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Knowledge, attitude, practice of the population toward diabetic foot in Jeddah, Saudi Arabia

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ABSTRACT

This study aimed at assessing the knowledge, attitude and practice (KAP) towards Diabetic foot and its determinants among the population of Jeddah, Saudi Arabia. A cross sectional study was conducted on 507 subjects via Online-Google form questionnaire. It provided information on personal and socio-demographic characteristics, morbid history, and KAP on diabetic foot. Type 2 diabetes mellitus (T2DM) was present among 10.3% of the enrolled subjects. It was significantly associated with male gender, lower educational level and high monthly income. Knowledge of the subjects about management of DM, and health of their feet was good. However, their knowledge about care for their feet and use of the appropriate feet-ware was low. Attitude of the subjects regarding avoiding risks for DM, and towards the health of their feet was good. However, the attitude and practice towards the use of their feet-ware was low. This was similar in both patients with and without DM. It is recommended that health education programs about how to care for the feet, and proper use of feet-ware should be implemented by health care professionals.

Keywords: Diabetic foot, KAP, Saudi Arabia

1. INTRODUCTION

According to World Health Organization (WHO) figures, Saudi Arabia ranks second in the Middle East and seventh worldwide for diabetes prevalence (Al-Amri et al., 2021; Shamim et al., 2021). Diabetes foot is a serious and long-lasting condition that has a significant impact on the quality of life for diabetic people (Alshammari et al., 2019). Diabetic foot syndrome is caused by peripheral artery disease and sensory. Male sex, black ethnic group, low educational level and stressful employment, damaged marital status, and low monthly income were all reported as risk factors for occurrence of T2DM (Bird et al., 2015; Harrison et al., 2003).

Family history of diabetes is a strong risk factor for the development of type 2 diabetes (Scott et al., 2013); while participation in regular physical

activity improves blood glucose control and can prevent or delay T2DM. Subjects from urban areas revealed higher occurrence of T2DM than those from rural areas (Alotaibi et al., 2017). Reducing variability of HbA1c and proper management after diagnosis of DM may prevent its complications and comorbidities in the future (Suh et al., 2023). Healing of diabetic foot ulcer might also take months to years, and those lesions frequently result in increased lower extremity amputation (Jain et al., 2023).

Foot complications can be prevented by appropriate foot care, footwear and foot screening aim to detect, prevent and manage problems early (Ahmed et al., 2019). Foot amputation occurrence was high among the patients who had longer duration of diabetes, no diet change, no proper blood sugar monitoring, sedentary type of life style, inadequate therapy, and poor compliance with treatment, history of smoking, hypertension, ischemic heart disease, and stroke (Madmoli et al., 2019). Washing the wound with oxygenated water, disinfection of the wound, and keeping feet clean with daily washing, keeping them dry, especially in-between the toes are among the proper procedures to prevent FUD (Frykberg et al., 2022).

However, the knowledge of the general about prober foot care was low. Eating habit and exercising are important life styles associated with proper control of T2DM (Al-Assadi, 2022; Samad-Omar et al., 2023). Adequate foot hygiene, proper control of blood glucose level, and quitting smoking together with using suitable foot-ware and getting adequate medical help may help to reduce the occurrence of foot ulcer disease by 50-60% (Muhammad-Lutfi et al., 2014; Van-Netten et al., 2018). This research was done to measure the KAP towards diabetic foot, and study its risk factors among the participants from Jeddah Saudi Arabia.

2. SUBJECTS AND METHODS

Study design

The study had a cross-sectional design.

Study setting

Between November 2022 and February, 2023, an anonymous, Arabic language electronic survey was distributed nationwide through social media networks. The sampling method was a non-probability convenient one.

Study subjects

Eligibility criteria included adults who reside in Jeddah Saudi Arabia. Any participant who resides outside the targeted setting was excluded. The required Sample size was calculated using G-Power software and according to effect size = 0.3, alpha = 0.05, power=0.95 and degree of freedom (df) = 5 the expected sample size was found to be 277 subjects. For the present study the enrollment number of participants was 507.

