
ORIGINAL ARTICLE

Estimation of level of awareness of diabetic foot in Hail, KSA

Amany Mohammed Khalifa ,Somayah Awdah Al-Hazmi, Rahaf Maleeh Al-Rammahi, Layan Khalaf Al-Shammri

Faculty of Medicine, Ha'il University, Hail, KSA.

ABSTRACT

According to the World Health Organization (WHO): in Saudi Arabia the diabetes mellitus is one of the most common cause of mortality which can lead to many complications. There are many types of diabetes: Type 1 diabetes, Type 2 diabetes, and Hyperglycemia in Pregnancy. Uncontrolled diabetes will lead to complications in many parts of the body. Persistent hyperglycemia causes generalized vascular damage affecting the heart, eyes, kidneys and nerves. A majority of diabetics are unaware of getting diabetes complications. One of the most serious complications of diabetes is diabetic foot (DF). The aim of this study is to assess the level of awareness of diabetic foot in diabetic patients in Hail, KSA. The work is a cross-sectional study on 262 subjects with different age groups (7groups) of Hail Population, between September 2019 and January 2020. A 31 questions' questionnaire was designed by the authors. It included the informed consent, then the basic data, and all information about diabetic foot as risk factors, signs, symptoms and methods of prevention. It was distributed electronically. The data were collected and analyzed by computer using statistical program SPSS. The present study results showed that 95.5% were Saudi, 81% were females. 83.1% of the participants were from Hail city. 32.2% were diabetics. The overall level of awareness was found to be 57.51%, which was encouraging to carry more efforts of health education programs in different media to raise awareness of diabetic patients to prevent the common complication as diabetic foot.

Key Words: Diabetes mellitus, Saudi Arabia, Hail, diabetic foot, awareness

Received 02.05.2020

Revised 18.06.2020

Accepted 04.08.2020

How to cite this article:

Girija, D K Sharma, H Priyadarshi · Assessment of Groundwater Quality by Using Water Quality Index Method in Agra and Aligarh City, Uttar Pradesh, India. Adv. Biores., Vol 11 (5) September 2020: 63-71

INTRODUCTION

'Diabetes Mellitus '(DM) is a term used to describe chronic metabolic multifactorial disorder, which can be progressive [1]. It occurs when there is disturbance in insulin hormone level lead to elevated levels of glucose in the blood [2]. The insulin hormone is essential to control glucose level and prevent its elevation or hyperglycemia [3]. In the Middle East ,Saudi Arabia has highest domination .KSA is the second country of highest prevalence of diabetes [4].

There are many types of diabetes: Type 1 diabetes, Type 2 diabetes, and Hyperglycemia in Pregnancy [5]. Type 1 diabetes which is autoimmune reaction. When the immune system itself attacks the body that affect the cells which produce insulin called beta cells in the islets of the pancreas gland, resulting in deficient insulin with none or little production [5]. Type 1 diabetes is also called insulin-dependent or previously named as childhood-onset or juvenile diabetes requires daily injections of insulin to maintain the amount of glucose in their blood. Patient of type 1 cannot survive [1,4,5].

Type 2 diabetes is the most common type 90% of all cases caused by an ineffective insulin production and the body cannot respond completely to insulin which called insulin resistance. Many patients of type 2 diabetes are diagnosed lately, so that they come with complications. Type 2 diabetes also called insulin-independent or adult onset diabetes [6].

Uncontrolled diabetes will lead to complications in many parts of the body. Persistent hyperglycemia causes generalized vascular damage affecting the heart, eyes, kidneys and nerves [6]. Diabetic Patients should be educated to make wise choices regarding diet, exercise, and weight. They should effectively monitor their blood glucose, lipids, blood pressure and cholesterol [7] It is one way of a comprehensive management planning. Regular medications should also be followed to prevent complications. Follow up

with healthcare professionals is essential [8]. The complications can be either acute or chronic complications. Acute complications include hypoglycaemia, diabetic ketoacidosis (DKA), hyperglycaemic hyperosmolar state (HHS), hyperglycemic diabetic coma, seizures or loss of consciousness and infections. Chronic microvascular complications are nephropathy, neuropathy and retinopathy [5], whereas chronic macro vascular complications are coronary artery disease (CAD) leading to angina or myocardial infarction, peripheral artery disease (PAD) contributing to stroke, diabetic encephalopathy and diabetic foot [9]. One of risk factor of diabetic foot is poor education about foot care. The present study aimed at detection of level of awareness of diabetic foot in diabetic patient.

