61.5%	243	60.0%	1.333 0.514
	5000- 1000 SR	72	19.7%	5	12.8%	77	19.0%	
	>10000 SR	75	20.5%	10	25.6%	85	21.0%	
Smoker	Yes	73	19.9%	6	15.4%	79	19.5%	0.467 0.494
	No	293	80.1%	33	84.6%	326	80.5%	
Exercise	Yes	104	28.4%	9	23.1%	113	27.9%	0.499 0.480
	No	262	71.6%	30	76.9%	292	72.1%	
Marital status	Single	213	58.2%	20	51.3%	233	57.5%	1.380 0.710
	Married	137	37.4%	16	41.0%	153	37.8%	
	Divorced	12	3.3%	2	5.1%	14	3.5%	
	Widow	4	1.1%	1	2.6%	5	1.2%	

Table 2: Distribution of studied subjects according to co-morbidities and COVID-19 vaccination

Variable	Category	Covid-19 Vaccine				Total		x2 (p)
		Yes		No		no.	%	
		no.	%	no.	%			
Hypertension	Yes	36	9.8%	5	12.8%	41	10.1%	0.345 0.557
	No	330	90.2%	34	87.2%	364	89.9%	
Diabetes	Yes	27	7.4%	5	12.8%	32	7.9%	1.435 0.231
	No	339	92.6%	34	87.2%	373	92.1%	
Ischemic Heart disease	Yes	5	1.4%	1	2.6%	6	1.5%	0.347 0.556
	No	361	98.6%	38	97.4%	399	98.5%	
Allergy	Yes	60	16.4%	7	17.9%	67	16.5%	0.062 0.804
	No	306	83.6%	32	82.1%	338	83.5%	
Asthma	Yes	17	4.6%	3	7.7%	20	4.9%	0.697 0.404
	No	349	95.4%	36	92.3%	385	95.1%	
Autoimmune Disease	Yes	6	1.6%	3	7.7%	9	2.2%	5.943 0.015
	No	360	98.4%	36	92.3%	396	97.8%	
Kidney Failure	Yes	1	0.3%	1	2.6%	2	0.5%	3.764 0.052
	No	365	99.7%	38	97.4%	403	99.5%	
Obesity	Yes	57	15.6%	11	28.2%	68	16.8%	4.025 0.045
	No	309	84.4%	28	71.8%	337	83.2%	
Have you ever Taken any Covid-19 Vaccine	Yes	78	21.3%	18	46.2%	96	23.7%	12.02 0.001
	No	288	78.7%	21	53.8%	309	76.3%	

Figure 1. distribution of patients of covid-19 infection according to post vaccination side effects

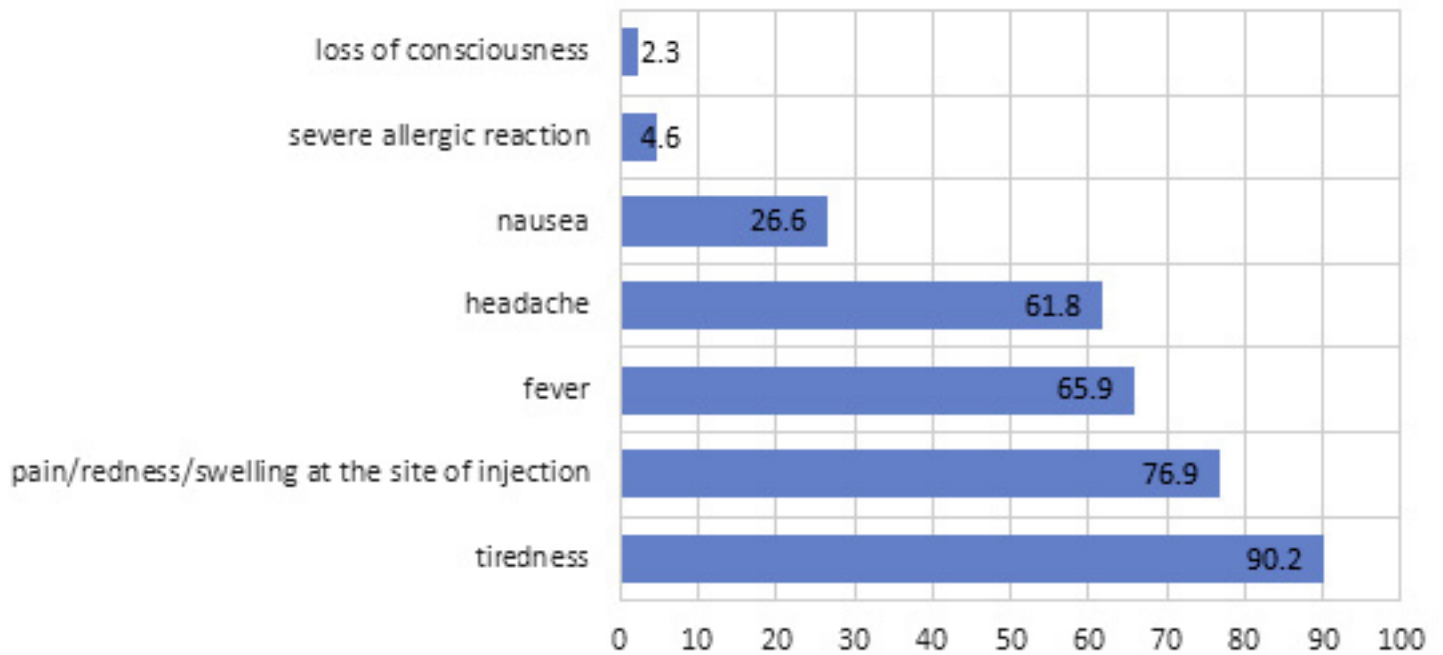


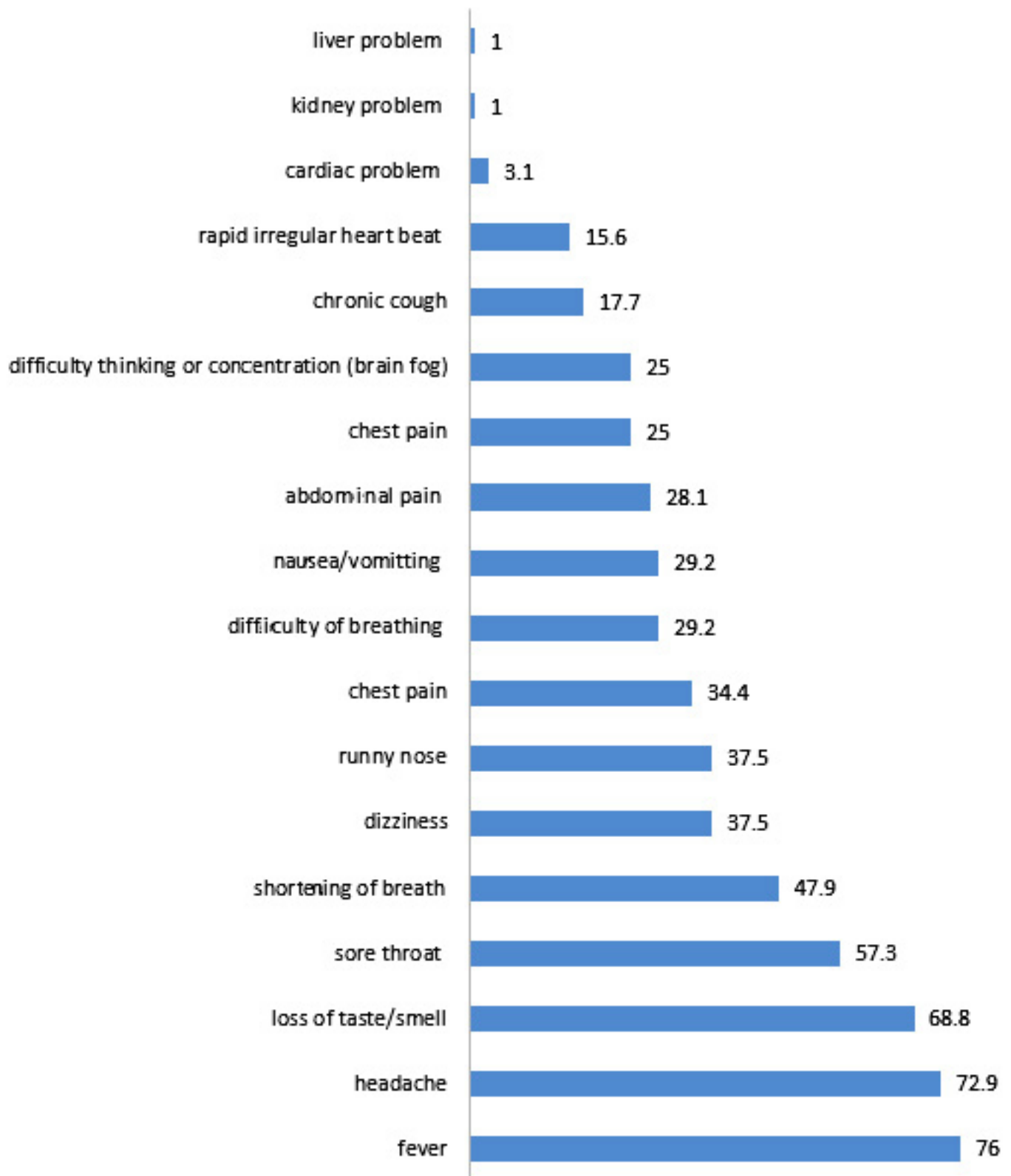
Table 3: distribution of studied subjects according to Personal characteristics and COVID-19 infection

Variable	Category	Covid-19 infection				Total		x2 (p)
		Yes		No		no.	%	
		no.	%	no.	%			
Gender	Female	54	56.3%	185	59.9%	239	59.0%	0.397 .529
	Male	42	43.8%	124	40.1%	166	41.0%	
Nationality	Saudi	75	78.1%	227	73.5%	302	74.6%	0.840 .360
	Non-Saudi	21	21.9%	38	26.5%	103	25.4%	
Residence	Rural	89	92.7%	278	90.0%	367	90.6%	0.647 0.421
	Urban	7	7.3%	31	10.0%	38	9.4%	
Education level	Less than University	27	28.1%	110	35.6%	137	33.8%	1.828 0.176
	University And above	69	71.9%	199	64.4%	268	66.2%	
Job	Unemployed	39	40.6%	179	57.9%	218	53.8%	9.99 0.007
	Manual worker	18	18.8%	51	16.5%	69	17.0%	
	Office job	39	40.6%	79	25.6%	118	29.1%	
Income per month	<5000SR	42	43.8%	201	65.0%	243	60.0%	21.204 .000
	5000- 1000 SR	33	34.4%	44	14.2%	77	19.0%	
	>10000 SR	21	21.9%	64	20.7%	85	21.0%	
Smoker	Yes	31	32.3%	48	15.5%	96	100.0%	13.100 .000
	No	65	67.7%	261	84.5%	309	100.0%	
Exercise	Yes	21	21.9%	92	29.8%	96	100.0%	2.271 .132
	No	75	78.1%	217	70.2%	309	100.0%	
Marital status	Single	47	49.0%	186	60.2%	233	57.5%	7.808 .050
	Married	41	42.7%	112	36.2%	153	37.8%	
	Divorced	7	7.3%	7	2.3%	14	3.5%	
	Widow	1	1.0%	4	1.3%	5	1.2%	

Table 4: distribution of studied subjects according to co-morbidities and COVID-19 infection