Data collection

A questionnaire was used to provide information on the socio-demographic as well as personal characteristics, morbidity history and clinical history about having T2DM. It included also questions on the KAP towards diabetic foot (Sivan et al., 2021; Al-Gaows et al., 2019). It provided information about:

1) Medical care of DM,
2) Care and hygiene of the feet and its injuries
3) Information about knowledge, attitude and practice towards diabetic foot
4) And care, choice and hygiene of feet ware.

Data management and analysis

The SPSS was used to analyze the data. The associations between the different categorical variables were studied using the Chi square test of significance. The level of significance for the present study was 0.05.

3. RESULTS

The total number of enrolled subjects for the present study was 507 (15.8% males and 84.2% females). Majority of the subjects were Saudis (78.9%). T2DM was present among 10.3% of the subjects; it was significantly more common among males compared to females (Figure 1). T2DM was also significantly more common among those with lower educational level, with high monthly income, and among married subjects ($p<0.000$). Having family history of DM was significantly associated with occurrence of T2DM ($p <0.001$). Practicing exercise, smoking and area of residence were irrelevant to occurrence of T2DM where p value was > 0.05 (Table 1).

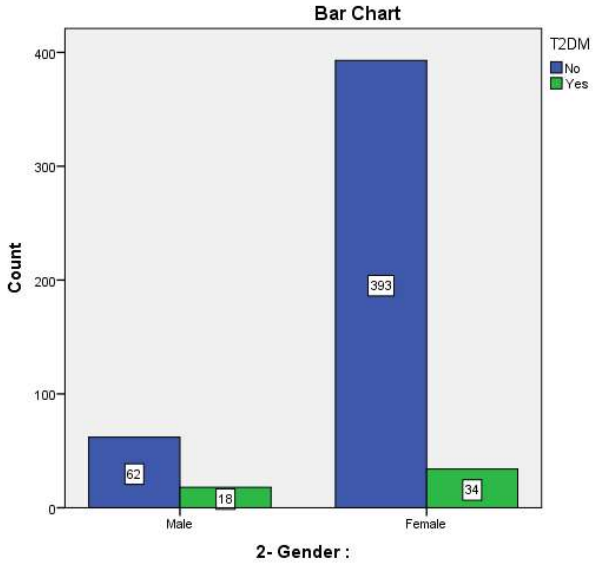

Figure 1 Distribution of studied subjects according to Gender and having T2DM

Table 1 Distribution of studied subjects by having T2DM and socio demographic characteristics

Variable	Category	T2DM				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Gender	Male	62	13.6%	18	34.6%	80	15.8%	15.470 (.000)
	Female	393	86.4%	34	65.4%	427	84.2%	
Nationality	Saudi	356	78.2%	44	84.6%	400	78.9%	1.139 (.286)
	Non-Saudi	99	21.8%	8	15.4%	107	21.1%	
Educational level	Below University	91	20.0%	23	44.2%	114	22.5%	15.720 (.000)
	University or more	364	80.0%	29	55.8%	393	77.5%	
Employs	Employed	144	31.6%	18	34.6%	162	32.0%	.189 (.664)
	Not Employed	311	68.4%	34	65.4%	345	68.0%	
Monthly income	Less than 5000	295	64.8%	22	42.3%	317	62.5%	10.562 (.005)
	5000-10000	98	21.5%	20	38.5%	118	23.3%	
	More than 10000	62	13.6%	10	19.2%	72	14.2%	
Marital status	Single	324	71.2%	19	36.5%	343	67.7%	25.633 (.000)
	Married	131	28.8%	33	63.5%	164	32.3%	
Family history of DM	Yes	263	57.8%	42	80.8%	305	60.2%	10.270 (.001)
	No	192	42.2%	10	19.2%	202	39.8%	
Smoking	Non smoker	374	82.2%	39	75.0%	413	81.5%	1.771 (.413)
	Ex-smoker	27	5.9%	5	9.6%	32	6.3%	
	Smoker	54	11.9%	8	15.4%	62	12.2%	
Exercises	No	168	36.9%	19	36.5%	187	36.9%	3.307 (.191)
	Yes regularly	41	9.0%	1	1.9%	42	8.3%	
	Yes not regularly	246	54.1%	32	61.5%	278	54.8%	
Residential area in Saudi Arabia	Western region	343	75.4%	44	84.6%	387	76.3%	2.333 (.506)
	Eastern region	37	8.1%	3	5.8%	40	7.9%	
	Central region	51	11.2%	3	5.8%	54	10.7%	
	Southern region	24	5.3%	2	3.8%	26	5.1%	

