

Diabetic Foot Awareness among Diabetic Patients in Saudi Arabia

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ABSTRACT

Aim of the work: diabetic foot disease (DFD) is diabetic patient's foot affection by ulcers which are accompanied by peripheral vascular disease and/or diabetic neuropathy of the lower limb. Prevalence of diabetic ulcer is ranging from 2%-10%. High rate of lower limb amputation in DFD (More than 15%) and survival rate for undertaken amputation patient are short. Ninety diabetic amputations are performed monthly in Saudi Arabia capital of Riyadh. Identification of DFD and diabetic patient's awareness of DFD and how to take care of it will reduce the incidence of more complications like amputation. This study aimed to evaluate knowledge, education, attitude and practice with diabetic foot among diabetic patients all over Saudi Arabia. **Patients and Method:** cross-sectional study directed among the diabetic clinic visitors in Primary Health Care Centers (PHCs). Selection of 55 PHCs was done by random sampling. Ten diabetic patients were randomly selected from each PHCs and collecting of data was done by interviews. Research questionnaire contains three parts; first part is asking about demographic data; second part is about data that are focusing on diabetes and its related questions and last part is the main part which asking about diabetic foot. **Results:** 519 diabetic patients were participated in this study. Only 180 participants were complaining of diabetic complications (34.7%). Most of participants (55.1%) get high score 7-8 out of 8 questions in Knowledge. Although, there were 166 persons (32%) who couldn't reach full score in attitude evaluation. There was a large percentage of our participants (69%) had very low score 0-2 out of 6 in assessment of previous education of diabetic foot. More than half of participants (56.5%) had score 6-10 out of 15 in evaluation of practice with diabetic foot. **Conclusion:** diabetic foot in Saudi Arabia is existing, even amputations and other diabetic foot complications were also present. Diabetic patients have good knowledge and attitude toward diabetic foot. Education about diabetic foot and practice is still weak.

Keywords: diabetes mellitus, diabetic foot, diabetic patients, awareness, knowledge, education, attitude, Saudi Arabia.

INTRODUCTION

Diabetes Mellitus (DM) is metabolic disorder characterized by chronic hyperglycemia and trouble in metabolism of carbohydrates, protein and fat as a result of defect in insulin secretion, insulin action or both⁽¹⁾. DM is highly prevalent worldwide, in 1980; 108 million adults (4.7%) were suffering from DM, this number increased to 422 million (8.5%) in 2014⁽²⁾. In 2015 a study was published by International Diabetes Federation (IDF); there is one adult suffering from diabetes in every eleven and one undiagnosed diabetic patient in every two patients⁽³⁾. According to the **World Health Organization (WHO)**: Saudi Arabia is 7th for rate of diabetes in the world and 2nd highest in middle east and pattern of diabetes is increasing in the past years⁽⁵⁾.

Many complications affecting heart, kidneys, eyes, vessels and nerves are result from DM, leading to disabilities and premature death⁽⁵⁾. One of common and annoying complications is the Diabetic Foot (DFD). DFD is diabetic patient's foot affection by ulcers accompanying with peripheral

vascular disease and/or diabetic neuropathy of lower limb⁽⁶⁾. Multiple factors can trigger DFD, commonest are abnormal joint mobility or foot pressure, trauma, foot deformity, peripheral vascular disease or peripheral neuropathy⁽⁷⁾.

Prevalence of diabetic ulcer was ranging from 2%-10% according to **Moss et al.**⁽⁸⁾. High rate of lower limb amputation in DFD (More than 15%) and survival rate for undertaken amputation patient is short⁽⁷⁾. According to what published on 2009 In Saudi Arabia, ninety diabetic amputations are performed monthly in Saudi Arabia capital of Riyadh and this number is increasing quickly and becoming to appear at younger age⁽⁹⁾. Early Identification of DFD and diabetic patient's awareness of DFD and how to take care of it will reduce the incidence of more complications like amputation^(10&11).

In this study we aimed to evaluate knowledge, education, attitude and practice with diabetic foot among diabetic patients all over Saudi Arabia.

