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Research Article

PREVALENCE AND AWARENESS OF DIABETIC FOOT AND ITS COMPLICATIONS AMONG SAUDI DIABETIC PATIENTS, THROUGH PRIMARY HEALTH CARE SERVICES, AT JEDDAH, SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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Abstract:

Background: In Saudi Arabia, Type 2 Diabetes Mellitus is fairly frequent. A significantly high percentage of persons with diabetic foot problems end up requiring an amputation.

Objective: Our aim was to evaluate level of awareness, the attitudes and the practice approaches of diabetic patients towards diabetic foot issue and its complications at Jeddah, KSA.

Methods: Descriptive correlational cross-sectional study was carried out with diabetic patients at primary health care centers, in Jeddah, KSA. Data collection was done during the months of May to July 2022. The study population was all DM patients, who are following up at Primary Health Care centers at Jeddah, KSA. The study sample was collected using the stratified random sampling technique.

Results: Participants' knowledge regarding diabetic foot care was high as (64%) of study participants demonstrated good knowledge. Participants' attitude regarding diabetic foot care was high as (79%) of study participants demonstrated good attitude. Participants' practice regarding diabetic foot care was good among study participants. Participants' with longer disease duration had better knowledge ($P < 0.001$). Moreover, participants with bachelor degree or higher had also higher level of knowledge ($P = 0.03$). Participants' with longer disease duration had better attitude ($P < 0.001$). Moreover, married participants had also better attitude ($P = 0.02$). Participants' with longer disease duration had better practice ($P < 0.001$). Moreover, married participants had also better practice ($P = 0.003$). Participants with bachelor degree or higher practiced better than others regarding their foot care ($P = 0.004$).

Conclusion: Participants in our study had optimistic views towards the management of diabetes and the foot issues that are associated with the condition. However, when it came to the management of the consequences of diabetic foot disease, they trailed behind.

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INTRODUCTION:

As the incidence of diabetes has increased globally over the last two decades, it has become a particularly critical problem in low- and middle-income nations. The number of individuals with diabetes is projected to increase from 285 million in 2009 to over 460 million by 2040. This is expected to increase to more than 578 million individuals by 2030 [1]. Diabetes-related complications are the top cause of mortality in the United States and worldwide. Hyperglycemia, often known as high blood sugar, is a metabolic disorder marked by chronic, progressively worsening symptoms and caused by insulin shortage or insulin resistance. Due to peripheral artery disease, diabetic patients often have sensory neuropathy in their feet, which may lead to problems such as a diabetic foot (PAD).

The impact of diabetic foot, a chronic illness consequence, on patients' quality of life is significant [2]. Common diabetic foot problems that contribute to diabetic foot syndrome include infection, diabetic foot ulcer, and neuropathic osteoarthropathy [3]. As time passes and the patient's diabetes develops, the diabetic foot often deteriorates. Peripheral neuropathy, which causes tingling in the feet, and peripheral vascular disease, which restricts blood flow to tissue and may lead to infection and gangrene, dramatically increase the risk of amputation in diabetics [4-5]. Due to foot issues, diabetic patients spend a disproportionate amount of time and money in hospitals. According to the Saudi National Diabetes Registry, 3.3% of diabetic patients reported foot complications, including 2.05% with a foot ulcer, 0.19 % with gangrene, and 1.06% needing amputation. Significant factors to foot disorders include ignoring one's feet and neglecting to educate oneself on appropriate foot care. This study aims to assess the frequency of comorbidities among Saudi diabetes patients as well as their degree of comprehension, knowledge, and observance of diabetic foot care [6].