Majority of the subjects realized that taking medication regularly may prevent complications of DM (95%). However, this information was significantly more encountered among those without DM (p<0.005). Over 90% of the subjects believed that patients with DM should care about their feet because they might not feel a minor injury to their feet and because wounds do not heal quickly and they might get feet ulcers. About one fifth of the subjects did not know that smoking might impair the circulation in the lower limbs. Only 37% of the subjects feel that the feet should be inspected daily. About two thirds of the subjects would see a doctor if they found redness or bleeding between the toes (62%). Around 86% of the subjects would see a doctor if they found a corn/ hard skin lesion on the feet. Over 90% of the subjects said that patients with diabetes should wash their feet daily. Two thirds of the subjects thought that patient with DM should inspect the inside of the foot ware when they use it only (Table 2).

Table 2 Distribution of studied subjects by having T2DM and knowledge on Diabetic foot

Variable	Category	T2DM				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
DM patients should take medication regularly to avoid complication	True*	432	94.9%	47	90.4%	479	94.5%	10.432 (.005)
	False	3	0.7%	3	5.8%	6	1.2%	
	Don't know	20	4.4%	2	3.8%	22	4.3%	
DM patients may not feel a minor injury to their feet	True*	417	91.6%	50	96.2%	467	92.1%	1.424 (.491)
	False	4	0.9%	0	0.0%	4	0.8%	
	Don't know	34	7.5%	2	3.8%	36	7.1%	
Wounds and infection may not heal quickly in patients with DM	True*	435	95.6%	49	94.2%	484	95.5%	3.834 (.147)
	False	4	0.9%	2	3.8%	6	1.2%	
	Don't know	16	3.5%	1	1.9%	17	3.4%	
DM patients may get a foot ulcer	True*	387	85.1%	44	84.6%	431	85.0%	.036 (.982)
	False	10	2.2%	1	1.9%	11	2.2%	
	Don't know	58	12.7%	7	13.5%	65	12.8%	
Smoking causes poor circulation in the feet of patients with DM	True*	330	72.5%	38	73.1%	368	72.6%	.095 (.953)
	False	12	2.6%	1	1.9%	13	2.6%	
	Don't know	113	24.8%	13	25.0%	126	24.9%	
How often do you think you should inspect your feet	Daily*	172	37.8%	16	30.8%	188	37.1%	1.160 (.560)
	Twice week	116	25.5%	16	30.8%	132	26.0%	
	Weekly	167	36.7%	20	38.5%	187	36.9%	
If you found redness/bleeding between your toes what is the first thing you do?	Report Doctor*	284	62.4%	32	61.5%	316	62.3%	1.559 (.459)
	Nurse Dress Wound*	125	27.5%	12	23.1%	137	27.0%	
	Don’t know	46	10.1%	8	15.4%	54	10.7%	
Even if you have never had a corn/ hard skin lesion, would you do if you had one?	Cut with blade	13	2.9%	2	3.8%	15	3.0%	.846 (.655)
	Report* Doctor	397	87.3%	43	82.7%	440	86.8%	
	Don’t know	45	9.9%	7	13.5%	52	10.3%	
How often do you think your feet should be washed?	Daily*	435	95.6%	49	94.2%	484	95.5%	1.384 (.501)
	Twice week	15	3.3%	3	5.8%	18	3.6%	
	Weekly	5	1.1%	0	0.0%	5	1.0%	
What temperature of water do you think you should wash your feet in?	Warm*	418	91.9%	45	86.5%	463	91.3%	1.677 (.432)
	Hot	5	1.1%	1	1.9%	6	1.2%	
	Cold	32	7.0%	6	11.5%	38	7.5%	
How often do you think you should inspect the inside of your footwear for objects and torn lining?	Daily*	94	20.7%	14	26.9%	108	21.3%	5.340 (.149)
	Twice week	24	5.3%	5	9.6%	29	5.7%	
	Weekly	55	12.1%	9	17.3%	64	12.6%	
	Every time* footwear put on	282	62.0%	24	46.2%	306	60.4%	

*Correct answer

Majority of the subjects were ready to change their diet and exercise pattern to minimize the occurrence of DM (89%). A great proportion of the subjects (86%) were also willing to check their feet daily and change their feet ware as said by the doctor. About two thirds of the subjects did wear feet wears indoor and outdoor as said by the doctor. Majority of the subjects (86%) thought that they were capable of leading a normal life, if they were ready to take measures against diabetes. About 70% of the patients with diabetes took their anti-diabetic drugs regularly. A Great proportion of the subjects (43%) do not dry their feet after washing. Majority of the subjects (95%) would consult their doctors if they noticed changes in their feet (Table 3).