Variable	Category	Covid-19 infection				Total		x2 (p)
		Yes		No		no.	%	
		no.	%	no.	%			
Hypertension	Yes	12	12.5%	29	9.4%	41	10.1%	0.781 0.377
	No	84	87.5%	280	90.6%	364	89.9%	
Diabetes	Yes	11	11.5%	21	6.8%	32	7.9%	2.188 .139
	No	85	88.5%	288	29.2%	373	92.1%	
Ischemic Heart disease	Yes	1	1.0%	5	1.6%	6	1.5%	0.167 .683
	No	95	99.0%	304	98.4%	399	98.5%	
Asthma	Yes	9	9.4%	11	3.6%	20	4.9%	5.276 0.022
	No	87	90.6%	298	96.4%	385	95.1%	
Autoimmune Disease	Yes	5	5.2%	4	1.3%	9	2.2%	5.164 0.023
	No	91	94.8%	305	98.7%	396	97.8%	
Kidney Failure	Yes	2	2.1%	94	97.9%	2	0.5%	6.469 0.11
	No	0	0.0%	309	100.0%	403	99.5%	
Obesity	Yes	21	21.9%	47	15.2%	68	16.8%	2.329 .127
	No	75	78.1%	262	84.8%	337	83.2%	
Have you ever Taken any Covid-19 Vaccine	Yes	78	81.3%	288	93.2%	366	90.4%	12.027 .001
	No	18	18.8%	21	6.8%	39	9.6%	

Fig 2. Distribution of patients of covid-19 infection according to clinical manifestation



Discussion

This study was conducted to study the epidemiological characteristics of COVID-19 infection and vaccination among the population in Jeddah city, Saudi Arabia. The present study found that gender, age, and nationality were not significant determinants of COVID 19 infection or vaccination. This is not in line with previous studies (2-4, 9). However, educational level and occupation and marital status were significant determinants of COVID-19 infection in the present study. This is in line with other studies (3, 4). In the present study well-off subjects were keen to get the vaccine ($p < 0.05$). This is in line with a previous study (6). A previous study revealed that those with central obesity, hypertension, or smokers were associated with lower Ab titers following COVID-19 vaccination. They could benefit from earlier vaccine boosters or different vaccine schedules (7). However in the present study smokers and subjects with hypertension were reluctant to receive the vaccine. Physical exercise performed near the time of immunization may increase antibody response to vaccination (8). In the present study, no significant relationship was found between practicing exercise and getting the vaccine ($p > 0.05$). A previous study revealed that efficacy and safety of COVID-19 vaccination were comparable in patients with endocrine disorders and healthy subjects (12). In the present study no association was found between having diabetes mellitus and getting the vaccine. A previous study revealed that although cardiac complications that are associated with mRNA COVID-19 vaccines are rare, they can be life-threatening; furthermore chest pain should be considered an alarming symptom, especially in those who had received a second dose of the BNT162b2 vaccine in the last 3 days (13). This is not in line with the findings from the present study. Contrary to a previous study (13), no significant association was found between allergy occurrence and vaccination. In the present study getting the vaccine was significantly more common in patients with autoimmune diseases, obesity, or chronic kidney disease. This is in line with other studies (14-17). In the present study smoking, but not gender was significantly associated with COVID-19 infection. This is in line with other studies (23-26). The present study found that only those with autoimmune disorders significantly got the infection more compared to normal subjects. But for the other chronic disorders such as hypertension, diabetes mellitus, asthma and cardiovascular disorders infection was similar to normal subjects. This is not in line with other studies (27 –29). The present study found a significant relation between getting the vaccine and protection from getting infected with COVID-19 virus. This is in line with a previous study (30).

Limitations

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

Acknowledgments

We thank all the participants for their cooperation throughout the study.

Data Availability Statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Conclusion

Prevalence of COVID-19 infection was 23.7%. About one third of the population did not accept the vaccine. Subjects with asthma, autoimmune disorders, and those who were unvaccinated were more likely to catch the infection. Increase the knowledge of the people about the clinical aspects, and health impact of the virus of COVID-19 on the community are important intervention tools to increase the acceptance rate of COVID-19 vaccination among the population. Increase the knowledge of the people about the clinical aspects, health impact of the virus of COVID-19 on the population and the community are important intervention tools to increase the acceptance rate of the population.

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Professionalism Among Family Medicine Residents in Jeddah City, Saudi Arabia: A Cross Sectional Study

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Abstract

Background: Professionalism, one of CanMEDS competencies is related to the commitment to carry out professional responsibilities. Researchers have suggested different domains. Most important among them is teamwork, respect, sense of responsibility, ethical practice reflection and self-awareness. The most commonly used instruments are peer assessments, standardized checklist, OSCE, portfolio and incident reports. Our study was to assess professionalism among family medicine residents in Jeddah.

Aim: Professionalism among Saudi Meds FM was updated in Saudi Arabia in accordance with the release of the Ethics and Professionalism Handbook by SCHS; so, the current study was aimed to assess these changes among family medicine residents in Jeddah.

Methodology: It is a descriptive observational study conducted in Jeddah, Kingdom of Saudi Arabia. A self-administered validated questionnaire involving two residency training programs for family medicine residents from R1 to R4 was used for collection of data using consecutive sampling technique. Chi-squared test was used for statistical analysis using IBM SPSS, significant if p-value is below 0.05.

Result: A total of 120 participants replied with a response rate of 73%. The majority of them are female 84(70%), mean age is 27.3±2.7 and mostly are married 64(54%). Majority of them are junior residents (64%) and mostly affiliated in a joint residency training program (62%) which is being instituted by the Ministry of Health (MOH) (44%). Independent learning (89%) is the most common teaching method in family medicine residency program followed by interactive learning in the form of seminar or small group discussion (80%) and traditional lecture (78%). The residents are being assessed typically through the completion of their portfolio (84%) and OSCE (81%). Clinical teachers obtained an attitude score of 63.4± 15.3, their professionalism score in general is 68.1±18.

Conclusions: Family medicine institutions already have professionalism education program, but modification and enhancement of existing teaching tools is essential. Existing teaching and assessment methods have no significant effect on resident's attitude. Role modeling, although a powerful method is no longer adequate to ensure the enucleation of professional values in residents

Keywords: Family medical residents, Professionalism, Saudi Arabia,

Background

Medically, the professionalism term is widely used in the medical field, which is considered one of main factors affecting on the relationship between the patients and clinicians (1), as well as the professionalism promoting a patient safety state through enhancement of the decisions about revalidation processes (2). Therefore, the professional doctors provide best healthcare services (3). Recently, several definitions have become available and variants according to countries, cultures, and religions, so it is difficult to set a perfect definition of professionalism, an American Board of Medical Specialty is defining medical professionalism a professional competence of physicians in knowledge, clinical reasoning, use of communication, emotions, technical skills, reflection, and values in each medical practice (4).

According to The Canadian Medical Education Directives for Specialists (Can MEDS) professionalism is one of these competencies which should be included in the family medicine residency program (5). Professionalism is defined as a “commitment to carry out professional responsibilities, respect and adherence to ethical principles, and to be sensitive to diversity among patient population” (6).

In Saudi Arabia, medical professionalism has a direct effect with Islamic religion, so healthcare providers should have a set of core values that include honesty, responsibility, altruism, dedication, self-improvement, integrity, respect to colleague and patient, accountability, empathy, and compassion; these values were published by the Saudi Commission for Health of Specialties based on Canadian Medical Association Framework and the Canadian Medical Education Directives for Specialists (7, 8).

Globally, Hilton and Slotnick (9) proposed six domains of professionalism which include ethical practice, teamwork, respect, sense of responsibility, reflection, and self-awareness. Siegler (10) has described three domains of medical ethics and professionalism which might help in teaching professionalism and they include cognitive skills, character development and behavioral skills. Cohen (11) mentioned that professionalism should be assessed if it is considered important and should be viewed as both positive and relevant. When assessing professionalism, no single instrument could capture all its dimensions and a combination of multiple methods is necessary. The most used instruments are peer assessments, standardized checklist, OSCE, portfolio and incident reports (12). Professionalism can be taught and learned from lectures and different well-constructed methods in the formal curriculum and can be easily absorbed from role model in hidden curriculum (13).

Therefore, The Saudi Commission for Health of Specialties proposed Saudi Meds FM 2020 program including a 3-year residency program of which part of the Family Medicine among Saudi Competency Curriculum, the Saudi Meds FM 2020 was adapted from Can MEDS-FM 2017 from the Canadian Medical Association Framework and Canadian Medical Education Directives. Also, the Saudi Meds FM

includes several competencies such as Patient Care, Collaboration, Management, Communication, Medical Knowledge, Leadership, and Scholarship, behind the Professionalism (14).

Saudi Meds FM 2020 defined the professionalism a behavior and attitude of family physicians in regard to patients and colleagues. The Saudi Meds FM 2020 showed the family physician should have compassion, dignity, and respect toward the patients and colleagues, as well as well as putting the patients' needs before theirs and needs of self-interest (14).

According to Symbiosis Centre for Health Skills (SCHS), physician professionalism should include the whole community not restricted to healthcare institutes through professional behavior with patients and their families through listening carefully and showing the empathy with their complaints. Also, the physicians should collaborate with colleagues by acknowledging them, being grateful, and praising. These skills of professional physicians produce a healthy work environment and have significant effect on the quality of healthcare services, job wellbeing, and physician outcomes (15).

Saudi Meds FM 2020 aimed to improve residency training and quality among the physicians as part of training and education criteria of 2030 Vision of Saudi Arabia by improving the quality of training, increasing the residency capacity, and promoting underserved specialties (16).

Marisette et al's (17) qualitative study aimed to investigate the professionalism among Canadian Family Medicine residents at the University of Toronto. The result showed the positive role modeling of professionalism among Family Medicine residents. Another Canadian study was conducted on 70 field notes written by clinical educators from the Department of Family and Community Medicine, University of Toronto between 2015 and 2017. This study aimed to investigate the weakness points of medical professionalism. The authors concluded that professional practitioners need development of educational interventions regarding how to teach professionalism (18).

A cross-sectional study by Kebede et al (19) was conducted for residents in Ethiopia. The results showed high levels of professionalism. The authors emphasized the use of role models to be key in professional teaching providing students with lessons in professional behavior.

Seif-Farshad et al (20) conducted a study at Shahid Beheshti University of Medical Sciences and affiliated hospitals, Iran. It focused on the absence of teaching professionalism and relationship with unfavorable theoretical knowledge about medical professionalism in the country. The authors showed the need for formal training and education to ensure high correlation between patients and the medical community.

Recently, the Professionalism among Saudi Meds FM was updated in Saudi Arabia in accordance with the release of the Ethics and Professionalism Handbook by SCHS; so, the current study was aimed to assess these changes among family medicine residents in Jeddah.

Methodology

Study Area \ Setting

It is a descriptive observational study which was conducted in the western region, Jeddah in the Kingdom of Saudi Arabia at two Residency training programs for family medicine regulated by Saudi Commission for Health Sciences (SCFHS). The Family Medicine Program was at King Abdul-Aziz Medical City (KAMC).

Study Participants and Design

Total number of residents was 46 in KAMC-JD and 120 residents in the joint program.

Inclusion criteria: All residents.

Exclusion criteria: None, unless the resident did not want to participate. It was a quantitative descriptive cross-sectional survey. For residents in family medicine programs. It used a structured validated questionnaire

Sample Size and sampling

All KAMC and Joint Program residents in Jeddah from R1 to R4 with expected numbers of almost 165 residents. Non-probability consecutive sampling technique was used as all the residents were included in the study.

