Primary Healthcare Physicians' Knowledge, Attitude and Practices about Diabetic Foot Prevention and Management in Aseer Region, Saudi Arabia

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Abstract

Aim of Study: To assess primary healthcare (PHC) physicians' knowledge, attitude, and practices related to prevention and management of diabetic foot.

Methods: Following a cross-sectional study design, a self-administered questionnaire was distributed to PHC physicians in Aseer Region, Saudi Arabia to assess their knowledge, attitude, and practices related to diabetic foot prevention and management.

Results: The study included 150 PHC physicians, out of whom 55.3% were males. General practitioners comprised 63.3%, specialists 20% and consultants 16.7% of the sample. There was a significant positive correlation between knowledge, attitude and practice scores of PHC physicians. Mean percent knowledge scores were highest among family physicians than those with other specialties (p=0.048), and were significantly highest among physicians with more than 10 years' experience in PHC (p=0.032). Attitude scores did not differ significantly according to their personal characteristics. Practice scores were highest among family physicians than those with other specialties (p=0.041).

Conclusion: PHC physicians' knowledge and attitude toward diabetic foot prevention and management are good but their practice is suboptimal. There are significantly positive correlations between knowledge, attitude and practices of PHC physicians. Those who have higher experience in PHC have higher knowledge, attitude and practices toward diabetic foot management.

Keywords: Diabetic foot, knowledge, attitude, practice, primary healthcare.

Introduction

Diabetic foot complications are one of the most pronounced and serious consequences of type 2 diabetes (1). Every 20 seconds there is an amputation of the unilateral lower limb as a result of diabetic foot complication (2). Complications include foot ulceration, peripheral neuropathy, vasculopathy, infection and destruction of deep tissues (3,4). Diabetic foot has a complex pathophysiology and multiple factors are involved. Impaired healing following a minor trauma of the foot, micro- and macro-vasculopathy, neuropathy and impaired response to an infection are the primary factors responsible for the formation of diabetic foot ulcer (5). Smoking, peripheral neuropathy, peripheral vascular disease, high levels of HbA1c and longer duration of diabetes mellitus are the known risk factors of diabetic foot (6).

Diabetic patients represent more than 60% of non-traumatic lower limb amputation cases (7). For this, diabetic foot ulcer is considered one of the common chronic diabetes complications leading to both minor and major limb loss (8). On the other hand, 24.4% of the total health expenses among diabetic population is related to foot complication. In USA, diabetic foot complications management costs 11 billion dollars (1).

By the year of 2030, there is an estimate of an increase of up to 69% in the prevalence of diabetes among adults in developing countries, and 20% in developed nations (9). Of Saudi citizens who are older than 30 years of age, 25.4% have diabetes (10). Thus, the prevalence of amputation of non-traumatic lower-limb is increasing due to the presence of Diabetes. Diabetic foot represents a major complication of diabetes, and 25 % of diabetes patients develop foot ulceration (9, 10).

In the coming decades, diabetes related lower-limb amputations are predicted to reach half a million in Saudi Arabia, the Middle East and North African countries. In KSA, based on a previous data review, 3,970 amputations per year is likely to occur and the rate of amputations is expected to increase more due to increasing prevalence of type 2 diabetes (8).

Current healthcare systems are designed in a way that all patients are first seen by a general practitioner or family physician. Unfortunately, the inadequate management and/or diagnosis of the diabetic foot will result in a delay in management and certainly complications which end up in most of the cases, by amputations. Thus, understanding the importance of initiating early treatment plays a crucial role in preventing progression to severe and limb-threatening infection and possibly stopping the inevitable pathway to amputation (8).

However, there are insufficient studies that assess the knowledge of the first line physicians regarding diabetic foot ulcer management (11). Moreover, there is a growing need for standardized practice and one of its forms is the multidisciplinary foot care team and patient education (12,13). Hospital and community-based awareness programs are highly recommended to be established in order to decrease the rate of morbidity and mortality correlated with diabetes mellitus (14).

The aim of this study is to assess knowledge, attitude, and practice of PHC physicians regarding diabetic foot prevention and management.

Methods

After obtaining institutional review board (IRB) ethical approval, a cross-sectional study was conducted at PHC centers in Abha City and Khamis Mushayt cities during the period from January till March, 2022.

The inclusion criteria were a physician who has been working at a PHC center for at least one year. However, residents were excluded since they cannot independently make management decisions.