Diabetes mellitus (DM) is characterized by hyperglycemia, which is mostly caused by insulin resistance or insufficiency. According to the 10th edition of the International Diabetes Federation Atlas (IDF), 2021, 537 million individuals (20-79) globally have diabetes, which accounts for almost one in ten. In 2021, diabetes will cause 6,7 million fatalities, or one death every five seconds. Diabetes will cost at least \$966 billion in health care costs, a 316% rise over the preceding 15 years. In addition, 541 million persons have Impaired Glucose Tolerance (IGT), placing them at at risk for type 2 diabetes. According to the

International Diabetes Federation Atlas, 17.7 percent of Saudi Arabia's adult population is diabetic. Saudi Arabia presently has the highest incidence of diabetes in the Middle East [7]. Diabetes mellitus increases the risk of long-term health problems such as hypertension, heart disease, retinopathy, and foot problems. In an attempt to prevent or reduce the course of the illness and its consequences, maintaining normal blood glucose levels is a fundamental focus of diabetes management.

In a quasi-experimental research in Riyadh, Saudi Arabia, the risk of co-morbid conditions emerging in patients with high glycosylated hemoglobin levels and long-term diabetes was determined. There was also a test to see how well diabetics cared for their feet. In addition, 62.8% of patients with type 2 DM had the condition for more than 10 years, and 32.5% had HbA1c readings that were considerably out of control ($\geq 8.2\%$). In addition, the patients had hypertension (61.4%), abnormal cholesterol levels (58.6%), eye disease (23.3%), cardiovascular disease (14.4%), and major foot problems (3.9%). Patients with severely uncontrolled HbA1c levels (7%) were more likely to develop retinopathy ($P=0.0001$), foot problems ($P=0.0001$), dyslipidemia ($P=0.010$), and hypertension ($P=0.028$). Additionally, patients with diabetes for more than ten years had a greater incidence of foot problems ($P=0.0001$), retinopathy ($P=0.011$), and hypertension ($P=0.033$). Only 34.2% of patients had their feet evaluated by physicians, and 36.7% of patients were given recommendations on how to take better care of their feet, according to patient replies. Although the majority of patients (70%) were aware of diabetic foot care, only 41.7% frequently examined their feet, 41.4% washed their feet with warm water, 31.4% dried between their toes, and 33.3% used foot-moisturizing chemicals [6].

The current research aimed to analyze diabetes patients' knowledge, attitudes, practices, and risk factors that influence diabetic foot ulcers in Jeddah, Saudi Arabia.

METHODS:**Study Setting and Design**

Descriptive correlational cross-sectional study was carried out with diabetic patients at primary health care centers, in Jeddah, KSA. Data collection was done during the months of May to July 2022.

Study Population and Sampling Technique

The study population was all DM patients, who are following up at Primary Health Care centers at Jeddah, KSA.

The study sample was collected using the stratified random sampling technique.

Sample Size calculation

The sample size was calculated via Epi-Info software [8-9], at a confidence level of 95% and statistical power of 80%.

Data Collection Methods and Instruments

The data was collected from the sample prospectively via a personally filled questionnaire. The questionnaire included 4 main parts: 1] Personal data, including age, gender, marital status, DM status, and general health-related questions. 2] Knowledge items. 3] Attitudes items. 4] Practice items.

Data Analysis

For the statistical analysis, the SPSS version 23 program was used. Basic descriptive statistics were used in the analysis of the demographic and clinical variables. In the qualitative variables, both nominal (categorical) and ordinal, absolute frequencies and

percentages were used. In the quantitative variables, measures of central tendency and dispersion were calculated. Independent T test and one way ANOVA were used for statistical significance as well as chi square was used for statistical relationships. In all cases, a significance level of $p < 0.05$ was taken into account.

Ethics and Human Subjects Issues

Ethical approval was taken from the IRB at Jeddah city.

Informed consent was signed by the selected sample.

RESULTS:

Characteristics of study participants

The study included 302 participants. Among them, there were 188 males (62.3%) and 114 females (37.7%). The most frequent age group was more than 50 years ($n = 114$, 37.7%). Figure 1 shows the distribution of study participants according to age.