Data collection method

A self-administered previously validated questionnaires (8,9) was used for collection of data. The first part consists of characteristics and demographic variables of the participants. The second part of the checklist was for assessment of teaching and assessment of professionalism. The third part assessed the resident's attitude toward professionalism while in the last the clinical teacher's professionalism was assessed from the resident's perspective. In the clinical teacher's professionalism section, there are four domains namely, doctor patient relationship, doctor student relationship, inter professional relationship and doctor self-relationship. Questionnaires were distributed by researchers in paper format after briefing participants about the research and taking verbal consent. The participants were given 10-15 minutes to fill in the questionnaire.

Data Analysis

All the collected data was entered on Microsoft Excel program, and statistical analysis was performed using IBM SPSS (Version 24.0. Armonk, NY: IBM Corporation) after transferring it to the software. Categorical variables were described as proportion and percentage. Numerical variables were presented as mean and standard deviation for normally distributed data and median and interquartile range if skewed. For categorical variable comparison, chi-square test was used. It was statistically significant if P value was below 0.05.

Result

A total of 120 participants replied with a response rate of 73%. As depicted in Table 1, of a total of 120 respondents, the majority of them are female (70%) as compared to male (30%). Their mean age is 27.3 ± 2.7 and mostly are married (54%). The majority of them are junior residents (64%) and mostly affiliated in a joint residency training program (62%) being instituted by the Ministry of Health (MOH) (44%). Only few of them had obtained Master's and Doctorate degree (5%), however, the majority of them (89%) had attended an educational program on professionalism in their years of residency training.

Figure 1 shows that independent learning (89%) is the most common teaching method in family medicine residency program followed by interactive learning in the form of seminar or small group discussion (80%) and traditional lecture (78%). The residents are being assessed typically through the completion of their portfolio (84%) and OSCE (81%). However, self-reported confidence survey (37%), patient's satisfaction survey, and chart audit (42%) are not commonly used for assessment. (Figure 2)

Based on the findings of this study as depicted in Table 3, most of the residents agreed that continuous professional education, respecting patient's confidentiality/autonomy and honestly towards the patients are the attitudes that are mostly shown for being professionally responsible. In contrast, providing necessary medical care regardless of a patient's ability to pay and reporting significant error or malpractice of colleagues are the least of the respondents' concerns. In general, clinical teachers obtained an attitude score of 63.4 ± 15.3 .

In terms of clinical teachers' professionalism, Table 4 shows that the clinical teachers have a good interpersonal relationship with other health professional (70.7 ± 18). However, they are less likely aware of themselves and know their own limitations (66 ± 18). As such, their professionalism score in general is 68.1 ± 18 .

In the analysis of findings, attitude scores of residents and their assessment as for the professionalism score of clinical teachers varies significantly only according to their marital status in which unmarried or single people had higher attitude score (64.3 ± 15.9) compared to the other (p-value, 0.16). Likewise, the professionalism score towards the clinical teacher for unmarried or single residents is high (46.2 ± 22.3), p-value of 0.40. Lastly, correlational analysis was calculated and found out there is no significant correlation between the attitude score of residents towards professionalism and professionalism score of clinical teachers (p-value of .794).

Table 1. Demographic characteristics of the participants

Demographic Profile	N= 120	n (%)
Age (Mean age = 27.38±2.7)		
Gender		
Male		36 (30%)
Female		84 (70%)
Marital Status		
Married		64 (54%)
Unmarried		51 (43%)
Divorced/Widowed		4 (3%)
Residency Level		
Junior Residents		(64%)
Senior Residents		(37%)
Residency Training Program		
National Guard Program		46 (38%)
Joint Program		74 (62%)
Educational Background		
MBBS		113 (95%)
Masters		5 (4%)
PhD		1 (1%)

Figure 1. Teaching methods used by the participants

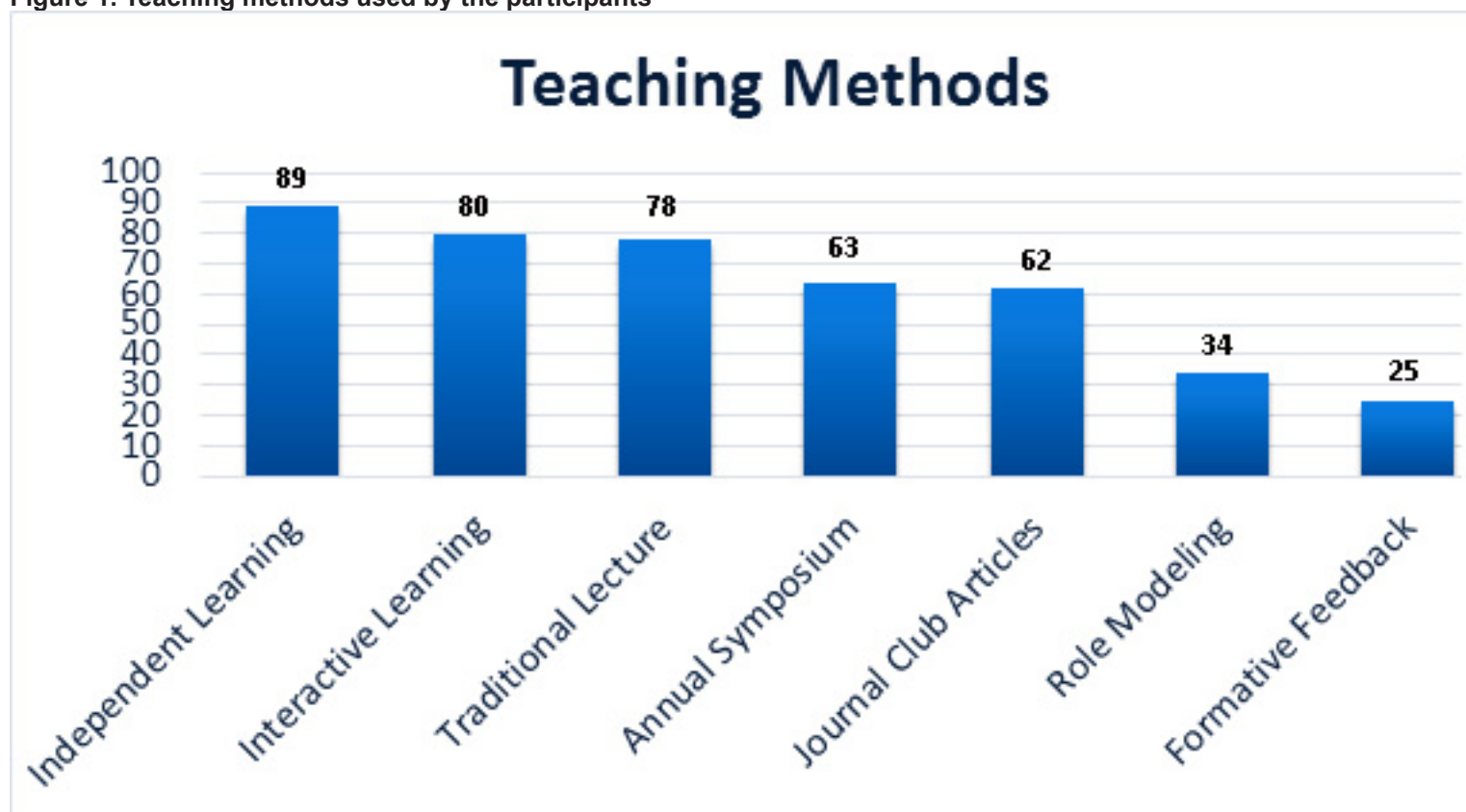


Figure 2. Assessment methods

Top and Lowest Assessment Methods

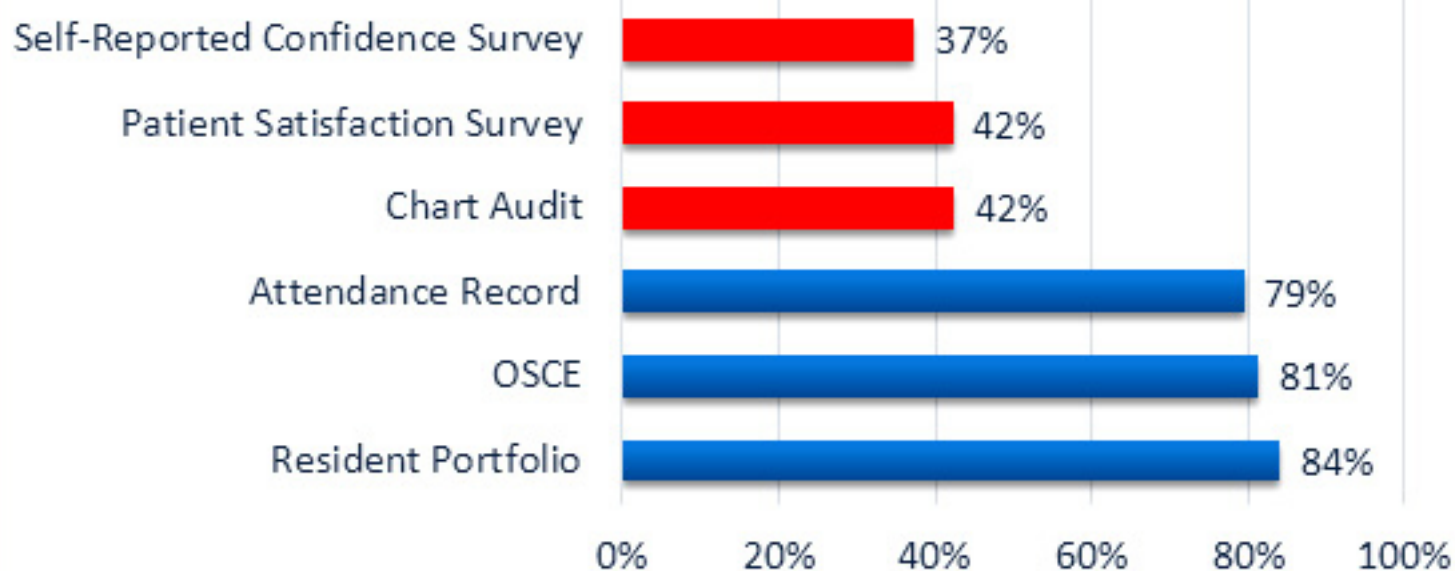


Table 2. Clinical Teacher's Professionalism Score as grouped according to demographic profile

Items	Professionalism Score (\pm SD)	p-value
Gender		
Male	44.5 \pm 22.1	0.28
Female	39.8 \pm 16.4	
Marital Status		
Married	37.5 \pm 13.9	0.04*
Unmarried	46.2 \pm 22.3	
Divorced/Widowed	31.3 \pm 2.9	
Residency Level		
Junior Residents	44.6 \pm 20.5	0.003*
Senior	35.3 \pm 11.8	
Residency Training Program		
National Guard Program	41.4 \pm 20.6	0.93
Joint Program	41.1 \pm 16.8	

Scatter plot of Clinical Teacher's Professionalism Score according to Age of Residents