Methodology

In our research, we tried to reach most of the

diabetic patients in Saudi Arabia as possible. By this cross-sectional study, we directed our research for the diabetic clinic visitors among Primary Health Care Centers (PHCs). Selection of PHCs was done by random sampling, in which we selected 55 PHCs from different regions in Saudi Arabia. Ten diabetic patients were randomly selected from each PHCs. Interviews between authors and selected participants from PHCs visitors have been done on period between 1st of March to 1st of April 2017. From many resources and previous articles, research questionnaire has been made and translated into Arabic language as it is the main language in Saudi Arabia. Questionnaire contains three parts; first part was asking about demographic data (Age, Gender, Job, nationality, Residency, Educational level, Marital State, height and weight), second part was about data that are focusing on diabetes and its related questions and last part is the main part which asking about diabetic foot.

One of important information that we need was BMI (Body Mass Index), as we used to ask about weight and height to calculate it by formula **BMI=Weight in KG/height in meter²**. We categorized patients according to BMI to underweight (BMI=<18.5), normal range (BMI=18.5-24.9), overweight (BMI= ≥25) and obese (BMI= ≥30) ⁽¹²⁾. Diabetic part of questionnaire was containing many questions that ask about duration of diabetes, having home glucometer, suffering from diabetic complications, compliance of diabetic medications, suffering of other chronic conditions, life style and eating habits. Last part was the diabetic foot part, it contains 32 questions to test knowledge (8 points), educations (6 points), Attitude (3 points) and practice (15 points) with diabetic foot [Tables 2,3]. In addition to questions about daily habits that related to the diabetic foot.

Ethical considerations: collection of data had been done by interview directly with participants after explaining the goal of interview and taking verbal consent to ask questions. We confirm to all participants that their personal information will be totally secret.

Data analysis: SPSS computer application has been used for analysis of data. Comparison between scores and many variables has been done using Chi-Square Test and P-value = 0.05 was consider as a significant level.

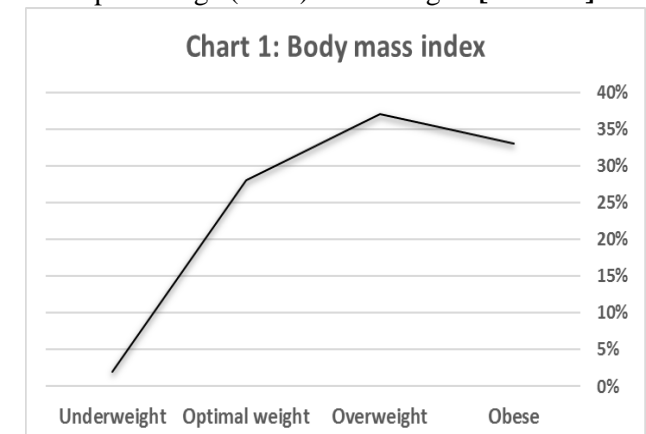
RESULTS

At the end of this study and after interviewing 550 diabetic patients, 519 persons participated in this study by mean age 56.9 (response rate was

94.36%). Around 31 patients refused to complete questionnaire. Male participants were 231(44.5%) and female were 288 (55.5%). Most of our participants were employee (35.3%), while jobless participants were 167 (32.2%), only 97 participants were retired (18.7%), 18 persons had free business (3.5%) and 54 were students (10.4%). Regarding to educational level; 55 participants didn't enter school (10.6%), nineteen participants at level of primary school (17.3%), 138 and 207 persons at high school and Bachelor degree respectively (26.6% and 39.9%), only 29 had high degree educational level (5.6%). There were 378 people which represented most of our participants (72.8%) are married. Most of our participants (89.8%) were living in the city, they were 466 participants. [Table 1]

Age Mean: 56.9 Minimum = 40 Maximum =89		
Frequency (%)		
Gender	Male	231(44.5)
	Female	288(55.5)
Job status of responders	Student	54(10.4)
	Employee	183(35.3)
	Retired	97(18.7)
	Free business	18(3.5)
	No Job	167(32.2)
Educational level	Did not enter school	55(10.6)
	Primary school	90(17.3)
	high school	138(26.6)
	Bachelor	207(39.9)
	High degrees	29(5.6)
Marital status	Married	378(72.8)
	Single	141(27.2)
Residency	City	466(89.8)
	Village	53(10.2)