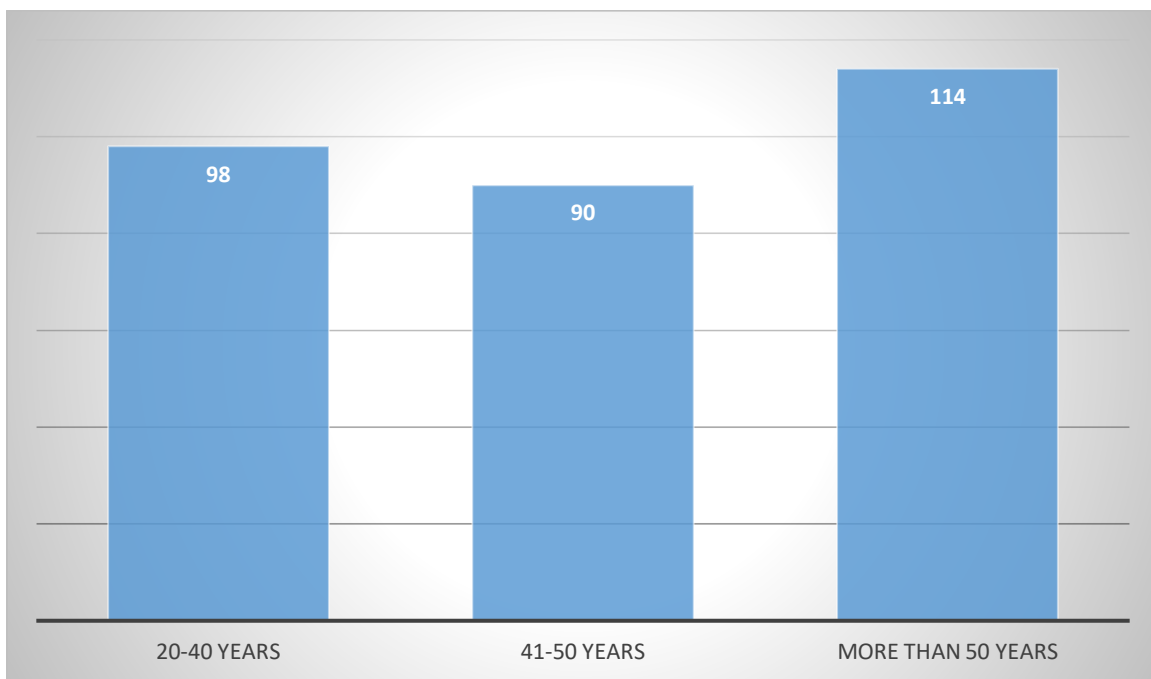


Figure 1: Distribution of study participants according to age

Two thirds of study participants were married ($n = 205$, 67.9%). Furthermore, more than half of study participants had a bachelor degree or higher ($n = 166$, 55%) according to their educational level. Figure 2 and 3 demonstrate distribution of study participants according to marital status and educational level respectively.