MATERIAL AND METHODS

The present work was a descriptive cross-sectional study on 245 subjects with different age groups (7groups) of Hail Population. The study was conducted in the *King Khalid hospital, Hail*, Saudi Arabia and diabetes and endocrine center of King Salman Specialist Hospital, hail, Saudi Arabia, between September 2019 and January 2020. Patients from different age groups, with a confirmed diagnosis of Type 1 and Type 2 diabetes and non- diabetic were recruited randomly to join the study.

Data collection was done by the investigators using a structured questionnaire in the Arabic language. A diabetic foot care questionnaire designed by Zainab J. Alshammari *et al* [10], was used. The questionnaire contained three parts:

- (A) Demographic profile of the patients,
- (B) Twelve questions on knowledge and attitude toward diabetic foot care,
- (C) Thirteen questions on the practice of diabetic foot care.

The information was collected by personal interview method and electronic method using the questionnaire after the informed consent.

METHODS

The data were collected, tabulated and analyzed statistically by computer using statistical program SPSS for Windows v22.0 IBM Inc..SPSS for windows Rel 15.0 2006 Chicago Inc [11].

Ethical Consent

It is taken at the beginning of the previously designed questionnaire. It was approved by the ethical committee, faculty of medicine, Hail University. All measures included in the current study comply with ethical standards of the 1964 Helsinki declaration, as well as, its related subsequent modifications. The study was approved by the Human Research Ethics Committee (HREC) of the College of Medicine, Hail University. Ethical approval number: HREC 00087/CM-UOH.12/19

RESULTS

A) Demographic results

• Gender Distribution

The majority of participants were females (77.5%), most of them aged from 41-50 years old (25.2%).(Figure 1, 2,)

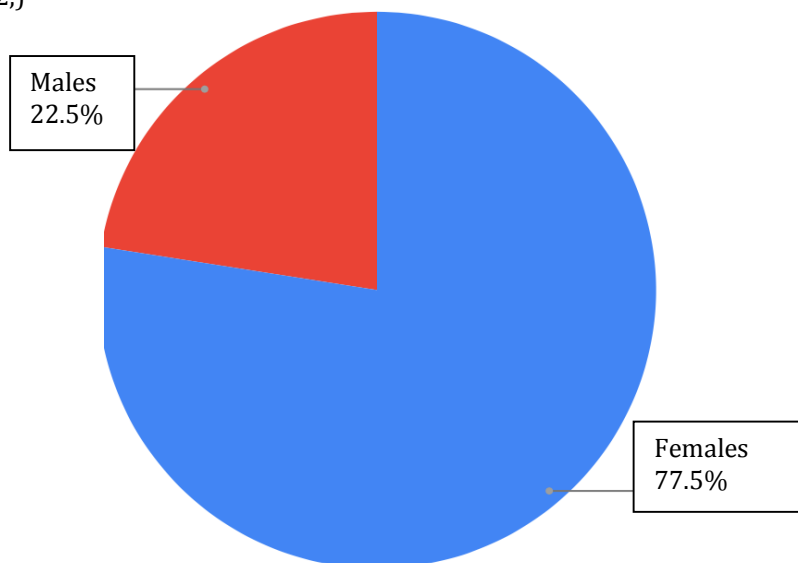


Figure 1: Gender distribution

Age Groups distribution

The participating individuals were divided according to their age into 7 groups

- Group 1: (less than 14 years old) : 2.2%
- Group 2: 14-20 years old: 22.5%
- Group 3:21-30 years old : 22.9%
- Group 4: 31-40 years old: 8.4%
- Group 5: 41-50 years old:25.2%
- Group 6: 51-60 years old:12.2%
- Group 7: more than 60 years old 7.5% (Figure 2).

