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Extent of awareness of diabetic foot care in diabetic patients and their families at AL Baha city, Saudi Arabia

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ABSTRACT

The incidence for diabetes mellitus in Saudi Arabia is high, along with its associated complications especially those of multiple micro and macro-vascular complications with special concern to diabetic foot. The aim of this study is to assess the awareness of diabetic patients and their relatives about the care of diabetic foot at Al Baha province. *Material and methods:* A descriptive cross sectional study is performed and the data was collected through online self administered questionnaire. The collected data was coded and analyzed by SPSS version 28, in which both inferential and descriptive statistics were adopted. Student T-test and ANOVA were used. P<0.05 was considered significant. About 385 diabetic patients were included in this study, 52.7% was female. 45.2 % were aged between 20-29 years, patients experienced diabetes mellitus for < five years were 37.9% and >ten years were 36.6%. *Results:* 74.4% of the patients bear a satisfactory knowledge, 76.9% revealed a satisfactory practice and 59.70% showed a positive attitude, those patients who read and write only and below 20 years showed a low mean knowledge score. Furthermore, those having history of Diabetes ranged from 5 to 10 years and attained a middle school revealed a low attitude score and finally those suffering from DM >10 years showed a low practice, with significant difference. *Conclusion:* The awareness of diabetic foot care was good depending on the educational level and duration of diseases. So, more efforts with good counseling are needed to improve the awareness of diabetic patients and reduce its complications.

Keywords: Awareness, Knowledge, Practice, Diabetic foot, Saudi Arabia.

1. INTRODUCTION

Diabetes Mellitus is the most common clinical concern with a highly increasing prevalence worldwide (Ogurtsova et al., 2017). Saudi Arabia is

ranked seventh in the world and second in the Middle East for the prevalence of diabetes among its population according to by (Al-Dawish et al., 2016).

Diabetes Mellitus is a disease that is associated with multiple complications among patients, these complications are classified as macro-vascular and micro-vascular complications, the macro-vascular ones include, coronary artery disease and peripheral arterial disease, whereas retinopathy, nephropathy and neuropathy are considered as micro-vascular. Diabetic foot is a result of a pathophysiology includes both macro and micro-vascular diseases (Solan et al., 2017; Tork & Elgazzar, 2020). Diabetes related foot complications have been identified as the single most common cause of morbidity among diabetic patients (Lim et al., 2017) and it is significantly impacting health care resource (Alshammary et al., 2020).

Diabetic foot is a result of a poorly controlled hyperglycemic state that is harmful and affecting the life quality and length of the patients, regardless of its hefty cost. The pathophysiology of diabetic foot includes the traumatic injury or infection of tissue because of peripheral neuropathy and disturbed sensation, in presence of peripheral artery disease and occlusion due to chronic changes in the body metabolism caused by diabetes mellitus (Bandyk et al., 2019).

Diabetes related foot complications could be preventative by taking care of the foot which can reduce the risk of lower limb ulcerations and sub sequent amputations (Al-Busaidi et al., 2016). The aim of this study is to assess the level of awareness and knowledge of foot care among diabetic patients and their families in Al Baha city, Saudi Arabia.

2. MATERIALS AND METHODS

Study design

This is an observational cross sectional community based study that ran between 2021 and 2022. A total of 385 participants were included of the diabetic patient or member of him/ her family at the Al Baha city in Saudi Arabia between 2021 and 2022 (figure 1).