Table 3 Distribution of studied subjects by having T2DM and Attitude on Diabetic foot

Variable	Category	T2DM				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Are you ready to change your diet and exercise pattern prevent occurrence of DM?	Yes*	407	89.5%	45	86.5%	452	89.2%	.409 (.522)
	No	48	10.5%	7	13.5%	55	10.8%	
Are you willing to check your foot daily and change your foot wear as said by doctor?	Yes*	394	86.6%	42	80.8%	436	86.0%	1.314 (.252)
	No	61	13.4%	10	19.2%	71	14.0%	
Do you wear your foot wears indoor and outdoor as said by the doctor?	Yes*	301	66.2%	36	69.2%	337	66.5%	.198 (.656)
	No	154	33.8%	16	30.8%	170	33.5%	
Do you think that you are capable of leading a normal life, if you are ready to take measures against diabetes?	Yes*	395	86.8%	45	86.5%	440	86.8%	.003 (.956)
	No	60	13.2%	7	13.5%	67	13.2%	
Do you take your anti diabetic drug regularly	Yes*	172	37.8%	38	73.1%	210	41.4%	23.932 (.000)
	No	283	62.2%	14	26.9%	297	58.6%	
Do you dry your feet with cloth, after washing?	Yes*	259	56.9%	30	57.7%	289	57.0%	.011 (.915)
	No	196	43.1%	22	42.3%	218	43.0%	
What would you do if you saw any changes in your feet, Will you consult your doctor	Yes*	435	95.6%	48	92.3%	483	95.3%	1.125 (.289)
	No	20	4.4%	4	7.7%	24	4.7%	

*Correct answer

About half the subjects inspect their feet regularly. Majority of the subjects (89%) washed their feet regularly. About 82% of the subjects washed their feet with warm water. About 70% of the subjects did trim toe nail straight across. Almost half of the subjects (56%) did measure their feet size when last they bought feet wear. Over 70% of the subjects did receive advice when they bought feet wear. About 70% of the subjects did ever inspect inside of feet wear. About one third of the subjects did regularly walk barefooted. About two thirds of the subjects (61.1%) didn't use sharp instruments to clean nails. Just over 80% of the subjects clean feet with water containing irritants. Almost half of the subjects (48%) did wear elasticated hosiery (Table 4).

Table 4 Distribution of studied subjects by having T2DM and Practice on Diabetic foot

Variable	Category	T2DM				Total		X^2 (p-value)
		No		Yes				
		N	%	N	%	N	%	
Regular inspection of the feet	Yes*	228	50.1%	28	53.8%	256	50.5%	.262 (.877)
	No	160	35.2%	17	32.7%	177	34.9%	
	Don't know	67	14.7%	7	13.5%	74	14.6%	
Regular washing of the feet	Yes*	405	89.0%	44	84.6%	449	88.6%	.964 (.617)
	No	29	6.4%	5	9.6%	34	6.7%	
	Don't know	21	4.6%	3	5.8%	24	4.7%	
Use warm water to wash the feet	Yes*	377	82.9%	38	73.1%	415	81.9%	3.043 (.218)
	No	54	11.9%	10	19.2%	64	12.6%	
	Don't know	24	5.3%	4	7.7%	28	5.5%	
Trimming the toe nails straight across	Yes*	316	69.5%	36	69.2%	352	69.4%	.289 (.866)
	No	96	21.1%	10	19.2%	106	20.9%	