Based on thorough review of relevant literature, a self-administered study questionnaire was designed by the researchers, taking into consideration the recommendations from the Saudi Guidelines for Diabetes Management and the Infectious Diseases Society of America (IDSA) Clinical Practice Guideline “Management of diabetic foot ulcer” (15-16). The questionnaire was validated by two Professors of Family Medicine at King Khalid University for content. The study questionnaire included four parts, i.e., sociodemographic data in addition to three other parts on knowledge (8 items), attitude (6 items) and practices (8 items) regarding diabetic foot prevention and management. Cronbach □ coefficients were 0.80 for knowledge, 0.73 for attitude, and 0.83 for practice. All the items were assessed based on a 5-point Likert scale, ranging from 4 as “strongly agree” to 0 as “strongly disagree”. Therefore, the knowledge and practices scores ranged from 0 to 32, while the attitude scores ranged from 0 to 24.

The study settings were visited by the researchers during the clinic duties. After obtaining written informed consent, the self-administered questionnaire was filled in by participants. No personal identification data were requested to ensure confidentiality and anonymity. The participants were requested to complete the questionnaire without consulting materials, textbooks or colleagues. Filled questionnaires were collected on the same day.

Collected data were analyzed using the Statistical Package for Social Sciences (SPSS, IBM Corporation, Armonk, NY, USA, Version 28). Quantitative variables were described using mean and standard deviation, while qualitative variables were described using frequencies and percentages. The total for each KAP score was summed up followed by their mean percent scores. Significance testing was performed based on the mean score of each dimension. Unpaired t-test and analysis of variance (ANOVA) were performed to find the association between demographic variables and KAP mean percent scores. Pearson’s correlation coefficient was applied to assess

Results

A total of 150 PHC physicians were enrolled in this study (response rate = 81.5%). Among them, there were 83 males (55.3%). More than half of participants (56%) were less than 40 years old. Almost two-thirds of participants (64.7%) were Saudi. Almost two-thirds were general practitioners (63.3%), while 20% were specialists and 16.7% were consultants, while 25.3% were specialized in family medicine. More than half of participants (53.3%) had 5-10 years' experience in PHC. About half of participants (53.3%) see 5-10 patients with diabetic foot, while 6% see more than 10 patients of diabetic foot, as shown in Table (1).

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Gender		
• Male	83	55.3
• Female	67	44.7
Age		
• <40 years	84	56.0
• 40-50 years	37	24.7
• >50 years	29	19.3
Nationality		
• Saudi	97	64.7
• Non-Saudi	53	35.3
Profession		
• General practitioner	95	63.3
• Specialist	30	20.0
• Consultant	25	16.7
Specialty		
• General Practice	95	63.3
• Family Medicine	38	25.3
• Others	17	11.4
Years of experience in PHC		
• <5 years	36	24.0
• 5-10 years	80	53.3
• >10 years	34	22.7
Monthly seen diabetic foot patients		
• <5	61	40.7
• 5-10	80	53.3
• >10	9	6.0

The highest PHC physicians' agreement regarding their knowledge about diabetic foot prevention and management was related to "early recognition of diabetic foot complications and early referral of cases can minimize amputations" (95.3%). The highest PHC physicians' positive attitudes toward diabetic foot prevention and management were related to "awareness and early referral of diabetic foot complications by PHC physicians will minimize the rate of amputation" and "Patients with diabetic foot complications should be promptly referred to a diabetologist" (97.3%). Regarding PHC physicians' practices about diabetic foot prevention and management was related "diabetic patients should have their feet inspected" (89.3%). Based on physicians' responses' the mean percent scores for the knowledge and attitude were good (79.7±12.6% and 88.1±12.7%, respectively), but the practice mean percent scores were low (52.9±10.1%), as shown in Table (2) and Figure (1).

Table 2: Physicians' responses regarding their knowledge, attitude, and practice about diabetic foot