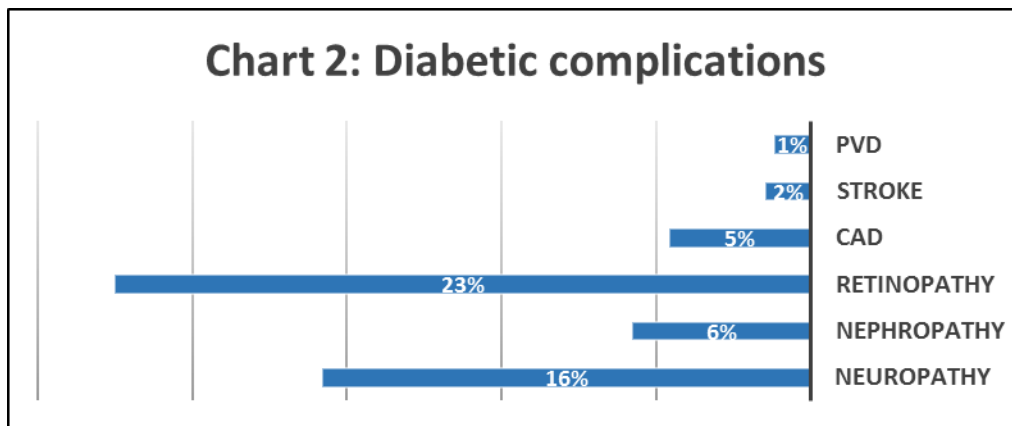
BMI level estimation was interpreted as follow: mean BMI was 28.56. Most of participants at overweight and obese level by percentage 34.9% and 30.8% respectively, only 25.8% of our participants had optimal level of BMI and there was small percentage (1.7%) underweight. [Chart 1].



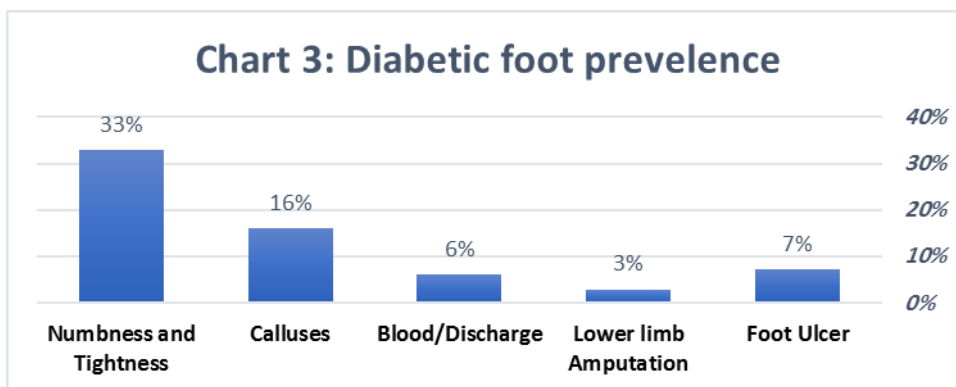
By asking participants about the diabetes mellitus in general and its related questions we found these results: more than half of participants (51.8%) has been diagnosed as diabetic before five years and remaining (48.2%) were recently diagnosed in the last 5 years. About 400 participants (78.2%) had glucometer in their houses. Most of participants (69.4%) were taking their diabetic medications regularly and remaining (30.6%) were not. About 273 participants (52.6%) were walking as the main type of daily exercise, while 224 (43.2%) did not do any exercise at all. Large percentage (43.9%) of participants often compliant in low fat-no sugar diet, also 161 (31%) were sometimes complaint; only small percentage was always or not complaint at all (10.4% and 14.6% respectively). About 268 persons of our participants (63.2%) were visiting

the diabetic clinic only if needed, while 181 (34.9%) were visiting clinic monthly, 10 (1.9%) and doing that weekly. There were 97 diabetic patients of our participants (18.7%) were complaining of hypertension and 43 (8.3%) were complaining of dyslipidemia.

Most of our participants didn't suffer from any diabetic complications in which only 180 patients are complaining of diabetic complications (34.7%). Six patients (1.2%) were suffering from peripheral vascular diseases (PVD), eight persons (1.5%) had previous stroke, also 24 persons (4.6%) were suffering from Coronary Artery Disease (CAD), 117 (22.5%) had retinopathy, 30 (5.8%) had nephropathy and 82 (15.8%) had neuropathy. [Chart 2]



Regarding to the diabetic foot; around 170 participants (33%) suffer from numbness and tightness, 83 (16%) suffer from calluses, 31 (6%) suffer from blood or discharge from foot, only 15 (2.9%) have limb amputation and only 37 (7.1%) get foot ulcer previously or at present. [Chart 3]



Knowledge, education, attitude and practice with diabetic foot; 32 Yes/No question quiz are summarized below. [Tables 2,3]