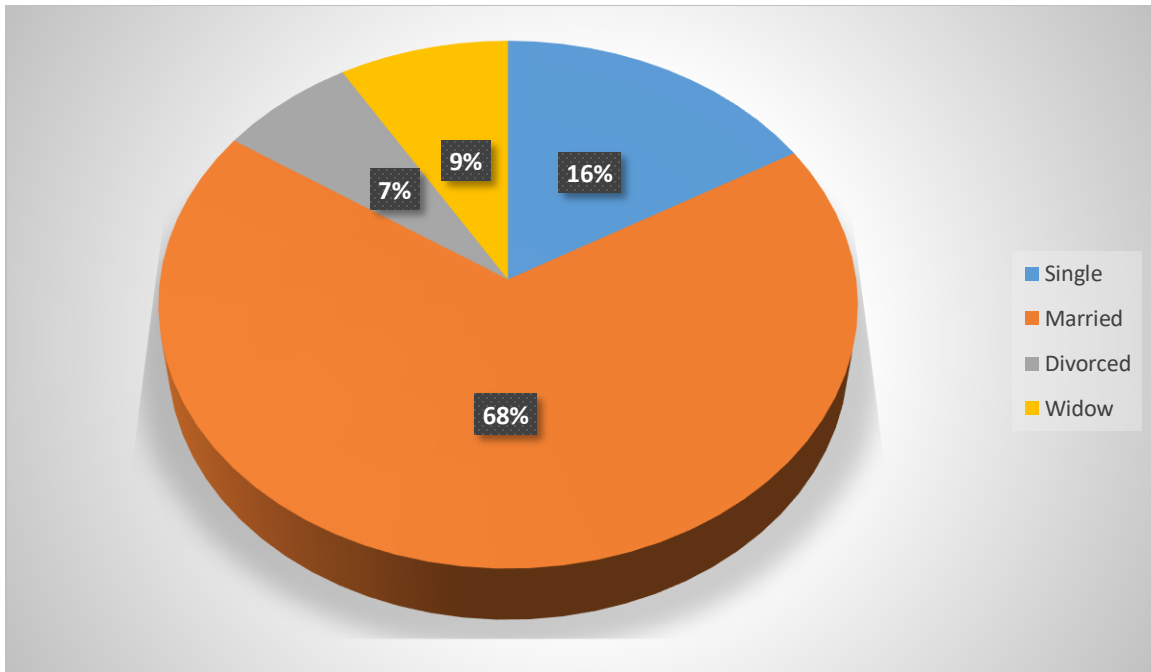


Figure 2: Distribution of study participants according to marital status

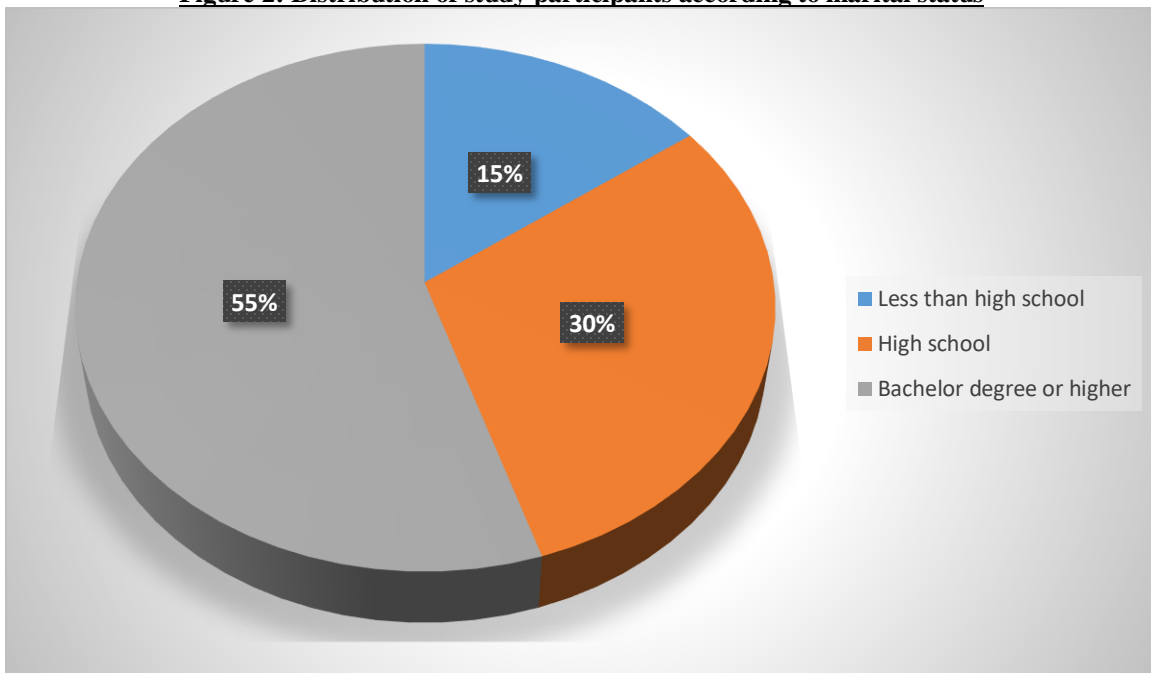


Figure 2: Distribution of study participants according to educational level

Among study participants, family history of type 2 diabetes mellitus was found among 230 participants (76.2%). On the other hand, 22 participants reported a possibility of having family history of type 2 diabetes mellitus (7.3%) while the rest of participants reported not having a family history (n= 50, 16.6%). Most of study participants were not smokers (n= 224, 74.2%) while the rest were smokers (n= 78, 25.8%). The duration of diabetes varied among study participants with most frequent duration