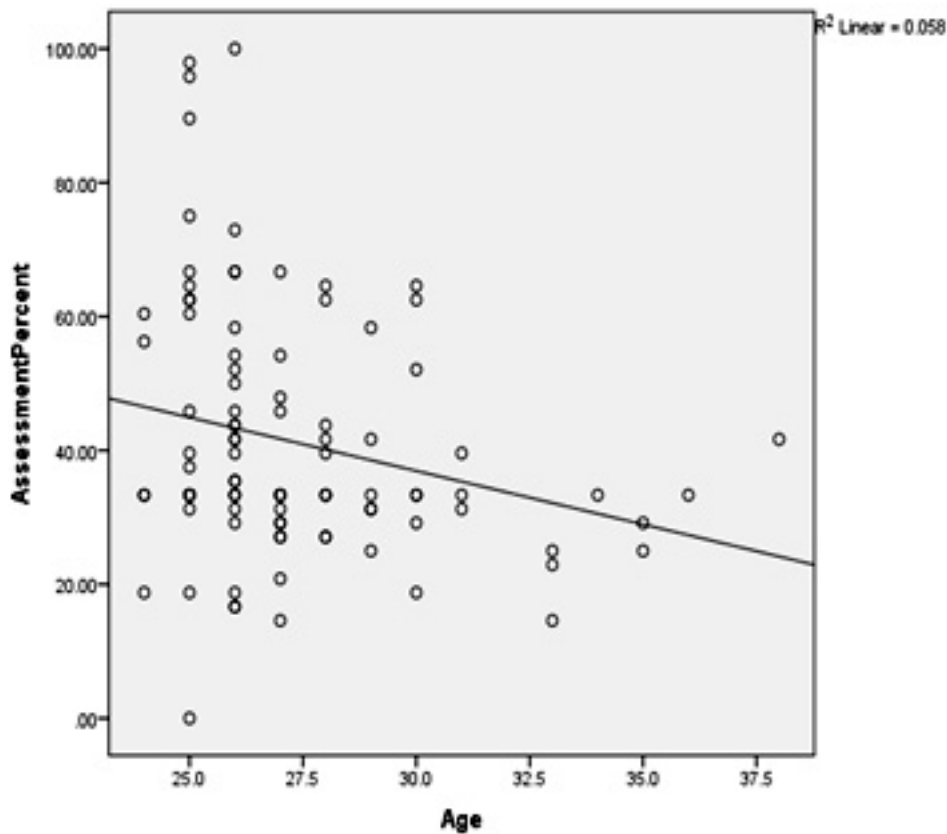
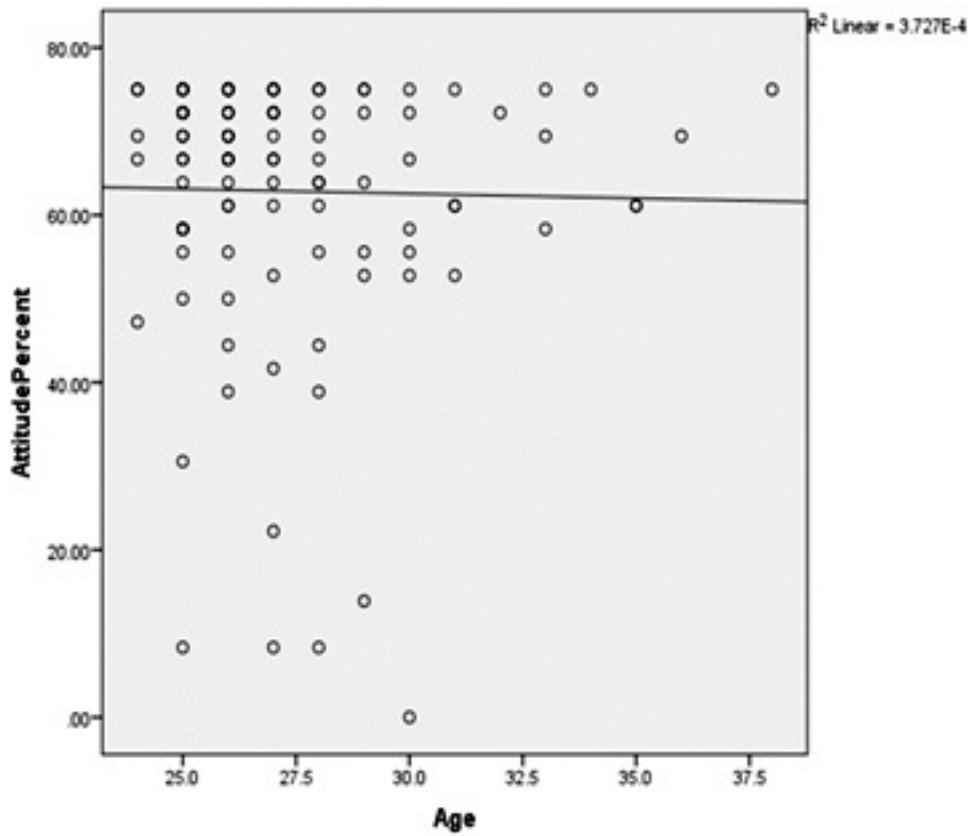


Table 3: Attitude Score of Residents as grouped according to demographic profile

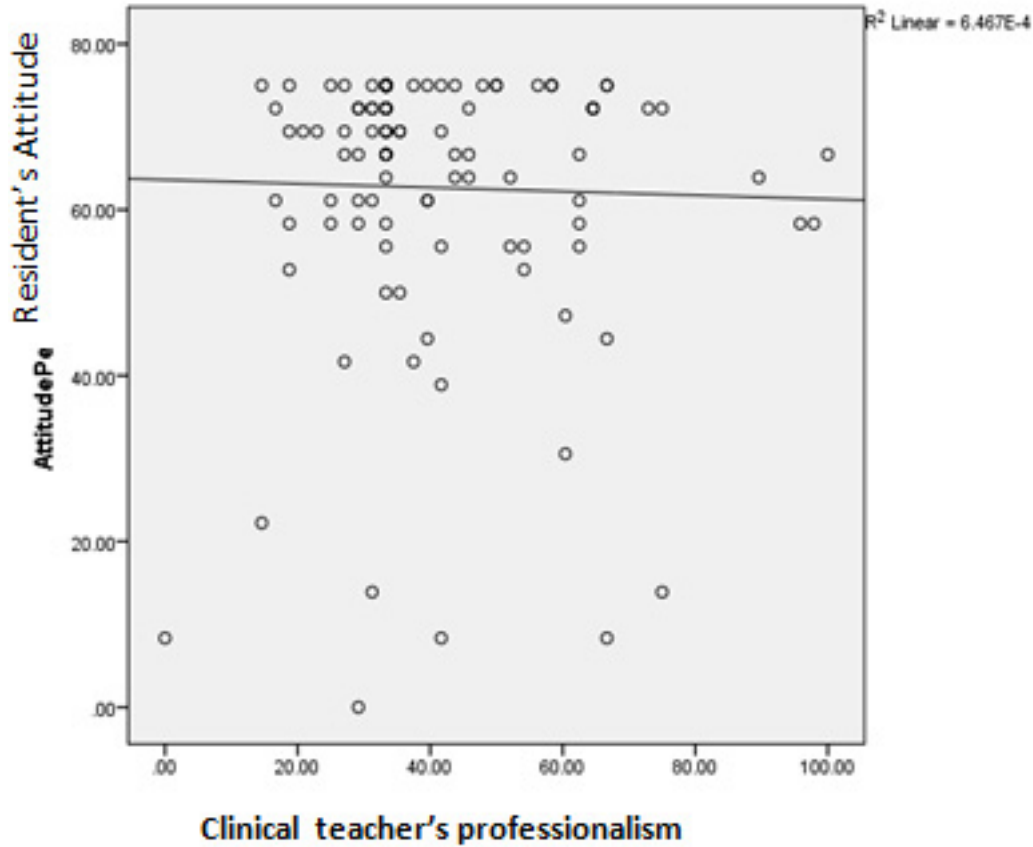
Items	Attitude Score (\pm SD)	p-value
Gender		
Male	62.3 \pm 16.2	0.81
Female	63.1 \pm 16.4	
Marital Status		
Married	62.9 \pm 15.2	.016*
Unmarried	64.3 \pm 15.9	
Divorced/Widowed	40.3 \pm 26.9	
Residency Level		
Junior Residents	64.2 \pm 15.7	0.22
Senior	60.4 \pm 17.0	
Residency Training Program		
National Guard Program	61.9 \pm 18.1	0.62
Joint Program	63.4 \pm 15.1	

The General Resident's Attitude Mean Score is 63.4 \pm 15.3

Scatter plot of Resident's Attitude Score according to Age



Correlation (Scatter Plot) of Residents Attitude and Clinical Teacher's Professionalism Score



Discussion

Based on literature review teaching encounters as proposed by Arnold include traditional lectures, case-based learning, small group discussion and seminars (10). A Canadian study published in 2020 assessed FM based on Can MEDS framework by investigating the level of Commitment to Ethical Practice included integrity, honesty, respect, commitment, humility, and compassion. The results showed approximately 50% of Canadian residents adhere to standards of practice, the professional and ethical and ethical codes, and laws governing practice (17). Compare with our results the Saudi residents showed a slightly higher number of 63% adherence. A recent Saudi study showed the Saudi resident adherence at about 68% among FM residents in Al Madinah region in 2021 (21).

Brownell and Côté's (22) study showed 93% of residents reported that contact with role models was the most important method of learning professionalism. Van Mook et al (13) stated that the most used instruments are peer assessment, OSCE, resident portfolio. Resident portfolio is an important and frequently used assessment methods in family medicine residency program as reported by 84% of our residents. In our study, the mean positive score of all four domains is 68.1% although the mean score was virtually acceptable. The teacher's professionalism is not at the appropriate level, since they lost around 30% of positive score which is a significantly high percentage to be lost. In our assumption at least a 90% positive score, we would be able to conclude that they behave professionally.

In 2019, a study was conducted to assess medical students' attitude and knowledge towards professionalism at various medical schools in Saudi Arabia. The results findings showed that most students have a positive perception and attitude regarding professionalism (23). In two other recent studies published in 2020 conducted on Saudi ophthalmologists, the results showed a high level of professionalism among them (24). Another study also showed a high level of professionalism among Saudi general surgeon residents (25). Also, the Alkahtani et al (24) and Hadedeya et al (25) Saudi Studies investigated the effect of use Can MEDS Competency Framework in the Saudi curriculum regarding development and improvement of professionalism among residents, as well as investigated the correlation with Clinical Leadership, these results showed residents embraced their acquisition of the Can MEDS competencies and attained a satisfactory level of leadership skills during their residency program. the results of these studies are compatible with our results about attitudes and knowledge of Saudi FM residents in Jeddah,

Consequently, the residents lack a desirable role model capable of triggering and internalizing complete professionalism concept. Consistent with our study, resident's perception about professionalism of their clinical teachers at Tehran University of medical sciences TUMS in Iran 2016, had a mean positive score of 60.35 %

(26). Junior residents in first and second year of residency program had slightly but significantly higher evaluation for all dimensions compared to senior residents. A similar finding was made in a professional survey in Taiwan, in which first and second year students had a slightly higher evaluation for all dimensions compared to older students (27). Overall residents show a relatively positive attitude toward professionalism 63.4%. Roland et al (28) study showed that the attitude score in USA and UK doctors were 63.1% and 59.36 % respectively. Residents' attitudes didn't show any difference by residency level or training years, which means that there is no direct effect of teaching and assessment methods on resident's attitude score. Jha et al (29) mentioned that there is evidence to support that teaching and learning experience will positively impact on attitudes toward professionalism.

The limitation of the study was that it has a small sample only limited to one center and cannot be generalized to other parts of the region or country and might have response bias as it was a self-administered survey, and it was filled in subjectively.

Conclusions

Family medicine institutions already have a professionalism education program, but modification and enhancement of existing teaching tools is essential. Existing teaching and assessment methods have no significant effect on resident's attitude. Role modeling although a powerful method is no longer adequate to ensure the enucleation of professional values in residents.

Recommendations

Further studies are needed to explore how to improve already existing teaching and assessment methods. Further studies necessary in the future to ensure that professionalism is taught and learned effectively. New teaching and assessment tools will be required. Faculty enhancement workshops are needed to improve clinical teachers' professionalism

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A case report of relapse of minimal change disease after the first dose of Pfizer-BioNTech Covid-19 vaccine in King Abdul-Aziz Specialist Hospital, Taif, Saudi Arabia

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Abstract

Background: Documented cases of de novo glomerular disease or relapse of pre-existing glomerular disease was acquired shortly after administration of COVID-19 messenger RNA (mRNA) vaccinations.