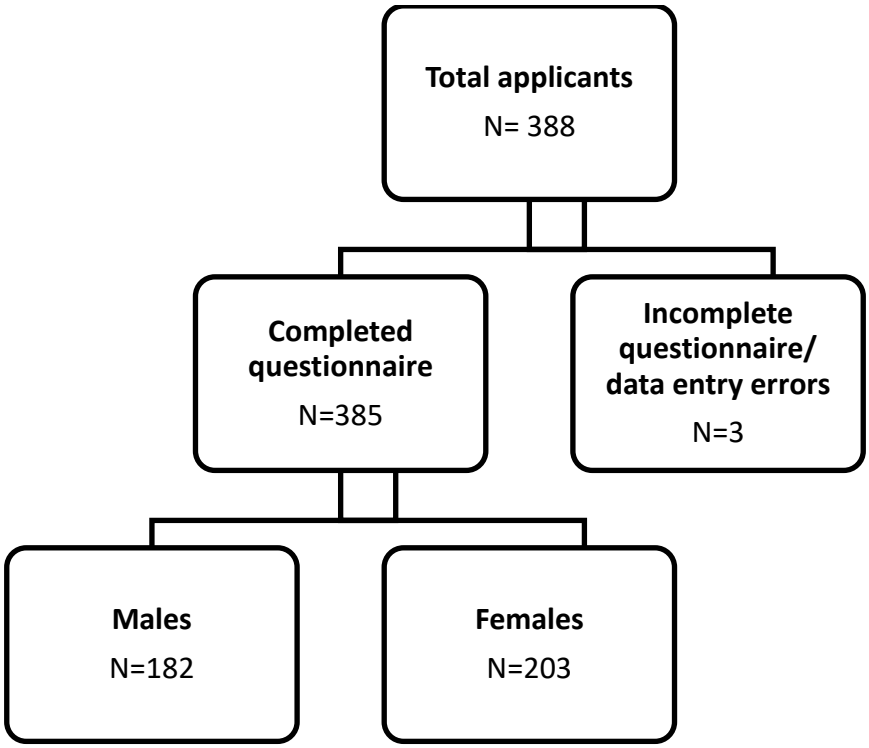

Figure 1 Algorithm for patient inclusion and classification according to gender

Inclusion criteria

Al Baha city, Saudi Arabia resident patients with known diagnosed diabetes mellitus including type 1 or type 2 diabetes or member of patient's family accepting to be included in the study.

Exclusion criteria

Diabetic patient or member of him/ her family refusing to complete or be included in the questionnaire or participants who didn't complete the questionnaire are had a data entry errors.

Sampling technique and Size

Convenience sampling was used and calculated by using the following formula:

$$n=\frac{\frac{z^2 \times p(1-p)}{e^2}}{1+(\frac{z^2 \times p(1-p)}{e^2 N})}$$

Sample size = 385, with a confidence level = 95% (Z statistic = 1.96), margin of error 5% and population of 487, 108 depend on general authority for statistic in Saudi Arabia.

Data collection tool and technique

Modified Closed ended questionnaire was used. The questionnaire was designed by a board containing associates from diabetologist and medical education. The questions were drafted and altered methodically by educational professionals to obtain the high quality of questionnaire. To create the validity of questionnaire, a pilot study was done on two separate clusters: The first one was represented staff academic members and the other represented group of students and their families. The results from both groups were acceptable confirming that the questionnaire was not only consistent, but also valid and reliable (Atta & Al-Qahtani, 2018; Atta & Alzahrani, 2020; Atta & Almilaibary, 2022). The questionnaire was addressed in a Google form and the link was distributed through different social media, which consists of four parts: Socio-demographic characteristics, duration of the diseases, Knowledge about diabetic foot care (6 questions), attitude regarding diabetic foot care (5 questions) and the practice and approach (4) questions.

Score grading

A common grading method was used for each variable in this KAP questionnaire as follows: The score was assessed by answering questions as follow

- For knowledge score for each participant Questions were given one point for correct response (Yes) and zero point for incorrect answers (No, I don't know).
- For attitude score for each participant Questions were given one point for correct response (Yes) and zero point for incorrect answers (No).
- For practice score for each participant Questions were given five points for always, four points for usually, three points for some times, two points for rarely and one point for never. Followed by the calculation of a total cumulative score: Less than 60% score were classified as unsatisfactory knowledge and practice and negative attitude whereas more than 60% score were classified as satisfactory knowledge and practice and positive attitude

Pilot Study

Data were used to assess internal consistency reliability using Cronbach's alpha. The results showed adequate internal consistency reliability with Cronbach's alpha = 0.68**.**

Data Analysis

Data was analyzed using SPSS version 28. Mean and standard deviation were used to describe the quantitative data. Frequencies and percentages were used to describe categorical variables. T-test and ANOVA were used. A P value of less than 0.05 was considered as significant in all tests.