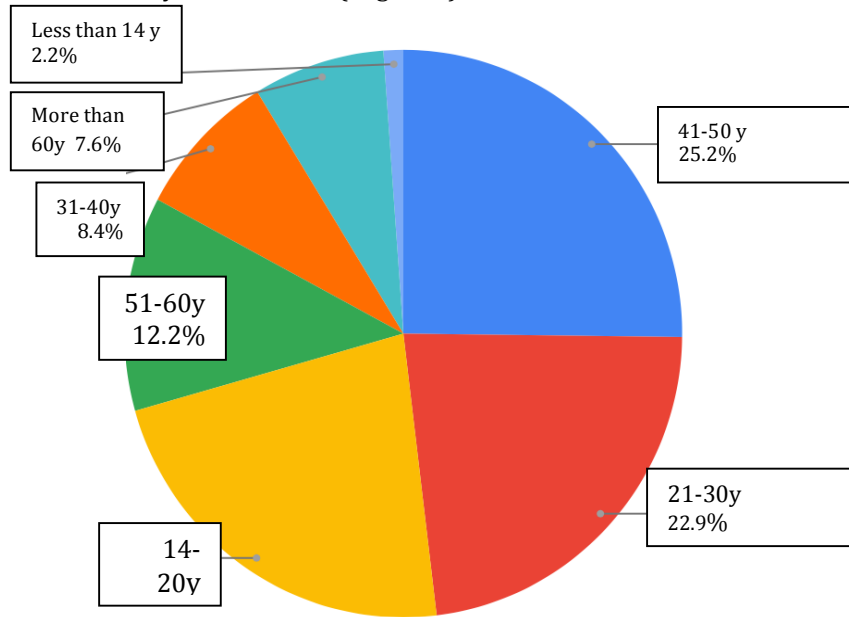


Figure 2: Age Groups' distribution

Nationality Distribution

95% of the participants were Saudis most of them were from Hail city.(Figure 3)

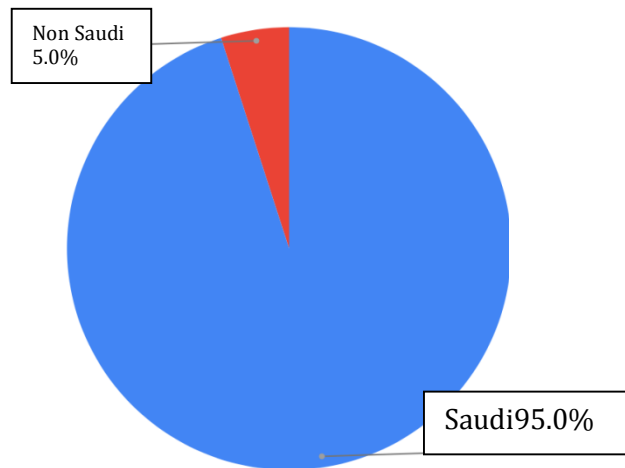


Figure 3: Nationality Distribution

Residence distribution

Most of attendees were from Hail city (83.2%), then from Hail villages (9.9%). 1.9% were from Al Madina Almonawara, 1.5% from Riyadh and only 0.4% were from Aljbailarea (Figure 4).