Objectives: to present a case of a 64-year-old female who received the Pfizer-BioNTech COVID-19 vaccination as a first dose and then experienced a relapse of minimal change disease (MCD) presenting with nephrotic syndrome.

Case presentation: The presenting symptom was ankle swelling and frothy urine which started 9 days after the first dose of vaccine. Albumin level was 24 g/L, urine albumin/creatinine ratio was 668 mg/mmol, Creatinine had risen to 1.3 mg/dl, urine analysis showed 3+ protein. light microscopy showed 17 patent glomeruli, one of which was globally sclerosed. There was mild focal increase in mesangial matrix with occasional atrophic tubules with minor interstitial scarring affecting less than 5% of cortical area. There was moderate fibrointimal thickening. In electron microscopy, 100% of podocyte foot process were effaced with microvilliation and marked cytoplasmic vacuolation. The findings were consistent with minimal change disease (MCD) with mild chronic renal parenchymal damage. The patient started furosemide 80 mg daily for 21 days after the onset of complaints. prednisolone 1 mg/kg was initiated 1 week and patient's symptoms improved. The patient achieved a complete remission 4 weeks after initiation of prednisolone.

Conclusion: For the best management of MCD as a potential side effect following COVID-19 vaccination, more knowledge is required.

Keywords: case, relapse, MCD, Pfizer-BioNTech, Covid-19, Taif

Introduction

At the end of 2019, a novel coronavirus (SARS-CoV-2) was identified as a cause of significant mortality and morbidity worldwide (1). Several COVID-19 vaccines were developed and widely used to fight this contagious disease (2). These vaccines are very effective at preventing serious illnesses, hospitalization and death from all current virus variants (2).

Multiple side effects of use of these vaccines have been identified including a reported case with de novo glomerular disease or relapse of pre-existing glomerular disease developed shortly after administration of COVID-19 messenger RNA (mRNA) vaccines (58-59-60 up to date) (3).

Here, we are reporting a case of a 64-year-old female who developed relapse of minimal change disease (MCD) presenting with nephrotic syndrome after her first dose of the Pfizer-BioNTech COVID-19 vaccine, an mRNA-based vaccine against severe acute respiratory syndrome coronavirus 2 (SARS CoV-2).

Case presentation

A case of 64-year-old female with past history of nephrotic syndrome presented at King Abdul-Aziz Specialist Hospital, Taif, Saudi Arabia. She was proved by biopsy to have minimal change disease that had been diagnosed 10 years ago when she was 54 years. The case was treated successfully with prednisolone for around 25 weeks. She had been on regular follow-up with the nephrology service since then, and did not show any evidence of relapse during this period. Recently, 9 days after her first dose of Pfizer-BioNTech COVID-19 vaccine, the patient presented with full-blown nephrotic syndrome.

Clinical Findings: The presenting symptom was ankle swelling and frothy urine that started around 9 days after her initial dose of vaccine. She was not taking any medications, including nonsteroidal anti-inflammatory drugs. Physical examination revealed bilateral peripheral pitting edema up to her mid thighs. She was afebrile and hemodynamically stable with a blood pressure of 122/67 mm. Her oxygen saturation was 98% in room air. There was no evidence of autoimmune diseases, infection, allergic exposure, or an underlying malignancy and the rest of the examination was unremarkable.

Diagnostic Focus and Assessment: The patient was admitted in hospital for 21 days after the onset of the complaints and laboratory investigation revealed an albumin level of 24 g/L and urine albumin/creatinine ratio of 668 mg/mmol. Creatinine had risen to 1.3 mg/dl from a baseline of 80 mg/dl. Urinalysis showed 3+ protein. Laboratory investigation for antinuclear antibody (ANA), urine and serum protein electrophoresis, hepatitis B and C, HIV serologies all were negative. C3 and C4 were within normal limits. A diagnostic kidney biopsy was performed approximately 3 days after admission (24 days after onset of the symptoms and 33 days after his first dose of Pfizer-BioNTech COVID-19 vaccine (Figure 1).

Light microscopy showed 17 patent glomeruli, 1 of which was globally sclerosed. There was mild focal increase in mesangial matrix with occasional atrophic tubules seen with minor interstitial scarring affecting less than 5% of cortical area. Six small arteries showed moderate fibrointimal thickening. Immunofluorescence microscopy revealed non-significant mesangial positivity for C1q (1+), C3 (1+) and IgM (traces). Electron microscopy revealed almost 100% of podocyte foot process were effaced with microvillation and marked cytoplasmic vacuolation. There were no electron-dense deposits. Overall, the findings were consistent with MCD with mild chronic renal parenchymal damage (glomerulosclerosis 6% , IFTA less than 5%) and arteriosclerosis (Figures 2 and 3).

Figure 1. Timing of vaccination, symptoms, admission and kidney biopsy

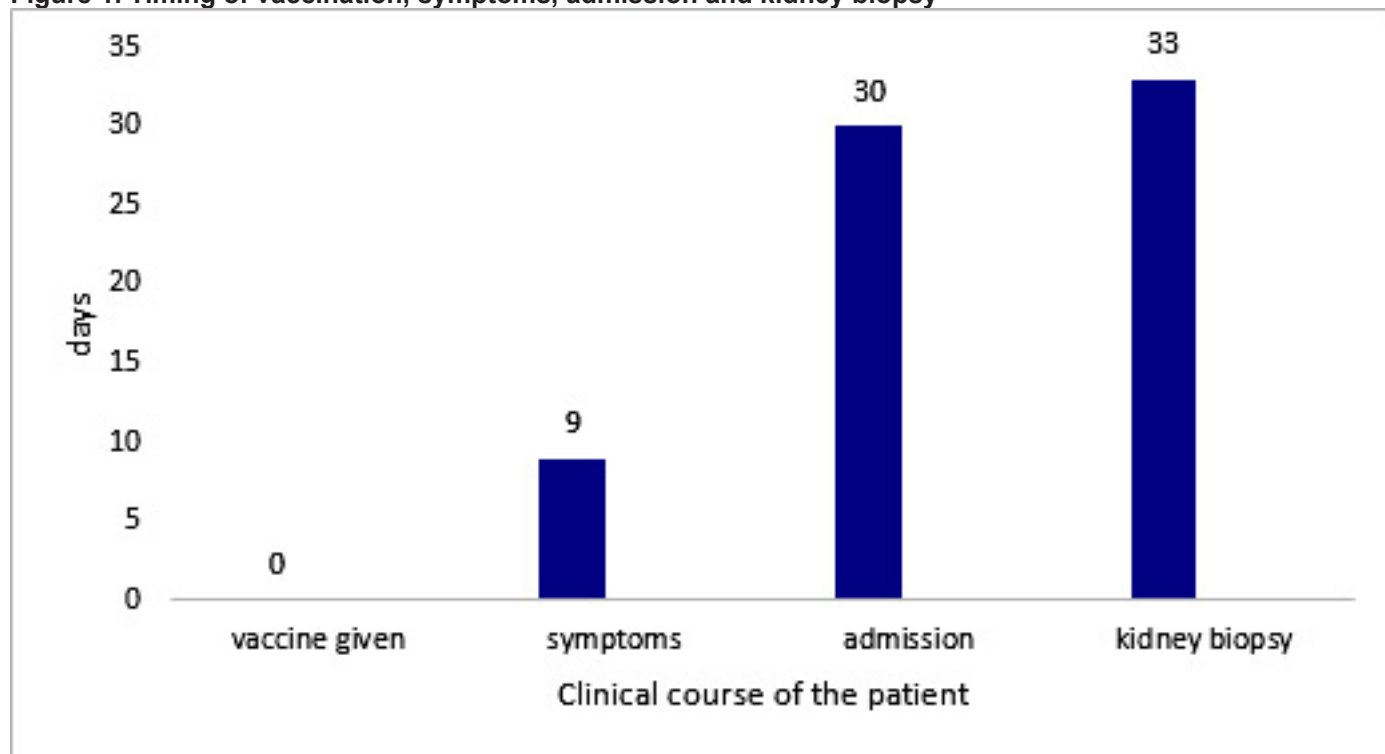


Figure 2. Findings of MCD with mild chronic renal parenchymal damage (glomerulosclerosis 6% , IFTA less than 5%)

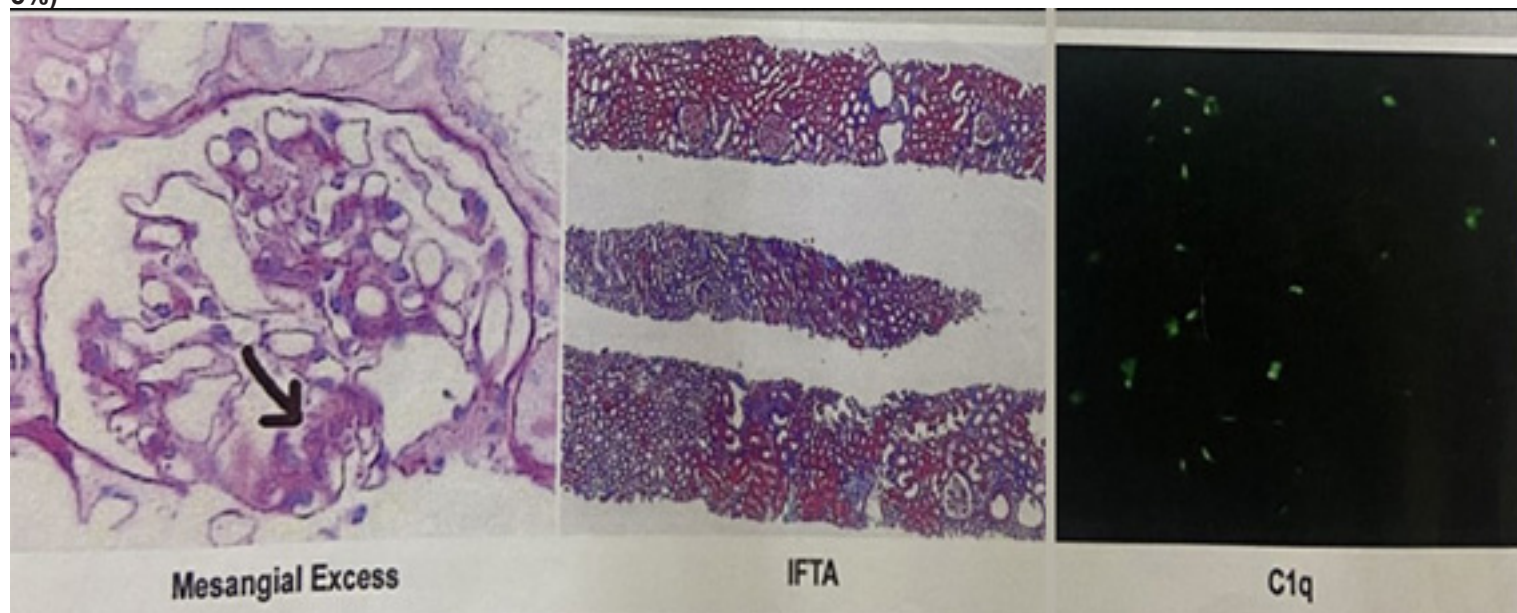
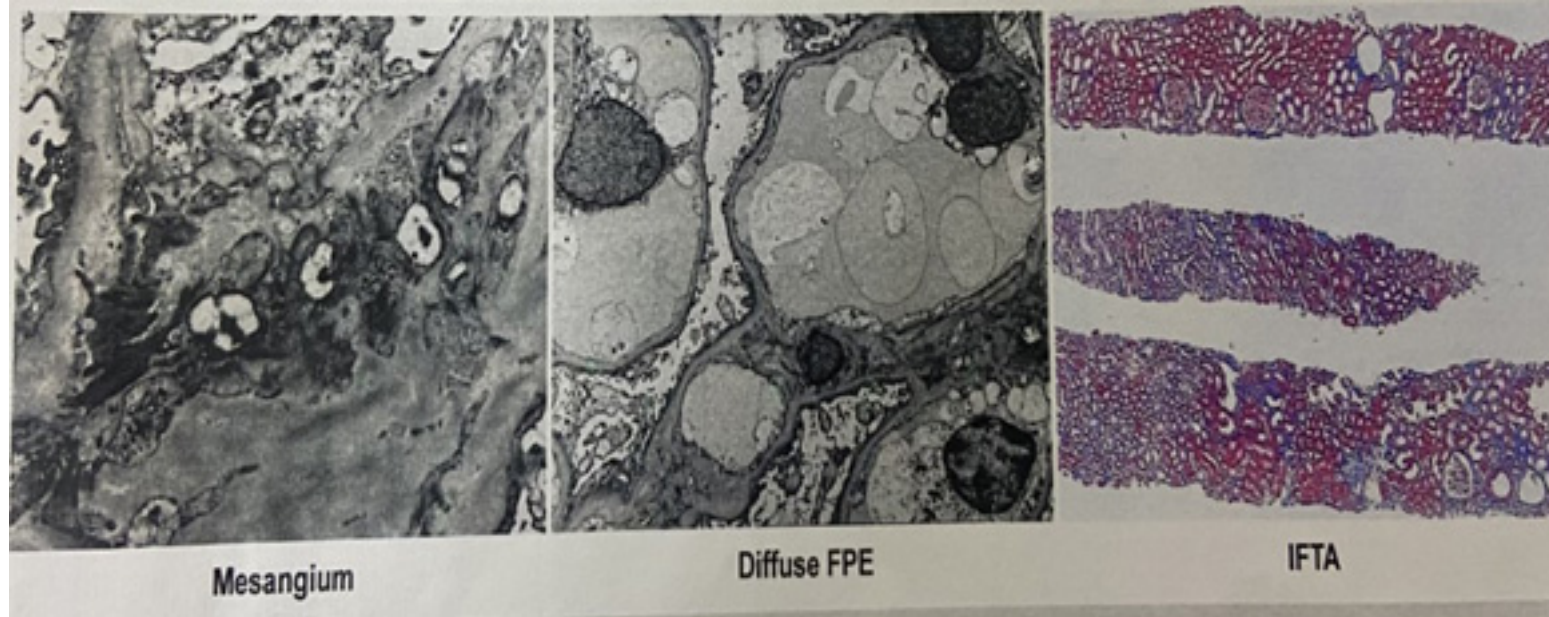