3. RESULTS

The study included 385 participants; 45.2 % of them were aged between 20-29 years, more than half of them were female 52.7% and 55.8% were single. In addition, more than a half of the patients 62.3% have bachelor or higher degrees, 42.1% of them are student and 57.9% of them their family income was less than 5000 SR. The Socio-demographic characteristics of diabetic patient in details in table 1. According to table 2, more than one third of the patients has been suffering from DM for less than five years followed by more than ten years respectively (37.9%, 36.6). Also, more than three quarters 76.1% were nonsmokers.

Table 3 showed that 54.0% of participants knew that diabetic patients could develop lack of foot sensation, 70.1% was aware that diabetic patients could develop foot ulcers or gangrene and 46.8% reported, they have been given information on foot care. Most of

the patients 80.3% mentioned the special diet should be followed to prevent diabetes complications from happening, 84.2% the physical activity prevents the diabetes complications from happening as well as 89.1% said complying with the medications prevent the diabetes complications from happening.

Table 4 showed patients' attitude regarding diabetic foot care. Unfortunately, more than a half of them 51.2% thought there is no need to check their feet daily for any injuries, 75.1% reported if there are injuries in their feet, it will be managed by themselves at home only 24.9% will consult a doctor. It is worth mentioning that most of the patients 81.3% cut their feet nails routinely whereas only 35.6% cut their feet nails straight across.

As showed in table 5, 34.5% of the patients always wash their feet daily and dry them after washing, 35.1% always check their shoes for anything that might be inside them before wearing them and 70.6% always go to check up their foot at the clinic every three month whereas 47.5% never wear medical special shoes for diabetics.

Figure 2 and 3 showed the mean score of knowledge (4.24±1.56), attitude (2.66±0.83) and practice (13.96±3.12). Moreover, about three quarters of the patients 74.40% have a satisfactory knowledge, 59.70% have positive attitude and 76.90% have satisfactory practice. Table 6 reported patients who read and write only and below 20 years have low mean knowledge score, also low attitude score reported among patients who had middle school and had suffering from DM from 5 to 10 years. In addition, a low practice among patients who has been suffering from DM for more than 10 years, they were statically significant. Table 7 showed positive small correlation, highly significant between knowledge and practice (.241), knowledge and attitude (.210), in addition a positive medium correlation, highly significant between attitude and practice (.409).

Table 1 Socio-demographic characteristics of diabetic patient (n=385).

Variables		Frequency	Percent
Age	Below 20	60	15.6
	20-29	174	45.2
	30-39	49	12.7
	40-49	50	13.0
	50-59	31	8.1
	More than 60	21	5.5
Gender	Male	182	47.3
	Female	203	52.7
Marital status	Single	215	55.8
	Married	158	41.0
	Divorced	4	1.0
	Widow	8	2.1
Educational level	I can read and write only	25	6.5
	Middle school	6	1.6
	High school	114	29.6
	Bachelor or higher degrees	240	62.3
Job	Student	162	42.1
	Working	112	29.1
	Not working	77	20.0
	Retired	34	8.8
Household income	Less 5000 SR	223	57.9
	5000-10000SR	107	27.8
	More than 10000SR	55	14.3

Table 2 Health status of diabetic patient (n=385).

Variables		Frequency	Percent
Duration of illness	less than 5 years	146	37.9
	5-10 years	98	25.5
	More than 10 years	141	36.6

Smoking	Nonsmoker	293	76.1
	Smoker	64	16.6
	Ex-smoker	28	7.3

Table 3 Knowledge of diabetic patient regarding diabetic foot care (n=385).