Table 2: Knowledge and education assessment

	Yes (%)	No (%)
Diabetic patient may develop reduced blood flow in his feet.	345(66.5)	174(33.5)
Diabetic patient may develop loss of sensation in his feet.	383(73.8)	136(26.2)
Diabetic patient may develop ulcers in his feet.	398(76.7)	121(23.3)
Diabetic patient may develop gangrene.	430(82.9)	89(17.1)
Do you know that smoking may reduce blood flow in your feet?	287(55.3)	232(44.7)
Are you aware that lack of sensation in foot will increase risk of ulcers?	320(61.7)	199(38.3)
Are you aware that reduced blood flow in foot will increase risk of ulcers?	318(61.3)	201(38.7)
Are you aware that foot infection will lead to foot ulcers?	327(63)	192(37)
Did you attend any class on how to care for your feet?	110(21.2)	409(78.8)
Did you receive education on foot care from nurse?	115(22.2)	404(77.8)
Did you receive education on foot care from doctors?	168(32.4)	351(67.6)
While you are waiting to see doctor, did you ever receive information about foot care?	126(24.3)	393(75.7)
Did you read any hand-outs on foot wear or foot care?	191(36.8)	328(63.2)
Do you like a hand-out on feet care?	299(57.6)	220(42.4)

Table 3: Practice AND Attitude assessment.

	Yes (%)	No (%)
Diabetic patient should be responsible for self-foot examination.	365(70.3)	154(29.7)
Diabetic patient will enjoy normal life by controlling diabetes	457(88.1)	62(11.9)
Diet is important in the control of diabetes.	461(88.8)	58(11.2)
Do you have the ability to reach your feet?	459(88.4)	60(11.6)
Do you examine your feet?	318(61.3)	201(38.7)
Do you wash your feet daily?	482(92.9)	37(7.1)
Do you dry your feet and between toes?	259(49.9)	260(50.1)
Do you use any cream on your feet?	314(60.5)	205(39.5)
Do you use any cream between toes?	183(35.3)	336(64.7)
Do you use medical products on your feet?	138(26.6)	381(73.4)
Do you file your nails?	437(84.2)	82(15.8)
Do you trim your nails?	487(93.8)	32(6.2)
Do you walk barefooted?	246(47.4)	273(52.6)
Do you check your shoes before wearing them?	235(45.3)	284(54.7)
Do you soak your feet?	180(34.7)	339(65.3)
Do you check water temperature before soaking?	187(36)	332(64)
Do you use a hot-water bottle on your feet?	77(14.8)	442(85.2)
Do you cross your legs in sitting?	312(60.1)	207(39.9)

After evaluating knowledge of participants; most of participants (55.1%) got high score 7-8 out of 8 questions. Although, there were 166 persons (32%) couldn't reach full score in attitude evaluation. There was a large percentage of our participants (69%) got very low score 0-2 in assessment of previous education of the diabetic foot, only 13% got 5-6 score out of 6. More than half of participants (56.5%) got score 6-10 out of 15 in evaluation of practice with diabetic foot, also 20% got score 0-5 and only 23.5% got high score 11-15 out of 15. [Table 4]

Table 4: Knowledge, attitude, Education and practice assessment

		Count	%	Mean	Standard Deviation
Knowledge Score / 8	Score 0-3	89	17.1%	5.41	2.713
	Score 4-6	144	27.7%		
	Score 7-8	286	55.1%		
Attitude Score / 3	Score < 3	166	32.0%	2.47	0.923
	Score 3	353	68.0%		
Previous DFD education Score / 6	Score 0-2	358	69.0%	1.94	1.949
	Score 3-4	90	17.3%		
	Score 5-6	71	13.7%		
Practice Score / 15	Score 0-5	104	20.0%	8.16	2.987
	Score 6-10	293	56.5%		
	Score 11-15	122	23.5%		

According to Chi-Square test; females are better than males in knowledge, attitude and practice (P-value < 0.05), while no significant difference was detected between male and female in previous education about DFD. However, no significant difference was detected in scores between different jobs. Although, there was significant difference in scores of knowledge, attitude and practice between the different educational level (P-value < 0.05) as participants with Bachelor and high degree were best, while no difference was detected in the previous education about DFD between the different educational levels. Regarding to residency, city populations got better attitude score than village

(P-value < 0.05), however there was no significant difference between city and village populations in knowledge, previous DFD education or practice. There was no significant difference in scores between married and single people. There was no significant difference in scores between the diabetic patients who diagnosed recently or before five years. We found that there was significant difference in knowledge and practice according to number of visiting diabetic clinics (P-value < 0.05) as patients who complaint to monthly visiting were best in practice and knowledge. After comparison scores of people who got diabetic before and those who are not, we found that there was no significant difference [Table 5].