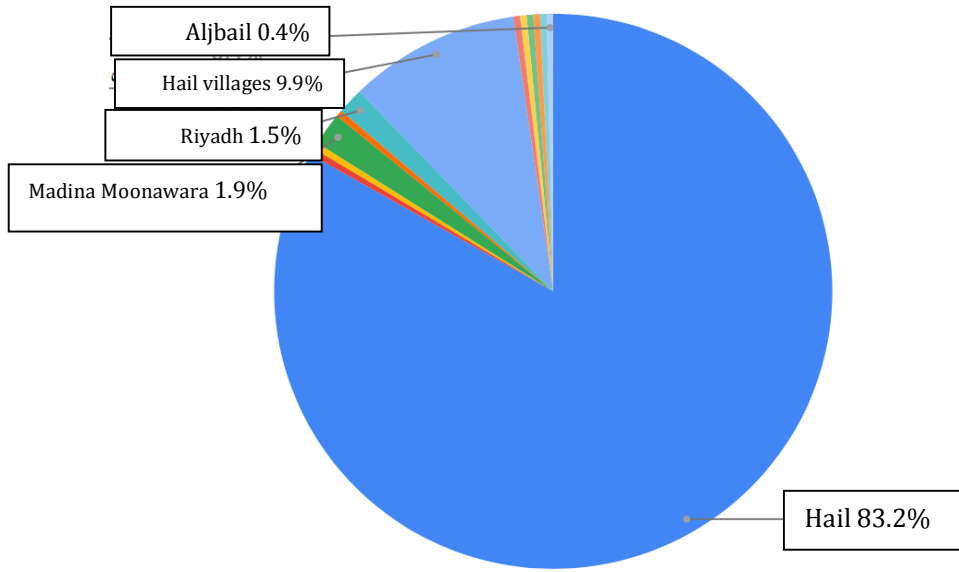


Figure 4: Residence Distribution

• **Distribution of Diabetics and Non-diabetics:**

In the present study, it was found that out of 98 out of 245 (40%) were diabetics and the rest were non diabetics or non diagnosed yet (147). 15.9% were type I diabetics, whereas 24.1% were of type II. (Figure 5). Most diabetics were in the age group 5 (41-50 years old) which were 38 cases (60.3% of this age group respondents) followed by group 6 then group 7 (17 cases, 16 cases respectively) (Table I).

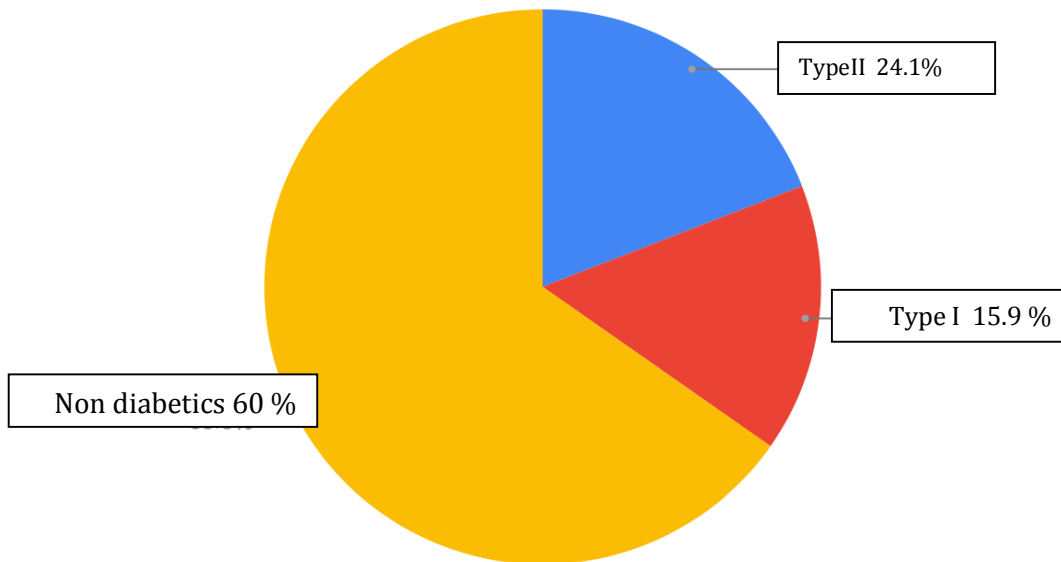


Figure 5: Distribution of Diabetics and Non-diabetics

Table I: Percentage of diabetics and non diabetics in relation to each age group

Crosstab			Do you have diabetes?		Total
			yes	no	
age of the responder	less than 14 years	Count	1	1	2
		% within age of the responder	50.0%	50.0%	100.0%
		% within Do you have diabetes?	1.0%	0.7%	0.8%
	14-20	Count	6	48	54
		% within age of the responder	11.1%	88.9%	100.0%
		% within Do you have diabetes?	6.1%	32.7%	22.0%
	21-30	Count	14	41	55
		% within age of the responder	25.5%	74.5%	100.0%
		% within Do you have diabetes?	14.3%	27.9%	22.4%
	31-40	Count	6	16	22
		% within age of the responder	27.3%	72.7%	100.0%
		% within Do you have diabetes?	6.1%	10.9%	9.0%
	41-50	Count	38	25	63
		% within age of the responder	60.3%	39.7%	100.0%
		% within Do you have diabetes?	38.8%	17.0%	25.7%
	51-60	Count	17	12	29
		% within age of the responder	58.6%	41.4%	100.0%
		% within Do you have diabetes?	17.3%	8.2%	11.8%
more than 60 years	Count	16	4	20	
	% within age of the responder	80.0%	20.0%	100.0%	
	% within Do you have diabetes?	16.3%	2.7%	8.2%	
Total		Count	98	147	245
		% within age of the responder	40.0%	60.0%	100.0%
		% within Do you have diabetes?	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.553 ^a	6	.000
Likelihood Ratio	57.160	6	.000
Linear-by-Linear Association	47.626	1	.000
N of Valid Cases	245		
a. 2 cells (14.3%) have expected count less than 5. The minimum expected count is .80.			