No	Items	Yes	No	I don't know
1	Do diabetic patients develop lack of foot sensation	208 54.0%	58 15.1%	119 30.9%
2	Do diabetic patients develop foot ulcers or gangrene	270 70.1%	41 10.6%	74 19.2%
3	Have you been given any information on foot care	180 46.8%	140 36.4%	65 16.9%
4	Does the special diet prevent the diabetes complications from happening	309 80.3%	21 5.5%	55 14.3%
5	Does the physical activity prevent the diabetes complications from happening	324 84.2%	18 4.7%	43 11.2%
6	Does complying with the medications prevent the diabetes complications from happening?	343 89.1%	12 3.1%	30 7.8%

Table 4 attitude of diabetic patient regarding diabetic foot care (n=385).

No	Items	Yes	No
1	Do you think you should check your feet daily for any injuries	188 48.8%	197 51.2%
2	If you find injuries in your feet you will manage yourself at home?	289 75.1%	96 24.9%
3	If you find injuries in your feet you will consult a doctor?	96 24.9%	289 75.1%
4	Do you cut your feet nails routinely	313 81.3%	72 18.7%
5	Do you cut your feet nails straight across	137 35.6%	248 64.4%

Table 5 Practice of diabetic patient regarding diabetic foot care (n=385).

No	Items	Always	Usually	Sometimes	Rarely	Never
1	Do you wash your feet daily and dry them after washing	133 34.5%	93 24.2%	98 25.5%	32 8.3%	29 7.5%
2	Do you check your shoes for anything that might be inside them before wearing them	135 35.1%	70 18.2%	65 16.9%	65 16.9%	50 13.0%
3	do you go to check up your foot at the clinic every three month	272 70.6%	39 10.1%	33 8.6%	28 7.3%	13 3.4%
4	Do you wear medical special shoes for diabetics	76 19.7%	37 9.6%	48 12.5%	41 10.6%	183 47.5%

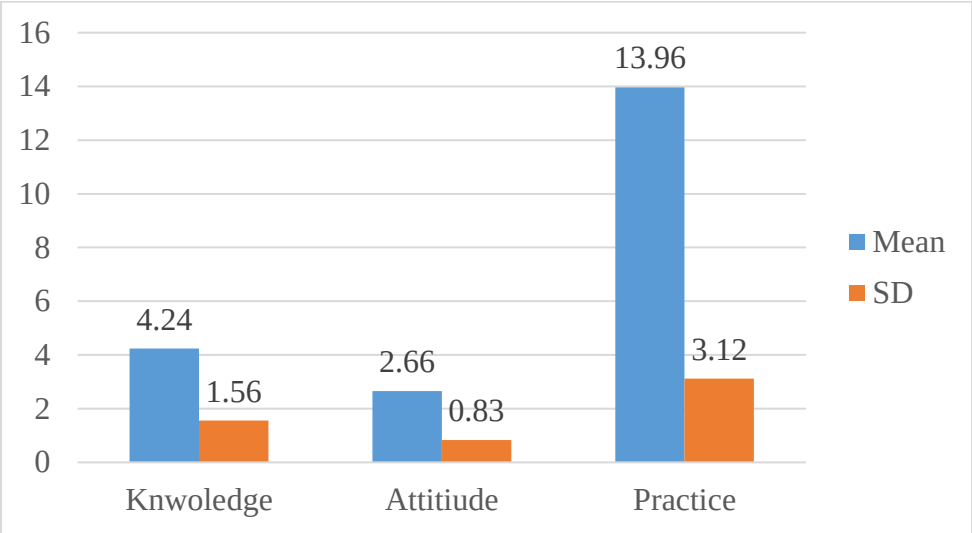

Figure 2 Mean and SD of knowledge, attitude and practice regarding diabetic foot care (n=385).