Table 5: Chi-Square Test for Knowledge, Attitude, Education and Practice Assessment

	P – Value When you compare with							
	Gender	Job	Educational level	Residency	Marital Status	DM duration	DM Clinic Visiting	DM foot previous suffering
Knowledge Score	0.021	0.259	0.01	0.545	0.425	0.788	0.037	0.461
Attitude Score	0.035	0.647	0.011	0.012	0.687	0.856	0.161	0.25
Previous DFD Education Score	0.966	0.147	0.148	0.413	0.196	0.092	0.131	0.105
Practice Score	0.009	0.279	0.001	0.15	0.142	0.287	0.033	0.265

There were only 90 participants (17.3%) who examined their feet daily, while 340 (65.5%) do that only if there was a problem and 98 persons (17.1%) didn't examine their feet at all. Around 420 participants (81.7%) didn't wear special shoes for diabetes. Also 355 participants (68.4%) didn't wear socks. Around 240 participants (47.8%) were cutting their nail from corners, while remaining 271 patients (52.2%) were cutting their nails in straight cross way.

DISCUSSION

In this study, we tried to include people with different demographic data by choosing public place like PHCs to reach our participants. By looking at number of male and female, we found that females were little less than males, while in Saudi Arabia we found that diabetic males were more than females (14.7% and 13.8% respectively) ⁽¹³⁾. When we look at large country with large number of populations like Saudi Arabia, we can guess that sample was small. Interview manner of collecting data that used made some reality in data more than self-administration questionnaire.

Large percentage (64.8%) of our participants was exceeding optimum level of BMI, with mean of 28.56. So, there was major risk factor that was prevalent between the diabetic patients which were obese. Almost, 90% of the diabetic patients were not compliant in low-fat no-sugar regime regularly. Although, around 88% believe that diet is important to control diabetes. Most of participants (78.2%) have glucometer in their houses. So, this will encourage participants to take care about their glucose level as this will alert them to reduce their intake of sugar.

According to some evidence, lifestyle modifications such as physical activities and nutrition were highly recommended to reduce incidence of Diabetes and some chronic diseases that are associated with it. Also, life style modifications were important factor to prevent diabetic complications ^(14&15). In our study, we found that more than 43% didn't do any exercise. However, if we consider non-compliance to diabetic medications as risk factor for diabetic complications, we still have 30% of diabetic patients which were at risk because they were not compliance.

Assessment of knowledge, attitude, previous diabetic foot education and practice showed that the diabetic patients have good knowledge and attitude. However, scores of previous education and practice with diabetic foot were low.

Female are better than male in knowledge, attitude and practice. So, they are less vulnerable to the diabetic foot and its complications. Educational level was an important factor to increase the awareness about the diabetic foot, in which highly educated participants got more scores in assessment. Patients got good benefit by visiting diabetic clinic as monthly visitors and they better in scores than others.

We expect high prevalence of diabetic foot when we look at percentages of patients who were not wearing socks or special shoes for the diabetes.

Trimming toe nails by straight across way is the best technique for the diabetic patients to avoid trauma. As trauma may lead to the diabetic foot ⁽¹⁶⁾. Large percentage of our participants (46.1%) were not using this technique. So, this will make concern about the diabetic foot.

CONCLUSION

Diabetic patients in Saudi Arabia are at risk of diabetic complication because of high body mass index level and loss of compliance to diabetic diet and physical activity.

Diabetic foot in Saudi Arabia is existing, even amputations and other diabetic foot complications are also present. Diabetic patients have good knowledge and attitude toward diabetic foot. Still education about diabetic foot and practice is still weak.

Diabetic clinics are important source of information about the diabetic foot and its complications

We suggest to increase awareness and prevent the diabetic foot and its complications by encouraging doctors in the diabetic clinics to educate their patients, use media to motivate diabetic patient for monthly diabetic clinic visiting using media, use media to increase awareness about the diabetic foot, continues follow up for patients who is suffering from the diabetic foot and increase distributing free handbooks that are specific for diabetes in the public places.

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