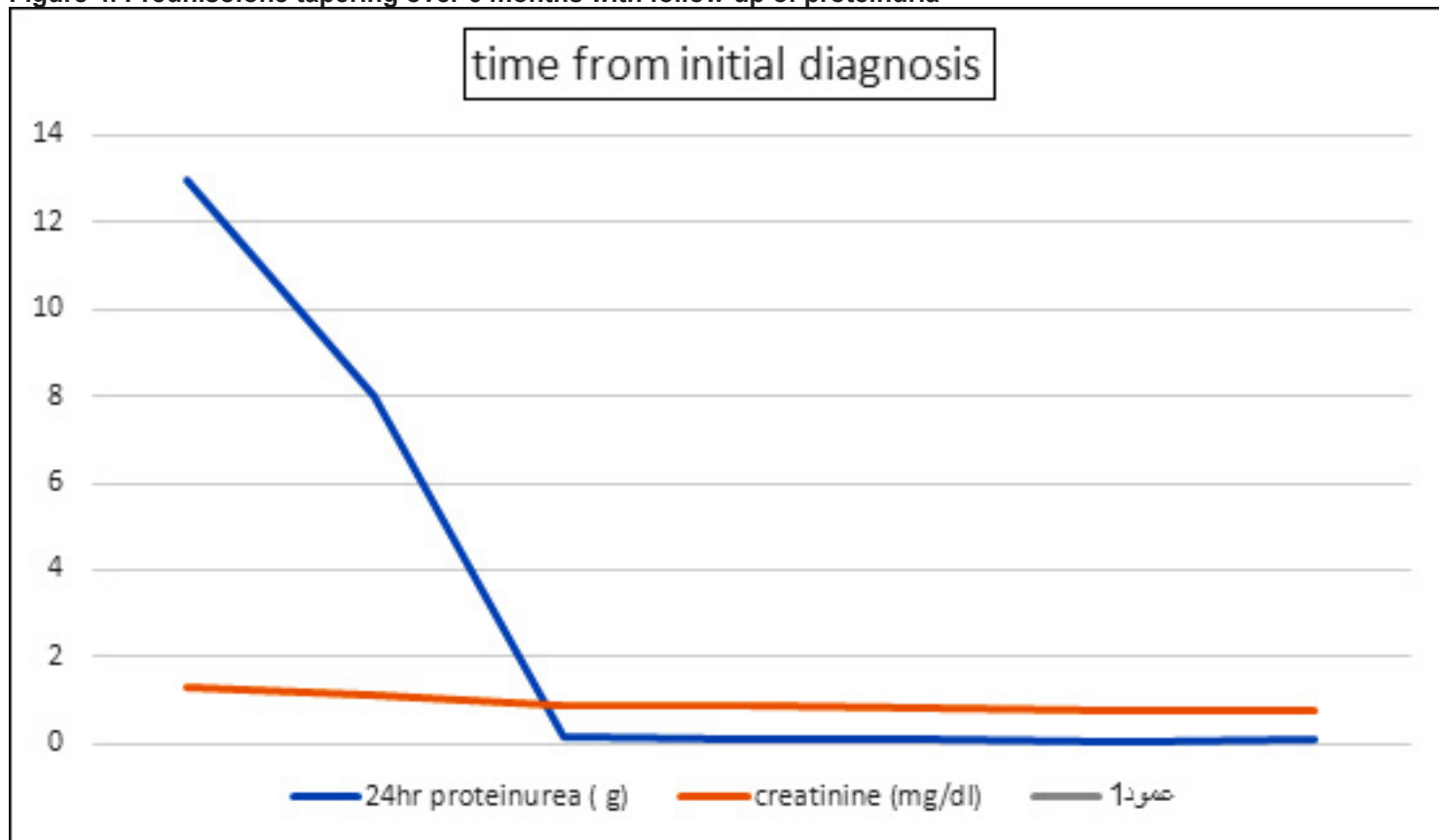
Figure 3. Findings of MCD with arteriosclerosis

Therapeutic Focus and Assessment: The patient started furosemide 80 mg daily for 21 days after the onset of complaints. Prednisolone 1 mg/kg (total 70 mg daily) was initiated 1 week later when the biopsy result was available. The patient's symptoms were getting better quickly with rapid weight loss starting 7 days post Prednisolone initiation, with 8 kg being lost over the subsequent week. Repeated investigations were done 2 weeks post kidney biopsy. The investigations demonstrated trended down kidney function with a creatinine of 1.1 mg/dl, and an improvement of serum albumin from 20 to 30 g/L and 24-hour urine collection of proteinuria 7.5 g. The patient achieved a complete remission 4 weeks after initiation of Prednisolone, then prednisolone was tapered slowly over a period of 6 months with careful follow-up of proteinuria.

Table 1. Prednisolone tapering over 6 months with follow-up of proteinuria

Time of starting treatment (week)	24 hr proteinuria (g/day)	Creatinine (mg/dl)
0	13	1.3
1	7.5	1.1
4	0.150	0.92
6	0.085	0.87
8	0.70	0.81
12	0.068	0.80
16	0.072	0.75
20	0.070	0.78

Figure 4. Prednisolone tapering over 6 months with follow-up of proteinuria



Discussion

There are several COVID-19 vaccines validated for use by the public. The first mass vaccination program started in early December 2020 and these provided strong protection against serious illness, hospitalization and death from the COVID-19 pandemic (2). However there are growing numbers of cases with glomerular diseases of both de novo glomerular disease and relapse of pre-existing glomerular disease that have been reported shortly after administration of COVID-19 messenger RNA (mRNA) vaccines (Moderna mRNA-1273 and Pfizer-BioNTech BNT162b2). However, these cases are rare and the causal link with the COVID-19 vaccine is not clearly established. De novo glomerular diseases have been described following COVID-19 vaccination include IgA nephropathy (4,5), Anti-neutrophilic cytoplasmic antibody (ANCA)-associated vasculitis (4), Minimal change disease (6,7,8,9), and Anti-glomerular basement membrane (anti-GBM) nephritis (5). In addition, a relapse of the glomerular diseases has been reported following COVID-19 vaccination and includes IgA nephropathy (10), Primary membranous nephropathy (11), and Complement-mediated thrombotic microangiopathy (12). Three case reports of minimal change disease are summarized in (Table 2).

The COVID-19 vaccines use different ways to stimulate host immunity by enhancing T cells response resulting in production of cytokines like interferon γ , tumor necrosis factor α , and interleukin 2 that can lead to podocytopathies and enhance B-cell production of immunoglobulins in predisposed patients (4). These cytokines are likely the key factors for triggering either de novo or relapse of glomerular disease in those

patients (4). Our case supports a link between COVID-19 vaccine and relapse of MCD. Although a causal association cannot be firmly confirmed, we believe that clinicians should be aware of MCD presenting with nephrotic syndrome as a possible side effect.

The number of de novo or relapse of MCD cases after Covid-19 vaccine is not significant based on reported literature but it must be taken into account that not all patients with relapsed nephrotic syndrome post-COVID vaccine were biopsied and doubtless not all cases of de novo MCD have been reported (5,6). Therefore, the actual number is likely higher.

The majority of the relapse of MCD cases have been reported post Pfizer-BioNTech administration. But de novo cases complicated with Moderna COVID-19 mRNA vaccination (9) and with the non-mRNA-based AstraZeneca vaccine have also been reported (16).

Complete remission of nephrotic syndrome can be achieved with steroid alone or with addition of calcineurin inhibitors in the majority of MCD cases (17). However, we don't have solid guidelines that help the nephrologist to either proceed or not with second dose or (booster) dose of vaccine in those populations or use a different vaccine type to reduce the risk of relapse.

Table 2. Case reports with presumed relapse of MCD following vaccination for COVID-19

Authors	Country	Age	Sex	Vaccine	Dose	Onset of symptoms (days)	Presentation	Biopsy	Treatment
Komaba et al., 2021	Japan	65	Male	Pfizer	First	8	NS	Not done	Steroid + Cyclosporine Not reported
Kervella et al., 2021	France	34	female	Pfizer	First	10	NS	Not done	Steroid Partial Response and relapse after second dose
Schwotzer et al., 2021	Switzerland	22	Male	Pfizer	First	3	NS	Not done	Steroid + tacrolimus Complete response

The COVID-19 vaccines use different ways to stimulate host immunity by enhancing T cells response resulting in production of cytokines like interferon γ , tumor necrosis factor α , and interleukin 2 that can lead to podocytopathies and enhance B-cell production of immunoglobulins in predisposed patients (4). These cytokines are likely the key factors for triggering either de novo or relapse of glomerular disease in those patients (4). Our case supports a link between COVID-19 vaccine and relapse of MCD. Although a causal association cannot be firmly confirmed, we believe that clinicians should be aware of MCD presenting with nephrotic syndrome as a possible side effect. The number of de novo or relapse of MCD cases after Covid-19 vaccine is not significant based on reported literature but it must be taken into account that not all patients with relapsed nephrotic syndrome post-COVID vaccine were biopsied and doubtless not all cases of de novo MCD have been reported (5,6). Therefore, the actual number is likely higher.