B) Knowledge and attitude toward diabetic foot care

In the present study, it was noticed that the general knowledge and attitude of diabetic foot care was higher in non-diabetics than diabetics (questions no.1-7,10-12) (Table II). On the other hand, the level of knowledge in diabetics was significantly double the level in non diabetics in two questions (8-9) about receiving health education of diabetic foot from doctors (68% in diabetics and 32% in non- diabetics) and nursing staff (68.4% in diabetics and 31.6% in non-diabetics) respectively (Table II). The mean percentage of knowledge and attitude toward diabetic foot care of diabetics was 46.2% while in non-diabetics were 53.8%.

C) The practice of diabetic foot care

In the present research, it was found that 33 of diabetics answered that they had developed foot wounds and infections (ulcers or cut), 21 (63.6%) of them answered that they sought hospital or doctor care while 12 (36.3%) gave wrong reply of using traditional ways. On the other hand, 50 of non-diabetics gave a history of having foot cut, 56% of them received medical care. (Table II) (Figure 6).

The present study showed that 54.5% of diabetics checked their feet daily while 45.5% of non-diabetics did the same. (Table II)

In the present work, the percentage of right answers of diabetics of examining their feet and looking for any new red spots / swelling / wounds was 57% which was higher than that of non- diabetics (43%). (Table II)

The present study showed that 32.3% of diabetics had foot cut without feeling, but discovered it by looking. Also 39.3% of diabetics had washed their feet daily. The other foot care right answers were higher in non- diabetics than that of diabetics as shown in (table II). These were about drying of feet after

washing, use moisturizers to moisturize the feet, knowing that they shouldn't walk barefoot, checking their shoes before wearing them, wearing closed or open shoes, checking the water temperature before showering and washing the feet and cutting their nails straight and equal. The mean percentage of practicing foot care was 44.5% in diabetics and in non- diabetics 55.5%.

The mean percentage of awareness in diabetics was 45.4% where as that of non- diabetics was 54.7% and the overall percentage of awareness of diabetic foot in Hail, KSA was 50.05%.

Table II: Level of awareness (correct answers) in diabetics versus non diabetics of the questionnaire 'participants

	SN	Questions	Diabetics		Non Diabetics	
			No	%	No	%
knowledge and attitude toward diabetic foot care	1	Diabetes may cause poor blood flow in the feet?	63	41.2%	90	58.8%
	2	Diabetics may get weak sensation in the feet?	76	41.5%	107	58.5%
	3	Diabetics may get foot ulcers?	84	40.0%	126	60.0%
	4	Diabetics may get gangrene?	90	41.3%	128	58.7%
	5	With weak sensations in the feet, may you be more susceptible to foot ulcers?	81	42.9%	108	57.1%
	6	With poor blood flow to your feet, may you be more susceptible to foot ulcers?	76	42.7%	102	57.3%
	7	Have you ever attended an awareness lecture on how to care for your feet?	11	39.3%	17	60.7%
	8	Have you ever received an education on how to care for a foot from a doctor?	34	68.0%	16	32.0%
	9	Have you ever been educated on how to care for the feet from nursing staff?	26	68.4%	12	31.6%
	10	Diabetics Should examine his feet by him self?	71	43.3%	93	56.7%
	11	Diabetics may enjoy life naturally by controlling blood sugar level?	94	45.0%	11555.0%	
	12	Nutrition is an important factor in controlling blood sugar level?	93	41.0%	134	59.0%
The practice of diabetic foot care	13	Have you ever had sores or cuts in the feet?	33	39.8%	50	60.2%
	14	If the answer to the previous question was (Yes), answer this question: What are the treatment steps that you took?	21	63.6%	28	56%
	15	When do you check your feet?	36	54.5%	30	45.5%
	16	Are you examining your feet and looking for any new red spots / swelling / wounds?	49	57.0%	37	43.0%
	17	Have you ever cut your foot without feeling? I found this out by looking	30	32.3%	63	67.7%
	18	Do you wash your feet daily?	88	39.3%	136	60.7%
	19	Do you dry the feet and between toes after washing them?	33	48.5%	35	51.5%
	20	Do you use moisturizers to moisturize your feet?	52	37.7%	86	62.3%