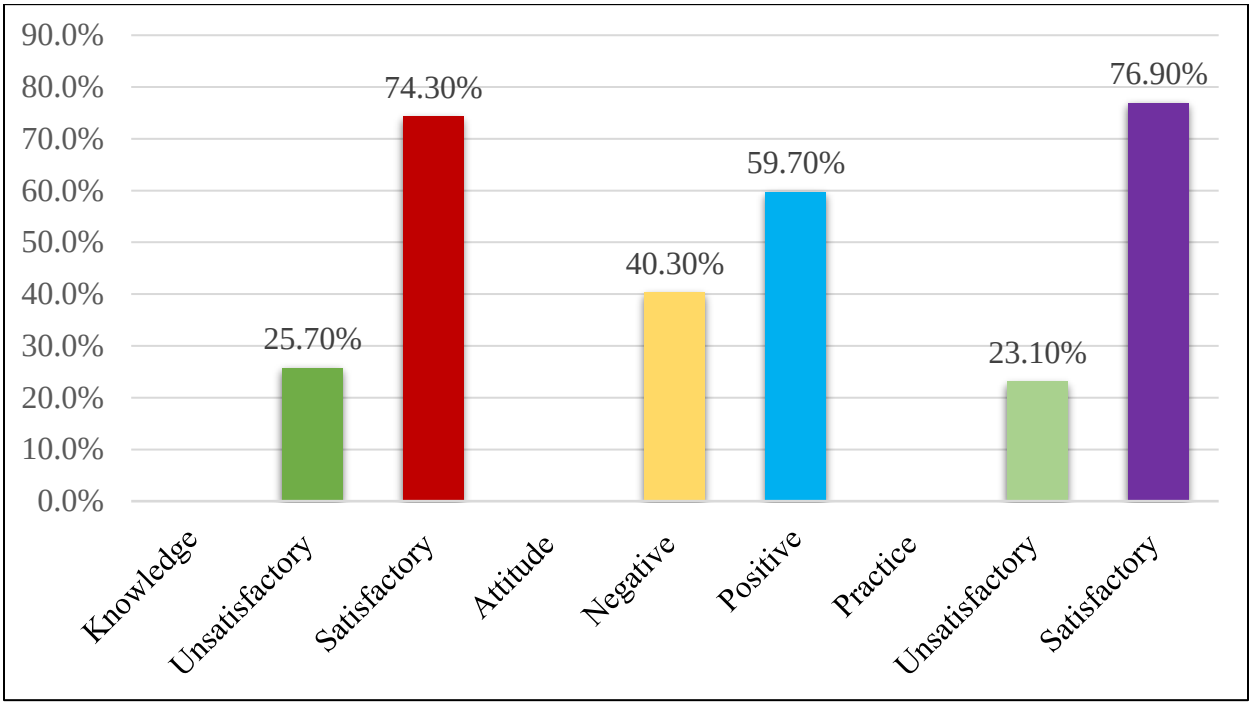

Figure 3 knowledge, attitude, and practice scores regarding diabetic foot care (n=385).

Table 6 Relation between socio-demographic, knowledge, attitude and practice regarding diabetic foot care (n=385).

Items	Knowledge			Attitude			Practice		
	Mean & SD	F	Sig	Mean & SD	F	Sig	Mean & SD	F	Sig
Sex									
Male	4.20 ±1.60	.228	.628	2.63±.91	10.36	.572	13.77±3.26	3.44	.253
Female	4.28±1.54			2.68±.76			14.13±2.98		
Education level									
Read and write only	3.68±1.60	4.13	.007	2.72±.94	3.32	.020	14.52±2.43	1.38	.249