Statements	No.	%
Knowledge		
1. Complications of diabetic foot affect 10-15% of patients	120	80.0
2. More than 80% of lower limb amputations are caused by diabetic foot complications	128	85.3
3. Lower limb amputations due to diabetic foot complications are highly prevalent in Saudi Arabia	56	37.3
4. Lack of awareness, use of traditional medicine, and unhealthy habits (e.g., walking barefooted) make diabetic foot complications more common in Saudi Arabia than in developed countries	131	87.3
5. Diabetic foot complications have less impact on patients and community than diabetic cardiac, renal and eye complications	99	66.0
6. Diabetic foot complications management is similar to non-diabetic foot complications	131	87.3
7. Early recognition of diabetic foot complications and early referral of cases can minimize amputations	143	95.3
8. Diabetic patients with foot deformity, callus, previous toe amputation, neuropathy or absent foot pulses should be referred to a specialist	141	94.0
Knowledge Score Percent (Mean±SD)	79.7±12.6%	
Attitude		
1. Diabetic foot ulcers management should be multidisciplinary in a specialized hospital	135	90.0
2. Awareness and early referral of diabetic foot complications by PHC physicians will minimize the rate of amputation	146	97.3
3. Foot care instructions and referral to diabetes educator should be done during each clinic visit	134	89.3
4. Patients with diabetic foot complications should be promptly referred to a diabetologist	146	97.3
5. Diabetic patients complaining of leg pain, or ulcer, and those with absent foot pulses should be referred to a vascular surgeon	141	94.0
6. Endocrinologists, not PHC physicians, should do feet examination for pre-ulcer risk factors	96	64.0
Attitude Score Percent (Mean±SD)	88.1±12.7%	
Practice		
1. I have attended a diabetic foot care management course	59	39.3
2. Diabetic patients should have their feet inspected	134	89.3
3. During each visit, I inspect the feet of all my diabetic patients and give them foot care instructions	105	70.0
4. Infected diabetic foot wounds or small ulcers with infection are treated by antibiotics and wound care only and do not need referral to a specialist	117	78.0
5. I refer patients with callus, deformity, or previous toe amputation to the specialist	120	80.0
6. Lack of time, is the reason I don't do feet assessment	67	44.7
7. Believing it is not my duty is the reason I don't do a foot exam	6	4.0
8. The main reason for not referring is the difficulty to get the acceptance by the specialist	45	30.0
Practice Score Percent (Mean±SD)	52.9±10.1%	