21	Did you know that you shouldn't walk barefoot?	82	42.7%	110	57.3%
22	Do you check your shoes before wearing them?	46	47.9%	50	52.1%
23	Do you always wear closed or open shoes?	36	46.2%	42	53.8%
24	Do you check the water temperature before showering and washing the feet?	72	42.1%	99	57.9%
25	Do you cut your nails straight and equal?	66	46.5%	76	53.5%
Total=245		98		147	

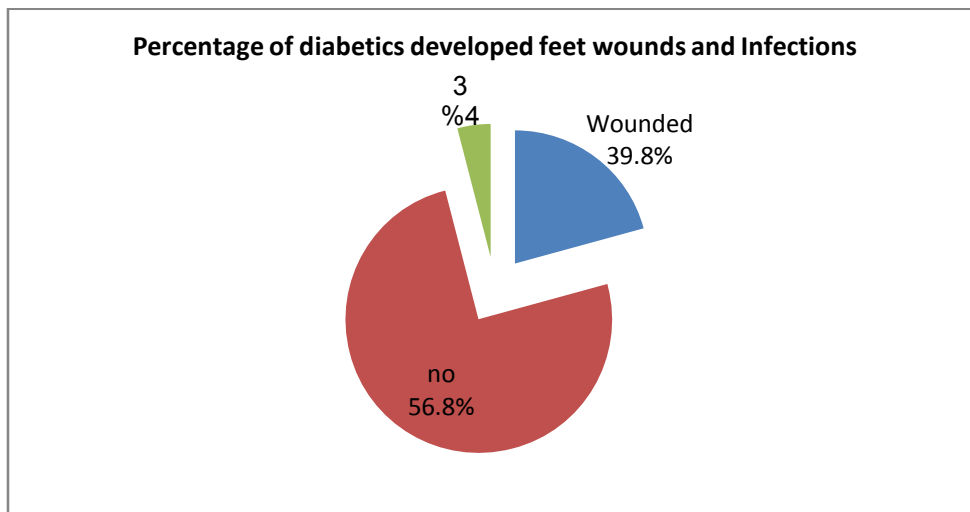


Figure 6: Percentage of diabetics which developed foot wounds

DISCUSSION

The present research had thrown light on the level of awareness of Hail population, KSA on diabetic foot. In Saudi Arabia the diabetes mellitus is one of the most common causes of mortality which can lead to many complications [1, 4]. There are many types of diabetes: Type 1 diabetes, Type 2 diabetes, and Hyperglycemia in Pregnancy. Uncontrolled diabetes will lead to complications in many parts of the body. Persistent hyperglycemia causes generalized vascular damage affecting the heart, eyes, kidneys and nerves. A majority of diabetics are unaware of getting diabetes complications. One of the most serious complications of diabetes is diabetic foot (DF) [8]. Therefore, the present study aimed at detection of level of awareness of diabetic foot in diabetic patients and non- diabetic individuals as well.

The majority of participants of the present study were females (77.5%), most of them aged from 41-50 years old (25.2%). (Figure 1, 2). Similarly, Zainab *et al* [10] in Riyadh reported that their diabetic participants were 111 (30.2%) males and 257 (69.8%) females, most of them above 40 years old [10]. Also Algshane *et al* in 2017 [12] discovered that 55.5% of their respondents were females from different cities of KSA.

95% of the participants of the present work, were Saudis most of them were from Hail city. (Figure 3, 4). Similarly, Algshane *et al* in 2017 [12], had found that majority of their patients were Saudi from cities (89.9%).

In the present study, it was found that out of 98 out of 245 (40%) were diabetics and the rest were non diabetics or non diagnosed yet (60%). 15.9% were type I diabetics, whereas 24.1% were of type II. (Figure 5). Most diabetics were in the age group 5 (41-50 years old) which were 38 cases (60.3% of this age group respondents) followed by group 6 then group 7 (17 cases, 16 cases respectively) (Table I). Similarly, Zainab *et al* in Riyadh reported that their diabetic participants were above 40 years old [10].