Middle school	4.0±2.10			2.00±.63			12.17±1.33		
High school	3.94±1.62			2.51±.87			13.68±3.19		
Bachelor or higher	4.55±1.49			2.74±.79			14.08±3.16		
Age									
below 20	3.70±1.55	4.80	<.001	2.55±.79	.600	.700	14.22±.2.99	.609	.693
20-29	4.57±1.55			2.71±.87			14.06±.3.27		
30-39	3.82±1.63			2.73±.84			13.67±.3.03		
40-49	3.94±1.42			2.60±.76			13.38±.3.13		
50-59	4.26±1.61			2.55±.85			14.06±.2.87		
More than 60	4.76±1.04			2.62±.74			14.33±.2.78		
Marital status									
Single	4.40±1.59	1.77	152	2.66±.88	.021	996	14.16±3.20	1.19	.314
Married	4.03±1.50			2.66±.76			13.67±3.00		
Divorced	4.25±1.26			2.75±.96			12.75±3.59		
Widow	4.38±2.07			2.63±.92			14.88±2.80		
Job									
Student	4.49±1.53	2.577	054	2.66±.86	602	.614	14.14±3.09	.924	.429
Working	4.04±1.50			2.69±.77			13.85±3.27		
Not working	4.01±1.63			2.56±.85			13.55±3.12		
Retired	4.24±1.67			2.76±.85			14.41±2.66		
Family income									
Less 5000 SR	4.27±1.56	.111	.895	2.64±.85	.722	.486	14.15±3.16	2.45	.088
5000-10000SR	4.19±1.52			2.64±.78			13.40±2.88		
More than 10000SR	4.24±1.69			2.78±.83			14.29±3.28		
Duration of illness									
less than 5 years	4.13±1.68	.629	.533	2.80±.89	3.89	.021	14.58±2.99	5.10	.007
5-10 years	4.33±1.32			2.52±.78			13.78±3.11		
More than 10 years	4.30±1.59			2.60±.78			13.45±3.16		

Table 7 Correlation between scores of KAP domains regarding diabetic foot care (n=385).

Items	R	P
Knowledge *practice	.241	<.001
Knowledge *attitude	.210	<.001
Attitude * practice	.409	<.001

4. DISCUSSION

The rising prevalence of diabetes mellitus (DM) in Saudi Arabia, ranked second in the Middle East and seventh in the world, is linked to a lot of complications. Diabetic foot complications are the leading cause of leg amputation and death, so the purpose of this study was to determine the knowledge, attitude and practice of foot care among diabetic patients at Al Baha region, Saudi Arabia. In our study, more than one third of the patients had been suffering from DM for less than five years followed by more than ten years respectively (37.9%, 36.6%). Also, more than three quarters 76.1% were non smokers. This survey was online and older people less uses social media (Al-Shaibari et al., 2021).

Overall, in our study about three quarters of the participants 74.40% had satisfactory knowledge and it's slightly more than the findings reported in India by Manjunath et al., (2020) which showed 73.13% had a good knowledge on diabetic foot care. Our

findings reported higher levels of knowledge compared to in Pakistan which showed about 51.3% had a moderate knowledge (Qasim et al., 2021) and a study done in India which showed 50% have a satisfactory knowledge (Sutariya & Kharadi, 2016).

On the contrary, the present study differs from studies done in India by (Manjunath et al., 2020) which showed only 23% had a good knowledge. In addition, the current study is in contrary with the study done in Iran by Pourkazemi et al., (2020) which showed, majority of participants had a poor knowledge (84.8%). This was explained in previous study by the high educational level of participant and the role of media and doctors in raising the awareness among patients and their families (Alshammari et al., 2019).

In details, the current study showed 54.0% of the participant knew that diabetic patients could develop lack of foot sensation. These findings are less than results obtained from the study of Alshammari et al., (2019) which conducted in Riyadh, Saudi Arabia that showed 78.5% developed alteration in foot sensation. However, our findings showed higher knowledge than a previous study done by Tork & Elgazzar, (2020) in Qassim region which showed only 27.2 %.

Moreover, in our study 70.1% were aware that diabetic patients could develop foot ulcers or gangrene, these results are mid-way between the previous study done in Riyadh by Alshammari et al., (2019) that revealed 89% and study done in Qassim region by Tork & Elgazzar, (2020) that showed 43.6% of diabetic patient developed foot ulcer. In addition, in this study 46.8% reported they has been given information on foot care while it differs from a study conducted in Qassim region by Alshammari et al., (2019) which showed 57.5% received information and from a study done in Riyadh by (Tork & Elgazzar, 2020) which showed 81% received information on diabetic care. In our study, most of the patients 80.3% mentioned that special diet can help preventing the diabetes complications and it's almost like a study conducted in KSA by Alshammari et al., (2019).