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Conclusion

More information is needed to guide optimal management of MCD as a potential consequence after COVID-19 vaccine.

Ethical considerations: Written consent informed consent was provided by the patient for the preparation and publication of this case report and ethical approval for the study was obtained from the research ethics committee of King Abdul-Aziz Specialist Hospital, Taif, Saudi Arabia.

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Effect of Gluten-Free Diets on Nutritional Status in celiac patients: a systematic review

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Abstract

Introduction: Celiac disease (CD) is an autoimmune disease of the small intestine in which ingestion of gluten leads to destruction of intestinal areas in affected patients. Lifelong adherence to a gluten-free diet (GFD) is the only possible treatment for CD. It is less evident in adults considering the nutrient status in patients on GFD. Therefore, the aim of the study is to systematically evaluate the effect of GFD on the nutritional status of celiac patients.

Methodology: A comprehensive electronic search with time and language restrictions was done. Several known databases were included: "Google Scholar, PubMed, The Cochrane Library, Web of Science" from 2000 to 2022. Keywords used included "celiac disease", "nutrient status", "gluten-free diet", "nutritional deficiencies", "dietary deficiencies", "nutrient intake", "micronutrient", "macronutrient", "vitamin", "mineral", "fiber intake", "Protein intake", and "Fat intake"

Results: The electronic search strategy conducted in this review ended in 875 hits which after removing duplications reduced to 360 studies. These 360 studies were considered eligible for further evaluation, from which 346 studies were excluded for different reasons as 216 studies were based on title and abstract, 86 studies were not relevant to the subject of this study or of this review, 17 were considered replies of authors, 2 were books, and 27 were reviews. Finally, 12 articles were included in the qualitative synthesis of the present review.

Conclusion: The current review showed that gluten free diet is associated with unbalanced intake of macro and micronutrients in both, celiac women and men mainly because of the unhealthy dietary habits and difficulty eliminating gluten from the diet which leads to low cereal intake and high consumption of processed gluten free products.

Keywords: Gluten free diet, nutritional status, celiac disease, Saudi Arabia

Introduction

Celiac disease (CD) is an autoimmune disease of the small intestine in which ingestion of gluten leads to destruction of intestinal areas in affected patients [1,2]. The main genes involved in CD development are HLA DQ2 and HLA DQ8 [1,3]. CD affects 1 to 2 out of every 100 people worldwide; however, systematic reviews have shown that CD prevalence in Saudi Arabia is high (about 3%) [4,5]. Patients with CD may present with a variety of gastrointestinal symptoms, malabsorption (classical CD) or extraintestinal symptoms (nonclassical CD) [6]. CD is a multifactorial disease characterized by the interaction between gluten intake and the immune response, as well as environmental and genetic factors [1,7]. Previously, CD was only considered in patients with overt malabsorption and gastrointestinal (GI) manifestations, including bloating, chronic diarrhea, abdominal pain, constipation, nausea, and vomiting [7–9]. However, at present, there are no signs of the classic symptoms in many patients, and extraintestinal symptoms such as growth retardation, dental enamel defects, and iron deficiency anemia have become predominant [7]. In fact, the clinical symptoms of CD go beyond gastrointestinal presentations [10]. Global assessments showed that CD affected approximately 1% of the European population [11]. In Iran, the serological assessments revealed a prevalence of CD of 1 per 167 children [12]. However, the prevalence of CD has been found to be higher in different diseases, such as irritable bowel syndrome (IBS), diabetes, and neurological disorders (11, 12, and 3.7%, respectively) [13].

According to the Oslo CD classification, different types of CD have been identified: classic, non-classic, subclinical, probable and refractory [14,15]. Classic CD is characterized by signs and symptoms of malabsorption and non-classical CD by extraintestinal symptoms. Subclinical CD is below the threshold of clinical detection. Potential CD identifies patients at high risk of developing the disease [16]. Proximal intestinal mucosal damage and fat malabsorption lead to nutrient, vitamin (D, K, and B9) and mineral (iron and zinc) deficiencies, which in turn may increase the risk of developing hypocalcemia, rickets and osteoporosis, coagulation disorders, anemia and poor nutrition [17–20]. As well as nutrient malabsorption, the reduced food intake is associated with poor growth in children with CD [21].

The lifelong adherence to the gluten-free diet (GFD) is the only possible treatment for CD [22]. A strict diet is very important to improve the duodenal mucosa and eliminate the symptoms [23,24]. Intestinal mucosa takes longer to heal in adults than in children, making it easier for children to achieve full recovery [25]. However, despite a strict GFD, total dietary gluten appears to be very difficult to avoid due to gluten cross-contamination, resulting in persistent intestinal atrophy [25–27]. In fact, apart from familiar wheat foods such as bread, pasta, cakes, and other processed foods such as snacks, gluten can also be used as a thickener in sauces or as a stabilizer or flavoring agent [27]. Therefore, inadvertent gluten

loss and resulting nutritional deficiencies are common in people with CD who follow a theoretically strict GFD [25,28]. Finally, the dietary habits of this group clearly play an important role in their nutritional status. In addition to being gluten-free, DSG should be balanced, meeting all energy and nutrient requirements. Several studies have revealed an unbalanced GFD profile characterized by low intake of grains, fruits and vegetables and meat and meat products [29–31]. In addition, high consumption of specific gluten-free products (GFP) has been reported among children and adolescents. Considering that these products have been shown to be inferior to their gluten-containing counterparts [32,33], the observed imbalance in nutrient and energy intake may be explained, particularly by high fat intake, which can alter the amount of dietary fiber and complex carbohydrates [34]. These habits can lead to many micronutrient deficiencies [28], however, they are less evident in adults and need further investigation. Therefore, the aim of the study is to systematically evaluate the effect of GFD on the nutritional status of celiac patients.

Methodology

This review was reported in the light of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement.

Search methods for identification of studies:

A comprehensive electronic search with time and language restrictions was done. Several known databases were included: “Google Scholar, PubMed, The Cochrane Library, Web of Science” from 2000 to 2022. Keywords that were used include “celiac disease”, “nutrient status”, “gluten-free diet”, “nutritional deficiencies”, “dietary deficiencies”, “nutrient intake”, “micronutrient”, “macronutrient”, “vitamin”, “mineral”, “fiber intake”, “Protein intake”, and “Fat intake”

Eligibility criteria and study selection

In the first step, two researchers reviewed the retrieved articles and removed the duplicates. In other steps, the researchers screened the title and abstract of the records and the ineligible studies were removed. Then, the authors surveyed the full text of the remaining studies based on inclusion and exclusion criteria and the eligible studies (case report, case series, and cross-sectional) were identified.

We excluded the articles which were topic to at least one of the following criteria:

• Exclusion criteria:

- Unpublished studies
- Non-original articles including reviews, protocols and editorials.
- Animal studies
- Unsupported opinion of expert.
- Clinical trials which were in progress without yet published results.
- Replies to the author/editor.
- Books'/conferences' abstracts.
- Abstract papers, articles without obtainable full text

- Published in any language other than English
- Published or conduction of the study prior to 2020

Data analysis:

In several known databases which were searched Ex: Google Scholar, PubMed, The Cochrane Library, Web of Science we combined the search terms and limited the study to the English language. Depending on PRISMA checklist we removed duplicates, and articles were screened based on title, abstract, and full text.

Results

Study selection

The electronic search strategy conducted in this review ended in 875 hits which after removing of duplications reduced to 360 studies. These 360 studies were considered eligible for further evaluation, from which 346 studies were excluded for different reasons as 216 studies were based on title and abstract, 86 studies were not relevant to the subject of this study or sitting of this review, 17 were considered replies of authors, and there were 2 books, and 27 reviews. Finally , 12 articles were included in the qualitative synthesis of the present review (Figure 1).

Study characteristics:

In the current review, we included 12 studies which were published between 2002 and 2021 in eight countries including five studies conducted in Spain [29,30,32,33,35] and one study conducted in each of the following countries: Italy [36], Netherlands [36], Sweden [36], UK [37], Germany [38], USA [33], and Canada [39]. Moreover, eight studies had study design of observational, transversal case-control design while one study was cross-sectional, two studies were observational, longitudinal cohort studies, and one study was randomized double blind-controlled study. The collected studies included 774 adult patients with celiac disease and who were on gluten free products. Among the sample, the age of the participants ranged between 25-80 years old with mean age of 41.26 years and 198 patients were males (25.58 %). The mean duration of intake of gluten free products was 8.157 years with at least 1 year (Table 1).

Macronutrients intake:

The intake of macronutrients and distribution in patients on gluten free foods and products is presented in table 2 where different imbalanced patterns were repeated across the studies which have been conducted in different patients from different countries who followed GFP of a different duration. All studies agree that intake of fat in celiac adults is considered unbalanced. Some of them reported high fat intakes in patients on GFP [29,36,39], however others studies reported high consumption of some types of fats including saturated fatty acids (SFA) or an excessive intake of cholesterol [30,35,40]. Considering intake of carbohydrates, several studies showed that patients with celiac disease who were on gluten free diet showed low carbohydrate intake [29,30,36,38,39,41]. Wild et al reported in their study low complex carbohydrate

intake, however the total carbohydrate intake seemed to be enough because of the high consumption of simple sugars and processed food [37]. Considering consumption of fibers among patients with celiac disease who were on gluten free diet, it was found that most of the studies reported low fiber intakes which is in perfect agreement with the low CHO and high fat intakes reported previously [29,30,35,37-41]. Moreover, some studies including the study of Martin et al. [38], Gonzalez et al. [30], and Ballestero-Fernandez et al., [35] reported that the intake of protein is higher than recommended in celiac patients who follow a gluten free diet which may be associated with excessive meat intake (Table 2).

Micronutrient Intake

The results of the current review also reported an impairment in the intake of vitamins and minerals in patients with celiac disease who are on gluten free diet. When analyzing the vitamin intakes, several studies showed deficiencies for the same vitamins including vitamin D and vitamin E [29,30,35-37] followed by low intake of vitamin B groups such as vitamin B9 (folate), vitamin B1 (thiamine), vitamin B2 (riboflavin), and vitamin B6 (pyridoxine) [29,30,36-38,42]. Moreover, among the included studies, iron, calcium, and magnesium showed the highest deficiency [29,30,35-41]. Deficiencies in iodine, potassium and zinc were also reported [29,30,36-38], and some studies showed low intake of selenium, sodium, and manganese [29,36,37] (Table 2).