In the present research, it was found that 33 of diabetics answered that they had developed foot wounds and infections (ulcers or cut), 21 (63.6%) of them answered that they sought hospital or doctor care while 12 (36.3%) gave wrong reply of using traditional non medical ways. On the other hand, 50 of non-

diabetics gave a history of having foot cut, 56% of them received medical care.(Table II)(Figure 6). This could be due to the level of education is good because most of participants had educated with different levels. It was reported, in a previous research on diabetics in KSA, that (33%) of their patients suffered from numbness and tightness, (16%) suffered from calluses, (6%) suffered from blood or discharge from foot, only (2.9%) have limb amputation and only (7.1%) get foot ulcer previously or at present [12].

The present study showed that 54.5% of diabetics checked their feet daily while 45.5% of non-diabetics did the same.(Table II). The present results was higher than that published previously .Zainab *et al* [10]reported that 46% of their diabetic patients had good feet care, While, Algshaneen *et al* in 2017 [12] ,had found that there were only (17.3%) of their diabetics patients examined their feet daily^[12]

In the present work, the percentage of right answers of diabetics of examining their feet and looking for any new red spots / swelling / wounds was 57% which was significantly higher than that of non-diabetics (43%).(Table II) Moreover, The present study showed that 32.3% of diabetics had foot cut without feeling, but discovered it by looking. This finding denoted loss of sensation which predisposes to foot ulcers and even gangrene [13, 14]. Also 39.3% of diabetics had washed their feet daily. The other foot care right answers were higher in non- diabetics than that of diabetics as shown in (table II). These were about drying of feet after washing, use moisturizers to moisturize the feet, knowing that they shouldn't walk barefoot, checking their shoes before wearing them, wearing closed shoes, checking the water temperature before showering and washing the feet and cutting their nails straight and equal. The mean percentage of practicing foot care was 44.5% in diabetics and in non- diabetics 55.5%. The present foot care results were much better than that reported by Algshaneen *et al* in 2017^[12]. They found that (81.7%) of their diabetic patients didn't wear special shoes for diabetes., (68.4%) didn't wear socks and (47.8%) were cutting their nail from corners, while remaining patients (52.2%) were cutting their nails in straight cross way. [12]. Also, in a study done in Makka Almokarama in 2017, it was found that 35.1% had history of foot ulcer and 34% walk around in bare feet [14].

The mean percentage of awareness in diabetics was 45.4% where as that of non- diabetics was 54.7% and the overall percentage of awareness of diabetic foot in Hail, KSA was 50.05% In Riyadh, a higher percentage (76.6%)was reported by Zainab *et al* [10]. On the other hand, Al Odhayani *et al*, [5] ,in Riyadh, found that their diabetic patients were unaware of the risk factors of diabetic foot and practiced poor foot care .The major complication can be infections that lead to gangrene. The results would be toes or leg amputations^[5, 13, 14]Moreover, chronic microvascular complications are nephropathy, neuropathy and retinopathy^[5, 14-16], whereas chronic macro vascular complications are coronary artery disease (CAD) leading to angina or myocardial infarction, peripheral artery disease (PAD) contributing to stroke, diabetic encephalopathy and diabetic foot [9, 13-20].

Therefore, Diabetic Patients should be educated to make wise choices regarding diet, exercise, and weight. They should effectively monitor their blood glucose, lipids, blood pressure and cholesterol^[7] Moreover, Patient knowledge and practices regarding diabetic foot care is significantly associated with the reduction of diabetic foot ulcer [14,20].

CONCLUSION

The overall level of awareness of diabetic foot of population in Hail, in the present study, was found to be 50.05%. Diabetic patients awareness level was 45.4% where as that of non- diabetics was 54.7%which was encouraging to carry more efforts of health education programs in different media to raise awareness of diabetics patients to prevent the common complication as diabetic foot. It is one way of a comprehensive management planning. Regular medications should also be followed to prevent complications especially diabetic foot. Physicians role is very vital in raising knowledge and practices of foot care . Foot care education is the most crucial tool for preventing lower leg amputation. Follow up with healthcare professionals is essential.

REFERENCES

1. World Health Organization. (2003). Definition, diagnosis and classification of diabetes mellitus and its complications: report of a WHO Consultation. Part 1: diagnosis and classification of diabetes mellitus. Geneva, Switzerland: World Health Organization. Available at: [http:// whqlibdoc.who.int/hq/1999/ WHO_NCD_NCS_99.2.p df](http://whqlibdoc.who.int/hq/1999/WHO_NCD_NCS_99.2.pdf). Accessed
2. Aune D, Norat T, Leitzmann M, Tonstad S and Vatten L.(2015). Physical activity and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis. *Eur. J. Epidemiol.* 30(7):529-542.
3. Moss SE, Klein R and Klein BE. (1992). The prevalence and incidence of lower extremity amputation in a diabetic population. *Arch. Intern. Med.*, 152:610-616.
4. World Health Organization (WHO).(2016). Global Report on Diabetes . WHO.: Geneva, Switzerland..