	Don't know	43	9.5%	6	11.5%	49	9.7%	
Measure the feet size before you buy footwear	Yes*	255	56.0%	33	63.5%	288	56.8%	6.293 (.043)
	No	183	40.2%	14	26.9%	197	38.9%	
	Don't know	17	3.7%	5	9.6%	22	4.3%	
Receive advice when you buy footwear	Yes*	124	27.3%	21	40.4%	145	28.6%	3.952 (.139)
	No	301	66.2%	28	53.8%	329	64.9%	
	Don't know	30	6.6%	3	5.8%	33	6.5%	
Regularly inspect the inside of the footwear	Yes*	306	67.3%	33	63.5%	339	66.9%	.639 (.727)
	No	132	29.0%	16	30.8%	148	29.2%	
	Don't know	17	3.7%	3	5.8%	20	3.9%	
Regularly walk barefooted	Yes	137	30.1%	12	23.1%	149	29.4%	2.038 (.361)
	No*	288	63.3%	38	73.1%	326	64.3%	
	Don't know	30	6.6%	2	3.8%	32	6.3%	
Use sharp instrument to clean the nails	Yes	159	34.9%	18	34.6%	177	34.9%	.513 (.774)
	No*	279	61.3%	31	59.6%	310	61.1%	
	Don't know	17	3.7%	3	5.8%	20	3.9%	
Clean your feet with water and irritants	Yes	51	11.2%	11	21.2%	62	12.2%	4.527 (.104)
	No*	376	82.6%	39	75.0%	415	81.9%	
	Don't know	28	6.2%	2	3.8%	30	5.9%	
Wearing elasticated hosiery	Yes	219	48.1%	25	48.1%	244	48.1%	.031 (.984)
	No*	207	45.5%	24	46.2%	231	45.6%	
	Don't know	29	6.4%	3	5.8%	32	6.3%	

*Correct answer

4. DISCUSSION

T2DM is a common chronic, progressive metabolic disorder (Al-Amri et al., 2021). Patients with diabetes account for 40% to 70% of all non-traumatic lower limb amputations; 85% of all amputations are preceded by foot ulcers, according to research. Patients with type 2 diabetes have a 30 to 40 times greater demand for amputations than non-diabetics (Ramirez-Perdomo et al., 2019). DM was found among 10.3% of the subjects, and was more common among males in the present study. This is in line with previous study (Al-Amri et al., 2021). It was reported that DM was attributable to lower educational level in males and females particularly the older ones (Alshammari et al., 2019). This is in line with findings from the present study.

A previous study found that monthly income was an important risk factor for occurrence of DM (Bird et al., 2015). This is in line with the present study. The present study found that marital status was significantly associated with DM. This is not in line with a previous study (Harrison et al, al., 2003). The occurrence of DM among family members of subjects with T2DM was very common (Scott et al., 2013). This is in line with findings from the present study. Sedentary life and smoking cigarette are significant determinants of occurrence T2DM and DFU (Frykberg et al., 2022; Al-Assadi, 2022). This was not in line with the present study where there was defective knowledge about that.

Management of DM after diagnosis and reducing variability of HbA1c may prevent future complications and comorbidities (Jain et al., 2023; Madmoli et al., 2019). This was in line with findings form the present study, where majority of the subjects were knowledgeable about that. The five-step lower extremity amputation prevention (leap) program consists of: 1) Patient education, 2) annual foot screening, 3) management of simple problems (pre-ulcerative) foot, 4) daily self-inspection, and 5) footwear selection (Samad-Omar et al., 2023; Muhammad-Lutfi et al., 2014). In the present study and others as well the majority of the subjects were unaware of these steps (Alanazi et al., 2018; Alqahtani et al., 2022).

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 relationship of these variables with KAP towards diabetic foot ulcer will persist in the long term. It is also a non-probability convenient sample, and its generalization to the population may be defective; however, it is an exploratory study.

5. CONCLUSION

DM is a common disorder in Jeddah Saudi Arabia. The KAP of the population towards the care of their feet and proper use of their feet-ware was defective. Thus, it is recommended that health education programs about how to care for the feet, and proper care and use of feet-ware particularly among those with DM should be implemented by health care professionals.

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Author Contributions

FG contributed to study design, analyzing data and writing the draft. ZK, BA, RM, RA contributed to collecting data, and writing the draft. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

The study was approved by the IRRB of Ibn Sina National College for medical studies (IRRB-#- 03-20092022).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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