of more than 10 years (n= 145, 48%) as illustrated in figure 4. Male participants had longer duration of female participants (P= 0.01). Among study participants, 94 participants had hypertension comorbidity besides their diabetes (31.1%).

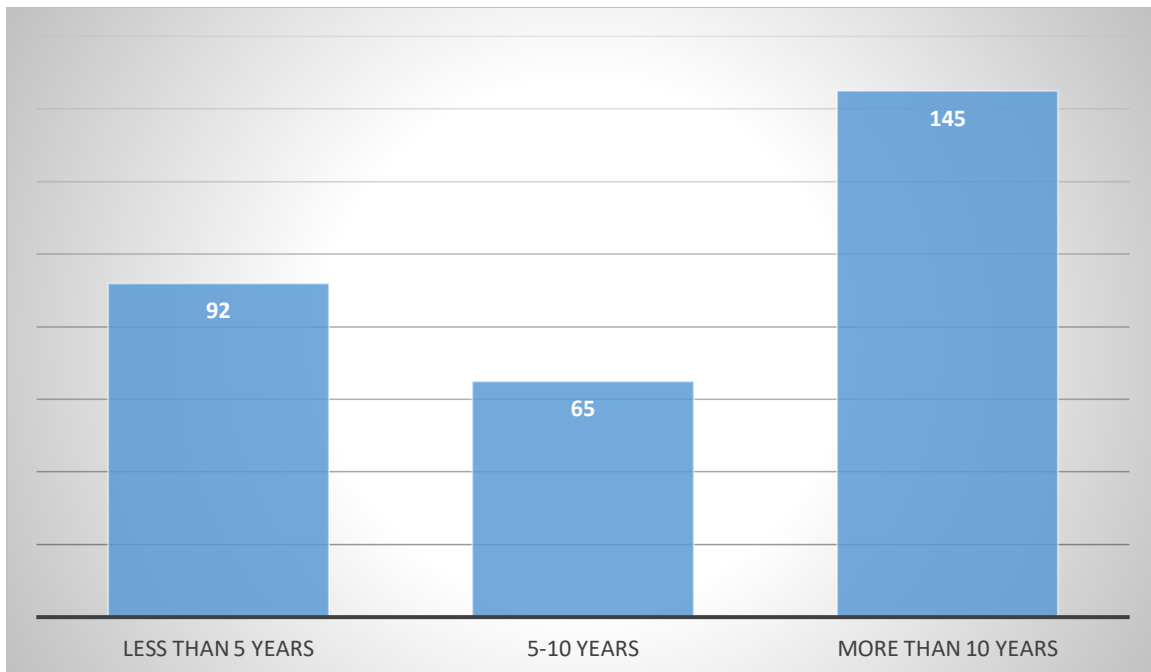


Figure 4: Distribution of study participants according to duration of diabetes

Participants' knowledge about diabetic foot

Participants' knowledge regarding diabetic foot care was high as (64%) of study participants demonstrated good knowledge. Table 1 shows participants' responses to knowledge scale items. It is noticed from the table, that participants were not knowledgeable about the risk of smoking on the reduction of blood flow to the feet.