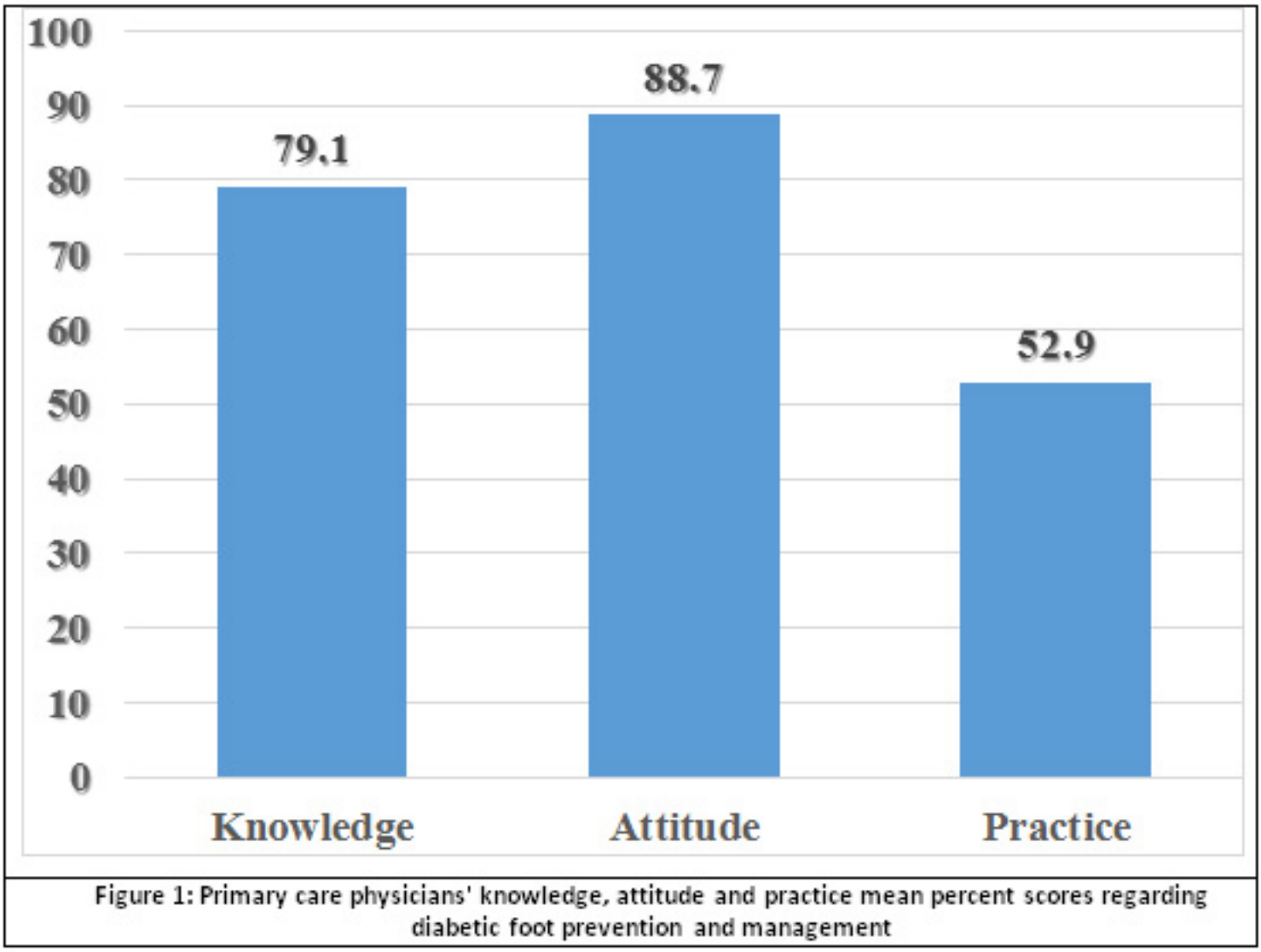

Figure 1: Primary care physicians' knowledge, attitude and practice mean percent scores regarding diabetic foot prevention and management

Table (3) shows that there were positive and statistically significant correlations between PHC physicians' knowledge, attitude and practice scores about diabetic foot prevention and management and attitude scores, was statistically significant (r=0.367, r=0.308; r=0.412, respectively, p<0.001 for all correlations).

Table 3: Correlation between PHC physicians' knowledge, attitude and practice scores

	Knowledge		Attitude		Practice	
	r	p	r	p	r	p
Knowledge	--	--	0.365	<0.001	0.308	<0.001
Attitude	0.365	<0.001	--	--	0.412	<0.001
Practice	0.308	<0.001	0.412	<0.001	--	--

Table (4) shows PHC physicians' mean percent knowledge scores regarding diabetic foot prevention and management according to their personal characteristics. Scores were significantly higher among family physicians than those with other specialties (p=0.048), and significantly higher among physicians with more than 10 years' experience in PHC (p=0.032). However, their mean percent knowledge scores did not differ significantly according to other personal characteristics.

Table 4: PHC physicians' mean percent knowledge scores according to their personal characteristics

Personal characteristics	No.	Mean±SD	P-value
Gender			
• Male	83	77.7±12.6	
• Female	67	80.9±13.5	0.136
Age			
• <40 years	84	77.5±12.4	
• 40-50 years	37	80.4±13.1	0.221
• >50 years	29	82.1±15.8	
Nationality			
• Saudi	97	78.0±13.9	
• Non-Saudi	53	81.1±14.3	0.198
Profession			
• General practitioner	95	78.5±12.2	
• Specialist	30	79.2±12.9	0.593
• Consultant	25	81.4±13.7	
Specialty			
• General Practice	95	78.5±12.2	
• Family Medicine	38	82.8±12.6	0.048†
• Others	17	74.3±12.8	
Years of experience in PHC			
• <5 years	36	75.5±11.5	
• 5-10 years	80	79.3±11.0	0.032†
• >10 years	34	82.6±11.3	
Monthly seen diabetic foot patients			
• <5	61	78.6±12.9	
• 5-10	80	79.4±11.1	0.871
• >10	9	80.5±13.8	

† Statistically significant

Table (5) shows PHC physicians' mean percent attitude scores regarding diabetic foot prevention and management according to their personal characteristics. Attitude mean percent did not differ significantly according to their personal characteristics.

Table 5: PHC physicians' mean percent attitude scores according to their personal characteristics

Personal characteristics	No.	Mean±SD	P-value
Gender			
• Male	83	88.3±12.9	
• Female	67	89.2±13.4	0.677
Age			
• <40 years	84	89.9±12.5	
• 40-50 years	37	87.9±12.7	0.412
• >50 years	29	86.5±12.9	
Nationality			
• Saudi	97	88.1±12.0	
• Non-Saudi	53	89.7±12.5	0.443
Profession			
• General practitioner	95	89.4±13.1	
• Specialist	30	87.6±12.9	0.708
• Consultant	25	87.5±13.3	
Specialty			
• General Practice	95	88.8±12.4	
• Family Medicine	38	88.7±13.1	0.989
• Others	17	88.3±13.7	
Years of experience in PHC			
• <5 years	36	88.2±13.0	
• 5-10 years	80	88.7±12.8	0.939
• >10 years	34	89.3±13.1	
Monthly seen diabetic foot patients			
• <5	61	89.0±12.7	
• 5-10	80	88.5±12.6	0.973
• >10	9	88.8±13.2	

Table (6) shows PHC physicians' mean percent practice scores regarding diabetic foot prevention and management according to their personal characteristics. Scores were significantly higher among family physicians than those with other specialties (p=0.041). However, their mean percent practice scores did not differ significantly according to other personal characteristics.