Regarding attitude of the participants, more than a half 59.7% had a positive attitude and this differ from other study done in Qassim by Tork & Elgazzar, (2020) which showed 53.2 % of the responders had a negative attitude and a study conducted in Riyadh which showed 86.4% had a poor attitude toward diabetic foot and diabetic foot care (Alshammari et al., 2019). Moreover, it is like a study conducted in China by Jia et al., (2022) which showed 63.9% had a positive attitude and a study done in diabetic clinic Military Hospital in Alkharj Saudi Arabia by (Shamim et al., 2021) which showed most patients had a positive attitude towards the management of diabetes and its foot complication

Regarding practice of the participants, in the current study 76.9% had a satisfactory practice and this is almost similar to a study in Pakistan by Qasim et al., (2021) that revealed 63.3% of the patients had moderate practice. Moreover, it is opposite to a study done in North China by Jia et al., (2022) which showed 71.4% had a poor practice. Also, there is a study done in Iran by Pourkazemi et al., (2020) which showed that 49.6% of the responders had a poor performance. This variation could be explained by the level of knowledge and the duration of disease.

Factors affecting knowledge, attitude and practice

The current study showed patients with low educational level and aged below 20 years, had a low mean knowledge score, also a low attitude score reported among patients who had a middle school and has been suffering from DM from 5 to 10 years. In addition, a low practice among patients who has been suffering from DM for more than 10 years, they were statically significant. These findings are in the same line with results obtained from a study of Alshammari et al., (2019) in Saudi Arabia which reported that approximately 81% of married patients with diabetes had significantly more adequate knowledge about diabetic care than other patients and there were significant differences in the level of knowledge and practices regarding diabetic foot care among different levels of education. Furthermore, our results are in accordance with a pervious study done by Ahmed et al., (2019) in Sudan showed that the awareness and practices of diabetic patients regarding foot care are correlated significantly with age and education level. However, these results did not agree with Pavithra et al., (2020) who noticed a link between male gender and a high knowledge level in diabetic foot patients. Also, this observation was found in study of Tuglo et al., (2022).

Importantly in this study there was a positive small correlation that is highly significant between knowledge and practice, knowledge and attitude in addition positive medium correlation highly significant between attitude and practice. The study permitted health care providers to enhance their knowledge and impose proper self care practice among diabetic patients.

Limitations of this study

The research drew on cross sectional design and was done on the questionnaire only. So, the results obtained may be inaccurate due to improper fulfilling of questionnaire by some respondents that give some bias. Despite trial to exclude some of these responses, the results should be more correlated with other parameters to estimate the actual degree of awareness of diabetes and complications among diabetic patients and their families.

5. CONCLSUION

In summary, we found that most responders had a good knowledge of diabetic foot care, also a half of them have a positive attitude and they applied appropriate preventive practices towards foot care. Increasing awareness regarding diabetic foot care through various media and in diabetic clinics by doctors could reduce leg amputations and enhance quality of life of the patients.

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Author Contributions

Agwa RH conceived the original idea and prepared the questionnaire, Alzahrani AA and Alghamdi MF designed the study, Altaweel FI, Alghamdi WM and Shuroq collected the data, Alherz SH and Alqahtani SM analyzed the data, Alherz SH drafted the manuscript and Agwa RH revised it. The work is supervised and revised step by step by Alghamdi AH. In addition, all authors were equally contributed and share in all steps of the research. All authors revised and approved the version to be published and agreed to be accountable for all aspects of the work.

Ethical Approval

The study was approved by the Medical Ethics Committee of Faculty of Medicine, Al Baha University under approval number REC/PEA/BU-FM/2021/0101. Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript. All collected data was confidentially kept and it was used for scientific purposes only.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data materials availability

Data that support the findings of this study are embedded within the manuscript.

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