Participants' with longer disease duration had better knowledge ($P < 0.001$). Moreover, participants with bachelor degree or higher had also higher level of knowledge ($P = 0.03$). Gender, age and marital status didn't demonstrate any statistically significant relationship with knowledge domain.

Item	Yes		No		Don't Know	
	Count	Percentage	Count	Percentage	Count	Percentage
Diabetes can reduce blood flow to the feet of diabetic patients.	184	60.9%	17	5.6%	101	33.4%
Diabetic patient can suffer from a lack of sensation in the feet.	208	68.9%	22	7.3%	72	23.8%
Diabetics can develop ulcers in the foot.	200	66.2%	15	5%	87	28.8%
Diabetics can get gangrene in the foot.	250	82.8%	12	4%	40	13.2%
Smoking can reduce blood flow to the feet.	121	40.1%	29	9.6%	152	50.3%

Participants' attitude toward diabetic foot

Participants' attitude regarding diabetic foot care was high as (79%) of study participants demonstrated good attitude. Table 2 shows participants' responses to attitude scale items. It is noticed from the table, that some of participants believed that they can treat their diabetic foot without doctor consultation ($n = 43$, 14.2%).

Participants' with longer disease duration had better attitude ($P < 0.001$). Moreover, married participants had also better attitude ($P = 0.02$). Gender, age and educational level didn't demonstrate any statistically significant relationship with attitude domain.

Table 2: Distribution of attitude towards diabetic foot care among diabetic patients

Items	Disagree		Agree		Unsure	
	Count	Percentage	Count	Percentage	Count	Percentage
Diabetics should check for any wounds on their feet daily	5	1.7%	266	88.1%	31	10.3%
Diabetics should visit a doctor when there is any infection or wound in the feet	10	3.3%	269	89.1%	23	7.6%
Diabetic patients should wear specialized shoes to avoid diabetic foot according to the doctor's instructions	14	4.6%	246	81.5%	42	13.9%
Diabetics should not make periodic visits to the diabetes clinic for the purpose of examination	198	65.6%	69	22.8%	35	11.6%
I believe that I can treat myself if I have diabetes without consulting a doctor	207	68.5%	43	14.2%	52	17.2%

Participants' practice toward diabetic foot

Participants' practice regarding diabetic foot care was good among study participants. Table 3 shows participants' responses to practice scale items. It is noticed from the table, that participants change their shoes when it is damaged (n= 114, 37.7%).

Participants' with longer disease duration had better practice (P<0.001). Moreover, married participants had also better practice (P= 0.003). Participants with bachelor degree or higher practiced better than others regarding their foot care (P= 0.004). Gender and age didn't demonstrate any statistically significant relationship with practice domain.

Table 3: Distribution of diabetic patients practice regarding diabetic foot care

Items	Yes		No		Sometimes					
	Count	Percentage	Count	Percentage	Count	Percentage				
Do you wash your feet daily?	249	82.5%	10	3.3%	43	14.2%				
Do you wear cotton socks regularly?	92	30.5%	85	28.1%	125	41.4%				
Do you always walk barefoot?	57	18.9%	94	31.1%	151	50%				
Items	Once per year		More than once per year		When the shoe is damaged					
How often do you change your shoes?	76	25.2%	112	37.1%	114	37.7%				
Items	Monthly		Every 6 months		Every year		When I am sick			
How often do you go to check your feet?	17	5.6%	47	15.6%	26	8.6%	212	70.2%		
Items	Consult a physician			Treat by yourself						
What do you do if you find deformities (wounds/ulcers) on your feet?	214			70.9%			88		29.1%	

DISCUSSION:

Diabetic foot ulcers are a common complication of diabetes that may lead to serious complications including infection, gangrene, and even death from sepsis and multi-organ failure syndrome if left untreated [12,13]. The development of diabetic foot ulcers may be prevented with the right kind of education for both patients and medical staff. With mean scores of 8.57 out of 12 (71.6%), 4 out of 5 (80%), and 13 out of 26 (50%) for knowledge, attitude, and practice, respectively, the literature shows that our

diabetic patients have excellent knowledge and attitudes about diabetic foot care [10].