Table 6: PHC physicians' mean percent practice scores according to their personal characteristics

Personal characteristics	No.	Mean±SD	P-value
Gender			
• Male	83	52.7±9.8	
• Female	67	53.2±10.1	0.760
Age			
• <40 years	84	52.3±9.8	
• 40-50 years	37	53.6±10.2	0.700
• >50 years	29	53.8±10.4	
Nationality			
• Saudi	97	52.5±10.1	
• Non-Saudi	53	53.6±10.4	0.791
Profession			
• General practitioner	95	52.4±9.8	
• Specialist	30	53.6±10.0	0.504
• Consultant	25	54.1±10.1	
Specialty			
• General Practice	95	52.4±9.8	
• Family Medicine	38	56.0±9.9	0.041†
• Others	17	49.1±10.1	
Years of experience in PHC			
• <5 years	36	52.4±10.0	
• 5-10 years	80	52.7±9.7	0.732
• >10 years	34	54.1±10.1	
Monthly seen diabetic foot patients			
• <5	61	52.0±10.0	
• 5-10	80	53.3±9.8	0.445
• >10	9	56.2±10.3	

† Statistically significant

Discussion

In the current study, knowledge, attitude and practice of physicians at PHC centers in Aseer Region were assessed and compared. The present study revealed that the highest PHC physicians' agreement regarding their knowledge about diabetic foot prevention and management was related to "early recognition of diabetic foot complications and early referral of cases can minimize amputations". The highest PHC physicians' positive attitudes toward diabetic foot prevention and management were related to "awareness and early referral of diabetic foot complications by PHC physicians will minimize the rate of amputation" and "patients with diabetic foot complications should be promptly referred to a diabetologist". Regarding PHC physicians' practices about diabetic foot prevention and management was related "diabetic patients should have their feet inspected".

Our results revealed significant differences in PHC physicians' knowledge and practice scores according to their specialty, with highest mean scores among family physicians.

It is to be noted that positive attitude is considered a determinant factor in the context of expectations that help individuals to carry out positive behavior (17-18). Pankhurst et al.,(19) found that 15% of the participants noted a delay in the referral of diabetic foot cases and reported that half of those participants have a misunderstanding of the urgency with which some cases required to be referred and of referral indications. Similarly, Manu et al.,(20) reported that there was a delay in diagnosis of 55-66% of diabetic foot ulcer cases of duration of less than one month from the wound's onset.

The present study also found that about one-third of PHC physicians have attended a course on diabetic foot care as a part of their continuing medical education (CME), which is not sufficient to maintain their competence and enhance their professional performance toward their profession and patients. Lavery et al. observed that enhancement of the awareness, assessment and practice of the physicians toward diabetic foot, reduced ulcer occurrence by 50% (21).

Our study also found that specialists and consultants have better attitude toward prevention and management of diabetic foot compared with general practitioners. However, there is lack of evidence in the literature in terms of comparison between PHC physicians' attitudes toward treating diabetic foot according to their profession. Similarly, Suwattee et al. reported a variation in terms of diabetes management among three different PHC settings, whose providers were residents, faculty and diabetologists (22).

This study revealed no gender differences regarding PHC physicians' knowledge, attitude or practices about diabetic foot prevention and management. These findings are in accordance with those of Dowell et al. (23), and Kim et al., (24) who reported no association between gender and knowledge and healthcare services. Nevertheless, gender differences in knowledge, attitude and practice were established in several studies (25–27).

Results of our study showed significant correlation between PHC physicians' scores of their knowledge, attitude and practices related to diabetic foot prevention and management. Similarly, Mansour et al. reported a significant correlation between practice and knowledge scores regarding diabetic neuropathy (28).

The associations between knowledge, attitude, and practice have been reported in literature (29-30). However, high knowledge does not necessarily mean good practice. Physicians may know certain information or guidelines, but due to time or system constraints, they may not be able to apply a particular skill or step in management. Lack of sequences or monitoring of physicians' performance may have influenced lower practice rates despite adequate knowledge due to certain physicians' personalities. Therefore, the establishment of strategies to close the gap between physician's knowledge and practices is highly recommended as it may enhance better diabetic foot diagnosis and management practices (31).

The limitations of the present study include the cross-sectional design, which precludes causal associations, and the possibility of self-reporting bias.

Conclusion

PHC physicians' knowledge and attitude toward diabetic foot prevention and management is good but their practice is suboptimal. There are significantly positive correlations between knowledge, attitude and practices of PHC physicians. Those who have higher experience in PHC have higher knowledge, attitude and practices toward diabetic foot management.

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