Figure 1: The PRISMA figures showing the steps to choose the studies for systematic review

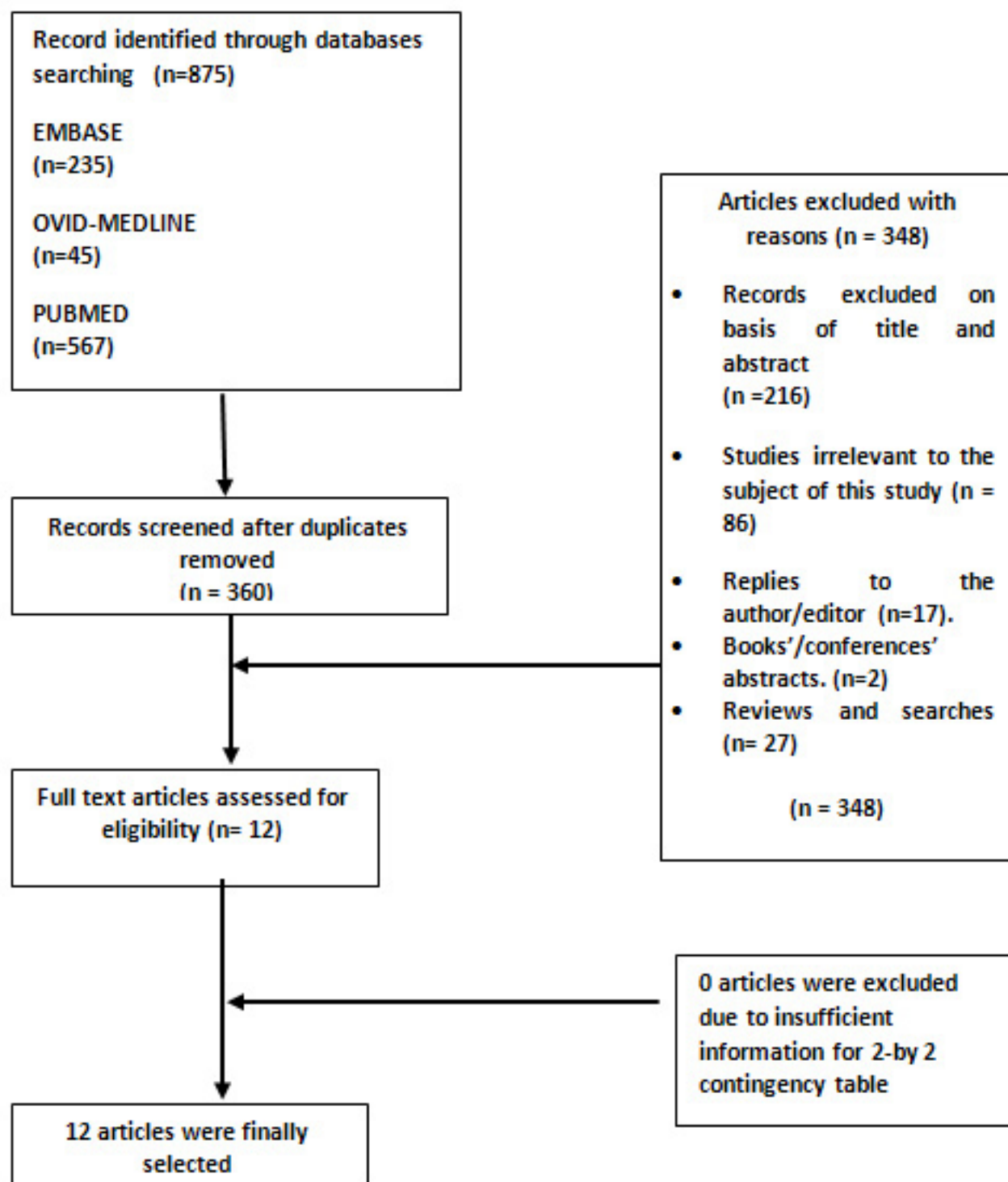


Table 1: The general characteristics of studies and their samples.

	Author	Year	Type of Study	Country	Sample size	Age (Mean \pm SD)	Gender (M)	Duration of GFD (year)
1	González et al. [30]	2018	Observational, transversal cohort study	Spain	42	31.5 \pm 11.9	42	>1 year
2	Churruga et al. [29]	2015	Observational, transversal cohort study	Spain	54	34 \pm 13	0	10
3	Bascuñán et al. [36]	2019	Randomized double blind controlled study	Italy	46	41.1 \pm 10.1	3	>1 year
4	Hopman et al. [40]	2006	Observational, transversal cohort study	Netherlands	132	16.6 \pm 4.4	45	9.6
5	Hallert et al.) [42]	2002	Observational, longitudinal cohort study	Sweden	30	55 \pm 10	12	10
6	Wild et al. [37]	2010	Observational, longitudinal cohort study	UK	93	56 \pm 15	31	8
7	Martin et al. [38]	2013	Observational, transversal cohort study	Germany	73	18-80	18	7.5
8	Thompson et al. [41]	2005	Observational, transversal cohort study	USA	47	51 \pm 11	8	5.3
9	Jamieson et al. [39]	2020	Observational, transversal cohort study	Canada	35	47 \pm 11.5	6	6.7
10	Miranda J. et al. [32]	2014	Observational, transversal cohort study	Spain	58	18-75	12	NA
11	Calvo-Lerma J et al [33]	2019	Cross-sectional study	Spain	100	NA	NA	NA
12	Ballestero-Fernández et al. [35]	2021	Observational, transversal case-control study	Spain	64	39.17 \pm 10.62	21	>1 year

N o.	Author	Macronutrients							Micronutrients								
		Fat	Protein	CHO	Fiber	Cholesterol	Energy	Folate	Vitamin E	Vitamin D	Iodine	Calcium	Zinc	Magnesium	Iron	Potassium	Vitamin B1, B2, B6
1	[30]	High, especially SFA	High	Low	Low	High	NA	Low	Low	Low	Low	NA	Low	Low	NA	NA	NA
2	[32]	High	NA	Low	Low	NA	Low	Low	Low	Low	Low	NA	Low	Low	Low	Low	Low
3	[34]	High	NA	Low	NA	NA	NA	Low	Low	NA	Low	Low	NA	Low	Low	NA	NA
4	[42]	High saturated fat	NA	Low	NA	NA	NA	Low	NA	NA	NA	Low	NA	Low	Low	NA	NA
5	[42]	NA	NA	NA	NA	NA	NA	Low	NA	NA	NA	NA	NA	Low	NA	NA	NA
6	[37]	NA	NA	High sugar	Low	NA	NA	Low	NA	NA	Low	Low	Low	Low	Low	NA	NA
7	[35]	NA	NA	Low	Low	NA	NA	Low	NA	NA	NA	NA	Low	Low	NA	NA	Low
8	[43]	NA	NA	Low	Low	NA	NA	Low	NA	NA	Low	NA	NA	Low	NA	NA	NA
9	[37]	High	NA	Low	Low	NA	NA	Low	NA	NA	Low	NA	NA	Low	NA	NA	NA
10	[32]	High	Low	High	Low	NA	NA	High	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	[32]	High	Low	High	NA	NA	NA	High	NA	NA	NA	NA	NA	NA	NA	NA	NA
12	[35]	High, low PUFA	High	Low	Low, high sugar	NA	NA	Low	NA	NA	Low	Low	Low	Low	NA	NA	NA

Table 2: The nutrient status in patients with celiac disease who are on gluten free diet

Discussion

Studies on nutritional deficiencies in the first year of a gluten free diet showed some possible deficiencies depending on biochemical data however, only a few main nutrients are described. When mucosa is recovered, it is assumed that strict gluten free diet has been followed in the long term therefore, measuring intake of different nutrients in celiac patients to assess their nutritional status with supposedly no absorption problem make sense [42,43]. In the current review, all included studies reported a high fat intake associated with gluten free product consumption. This result is similar to that reported in pediatric patients with celiac disease where it was found that GFP was associated with high fat intake with increased SFA/polyunsaturated (PUFA) ratio [28]. This could be explained due to the low intake of plant-based foods and high consumption of processed gluten free products [29,37]. In patients with celiac disease who follow a gluten free diet, it is common to consume gluten free products extensively and this tends to be generally higher in both total fat and SFA than their gluten containing analogues [28,32,33]. Moreover, the study of Wild et al compiled some records of gluten free products and reported that 47 % of the energy intake came from processed products thus, correct classification of GFP is needed so that celiac patients could be more informed and choose these products appropriately [37]. Moreover, consuming of unbalanced diets which are rich in SFA is associated with many different health problems including increased risk of cardiovascular disease, and/or insulin resistance in general and celiac patients [44–46]. In addition, consuming food with high fat content is associated with higher risk of death from cardiovascular disease in celiac patients [47].

Furthermore, consumption of processed products has been associated with higher mortality in patients with celiac disease [48] and chronic low grade inflammation [49].

Patients with celiac disease who are on a gluten free diet have to stop consuming cereal based foods which contain gluten which are the most commonly consumed cereals. Cereals are considered the basis of a balanced diet, therefore, without adequate guidelines, diet could be imbalanced [50]. In the current review, it was noticed that patients on gluten free diet showed low carbohydrate intakes which may be due to their fear of consuming gluten which makes them reject cereals which prevent them from consuming enough complex carbohydrates. This is consistent with the fact that gluten free products tend to increase the glycemic index in their products when compared with their gluten containing alternatives [45,51]. Therefore, it can be assumed that imbalances observed in the current review are not only associated with low- or non-existent consumption of gluten-containing cereals, but with the high intake of processed gluten free products and low consumption of vegetables and legumes [37]. This result is similar to that reported in children where it was found that children tend to consume less food rich in complex carbohydrates and increase the consumption of simple carbohydrates because of gluten free products [28].

Foods which are high in carbohydrates usually contain a high level of fibers [44], however, this is unusual in the diets of celiac patients [30,31,38]. The current review showed low fiber intake in patients with celiac disease which could be explained by the low consumption of fiber-rich plant foods and whole-grains [52], and by the high consumption of refined processed foods [28]. Low fiber intake is significantly associated with higher prevalence of constipation, increasing the risk of diverticulitis, and higher risk of gastrointestinal symptoms commonly present in patients with celiac disease [53]. Therefore, however while a direct relation between gluten free diet and constipation or diverticulitis has not been confirmed, it could be thought that increase in the intake of fibers among these patients could help in improvement of inflammation that is noticeable in those patients [54,55] and reduction if the symptoms of abdominal pain [56]. Moreover, the current review showed high intake of protein among patients on gluten free diet which is not consistent with the results of previous studies which showed higher protein consumption among non-celiac children [28,35,57].

Considering the intake of micronutrients, the current study reported a low intake of vitamin D among patients on a gluten free diet. Vitamin D deficiency reported in the current review has some indications since there is higher prevalence of osteoporosis reported in patients with celiac disease, and this vitamin is considered of vital importance in bone metabolism [58–60]. Therefore, vitamin D supplementation should be administered during the first year of a gluten free diet in order to recover its deficiency because of the low absorption associated with celiac disease. Considering deficiency in group B vitamins, this is in agreement with the biochemical data reported by Hallert et al who reported low B12 and low folate levels and reported that homocysteine levels were raised in those patients higher than in the general population [42,61]. High level of homocysteine is associated with higher risk of cardiovascular disease [62]. In order to reduce this problem, it is vital to highlight that the deficiency of vitamins is associated with low intake and not to the intestinal malabsorption [42]. Moreover, deficiency in vitamin B group is associated with worse sense of quality of life [42], and their supplementation is associated with better general well-being [61].

Iron deficiency is a major problem in non-treated active celiac disease and in patients with incompletely regenerated mucosa who have difficulties in reaching normal iron values [63]. Therefore, low levels of iron should be considered alarming, especially in women [38]. Moreover, it can worsen because of the observed low consumption of legumes and cereals [29,30]. In relation to calcium, different results could be found based on the reference intakes of different countries. Hopman et al. observed a low intake of calcium depending on the American recommendation [40] and Moreiras et al reported adequate results based on the Dutch recommendation [52]. Although calcium intakes are similar in celiac patients to the general population, it is considered that in recently diagnosed celiac patients, too little lactase is produced because of the damaged

mucosa and therefore they develop a secondary lactose intolerance. Calcium intake together with appropriate levels of vitamin D should be of benefit in newly diagnosed patients [64].

In conclusion, the current review showed that gluten free diet is associated with unbalanced intake of macro and micronutrients in both, celiac women, and men mainly because of the unhealthy dietary habits and difficulty in eliminating gluten from the diet which leads to low cereal intake and high consumption of processed gluten free products. It is vital to conduct a continuous and personalized follow-up of celiac patients from the moment of diagnosis in the presence of a nutritionist. Moreover, increasing the knowledge among patients through proper nutritional education will be the key for the long-term balanced diet.

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