It's possible that patients' lack of participation accounts for the disparity in the test results between knowledge and practice [10]. The value placed on experience was found to be much lower than that placed on theoretical knowledge in other comparable studies [9,10,11]. Inadequate foot care may have contributed to the fact that the majority of patients (77%) in study [10] did not get proper diabetic foot management guidelines from their physicians. This

may be due to clinicians' lack of familiarity with diabetic foot care, which highlights the need of regular training opportunities [10]. Similar conclusions were made in other recent local studies, pointing to an insufficient amount of patient education on foot care [9,14].

Dyslipidemia, neuropathy, cardiovascular disease, hypertension, and retinopathy were all very common comorbidities among the study participants [10]. Increased risk of ischemic changes, foot ulcer incidence, and amputations is also a result of the synergistic impact of these disorders with long-term diabetes on blood vessels and blood flow, especially peripheral blood flow [15,16]. Additionally, the study [10] found that 9.4% of people had either a healed or active foot ulcer, which is on par with the frequency of foot ulcers in Asia and Europe (10-15%). Yet, the systematic review and meta-analysis found a lower global incidence of diabetic foot ulcers (6,3%) than was found (9,4%) [16].

As a result of recent developments, it has become more clear that all diabetic patients would benefit from education and guidance in order to reduce their risk of developing diabetic foot issues [10]. In addition, it is crucial that patients be inspired and motivated to enhance their daily foot care regimen at each and every clinic appointment. Patient education on diabetes foot results in improved practices, altered patient behavior and motivation, and a decrease in the occurrence of diabetic foot ulcers, as shown in a number of studies [10]. Family members of people with diabetes may benefit greatly from psychological and nutritional support, as well as from education on how to make lifestyle changes [17,18,19,20].

Unfortunately, most people did not see their physicians for regular foot checkups. The majority of people also report checking their own feet and using shoes designed to prevent foot problems [10]. But just 26.8% of people were doing frequent self-exams of their feet, and 43.3% of people had never done so [10]. The good news is that being checked up by a diabetic clinic early may reduce the need for hospitalization or amputation [21,22]. It is emphasized that physicians should spend time with their patients and train them on diabetic foot practices in order to boost practice ratings [10]. For doctors to develop effective clinical practice and make the most of clinical tools for the diagnosis, prevention, and treatment of diabetic foot, one study from India recommended an educational program on the topic [23].

Patients with diabetic foot frequently first see their primary care physician, so it is important for them to understand the condition and its associated risks, as well as how it's diagnosed and treated. As a result of reading this article, primary care physicians will have a greater understanding of the importance of taking care of diabetes patients' feet. This study's findings, in the end, show that patients have adequate knowledge and attitudes about diabetic foot care. Refresher courses for primary care physicians might help address the need to improve the quality of practice.

CONCLUSION

Participants in our study were optimistic towards the treatment of diabetes and associated foot issues. Regarding the management of diabetic foot problems, they trailed behind.

We sought to address this issue by conducting an online survey of Jeddah inhabitants, despite the fact that this study was done largely among relatively small sample size and hence may not be typical of the city as a whole.

The questionnaire's knowledge and attitude questions were also limited to yes/no responses. We believed that patients would have no difficulty responding to closed-ended questions; nonetheless, it is probable that participants agreed with the questions (by replying "yes") even if they did not know the proper answer, which might explain their optimistic perspective and degree of competence. To alleviate this impact, "I do not know" was given as an option.

We recommend that the Saudi Ministry of Health create a thorough training program on diabetic foot care for both patients and physicians. Additionally, every healthcare facility must include a clinic specialized to addressing diabetic foot issues.

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