5. Al Odhayani AA, Tayel SA, Al-Modi F.(2017). Foot care practices of diabetic patients in Saudi Arabia. Saudi J of Biological Sc.. 24: 1667-1671.
6. SEMDSA (2012). Diabetes foot care guidelines for primary healthcare professionals. Society of Endocrinology, Metabolism and Diabetes of South Africa; JEMDSA., <https://www.semDSA.org.za/images/647-4385-1PB.pdf>.
7. Tuttolomondo A, Maida C, Pinto A. (2015). Diabetic foot syndrome: Immune-inflammatory features as possible cardiovascular markers in diabetes. World J. Orthop. 6(1):62-76 .
8. Yavuz DG, TuUlular S, Ersoz HO, Altun A and Archer A. (1999). Awareness of diabetic foot disease in a group of Turkish and English patients with type 2 diabetes mellitus: assessment of the status and the efficacy of diabetic foot education programs. Turk.J.Endocrinol.Metab. 2: 65-70.
9. Alzahrani HA. (2012).Diabetes-related lower extremities amputations in Saudi Arabia: the magnitude of the problem. Ann. Vasc. Dis., 5(2):151-157.
10. Zainab J. Alshammari, Leila A. Alsaid, PJ Parameaswari, and Abrar A. Alzahrani. (2019). Attitude and knowledge about foot care among diabetic patients in Riyadh, Saudi Arabia.J Family Med Prim Care.; 8(6): 2089–2094.
11. SPSS 22 for windows Rel 15.0 (2006).Chicago Inc. https://macdownload.informer.com/_/advice_/Spss_22_Free_Full_Version.html
12. Alghshanan MA, Almuhanha MF, Almuhanha AM, AlghobaishFF, Bari OS, Alajji NA,Alabdullah HJ, Aldosari SH, Alomran SI, Abualjadaye I, M Almeshari AA, Almustafa MA, Alqahtani FS, Alzamanan MD, Alotaibi KM, AlzamananMY..(2017). Diabetic Foot Awareness among Diabetic Patients in Saudi Arabia. The Egyptian Journal of Hospital Medicine .68 (2);:1289-1290
13. Otte J, van Netten JJ, WoittiezAJ. (2015). The association of chronic kidney disease and dialysis treatment with foot ulceration and major amputation. J Vasc Surg. ;62(2):406-11.
14. Goweda R., Shatla M, Alzaidi A, Alzaidi A, Aldhawani B, Alharbi H, Sultan N, Alnemari D, Badr Rawa(2017). Assessment of knowledge and practices of diabetic patients regarding diabetic foot care, in Makkah, Saudi Arabia. J Fam Med Health Care. 3:17–22.
15. Al dawish MA, Robert AA, Braham R et al. (2016). Diabetes mellitus in Saudi Arabia. Curr Diabetes Rev., 12(4):359-368
16. Goie TT and Naidoo M . Awareness of diabetic foot disease amongst patients with type 2 diabetes mellitus attending the chronic outpatients department at a Regional Hospital in Durban, South Africa. Afr J. Prim Health Care Fam. Med. 2016; 8(1): 1-8
17. IDF Diabetes Atlas (2015):. Available at: <http://www.diabetesatlas.org/>.
18. Barwick AL, Hurn SE, van Netten JJ, Reed LF, Lazzarini PA. (2019).Factors associated with wearing inadequate outdoor footwear in populations at risk of foot ulceration: A cross-sectional study. PLoS One. 21;14(2):e0211140
19. Khalfallah M, Gouta EL, Dougaz W, Jerraya H, Samaali I, Nouira R, Bouasker I, DziriC. (2018). Predictive factors for major amputation of lower limb in diabetic foot: about 430 patients. Tunis Med. 96(5):298-301.
20. Al-Wahbi AM. (2010). Impact of diabetic foot care education program on lower limb amputation rate. Vasc. Health Risk Manag. 6: 923-934.

Copyright: © 2020 Society of Education. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.