Determinants for Developing Foot Ulcer Among Persons with Diabetes Mellitus Attending Outpatient Clinic in a Tertiary Hospital in Nigeria

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Introduction

Diabetes mellitus prevalence in Nigeria is on the rise and it is estimated to be about 5.77%.[1] One of the most dreaded complications seen among persons with diabetes mellitus (DM) is diabetes foot ulcer (DFU). DFU is a chronic complication not desired in individuals with DM. DFU occurs in the setting of one or combination of neuropathy, vasculopathy and infection and where appropriate measures are not taken, it can lead to amputation of part or the whole limb.[2] This subsequently reduces the productivity and the economic power of the affected persons and the society at large. Identifying risk factors leading to development of DFU is of paramount importance in preventing its occurrence. This study aimed to identified risk factors to development of DFU among DM patients attending diabetes outpatient clinic of Lagos University Teaching Hospital (LUTH), Lagos Nigeria.

Method

This was a cross-sectional study in which 296 consenting individuals with DM attending LUTH diabetes Medical outpatient clinic were enrolled. Interviewer-administered questionnaire utilized included history of previous ulcers, burning sensation, numbness, intermittent claudication, pin and needle sensation and visual impairment. Patient were assessed clinically with emphasis on foot examination. Anthropometric and biochemical measurements were also obtained. 10g monofilament and ankle-brachial index were using for foot examination. Ethical approval was obtained from health and ethics research committee of LUTH.

Data was analysed using SPSS version 25. Continuous variables were obtained using student t test while frequency distributions were obtained for categorical variables. The Chi-square test was used to assess the significance of the association between foot ulcer and risk factors. Odds ratios were calculated using logistic regression after adjusting for age and gender. p value ≤ 0.05 was considered significant.

Result

The mean age of participants was 60.58±11.3 years of which females were 61.8%. Twenty-three individuals (7.8%) had past history of DFU. Significant proportion of participants were hypertensive (75.7%) and overweight/obese (67.6%) as seen in table 1. Some of the common risk factors in identified in table 2 for development of DFU include visual impairment (63.2%), skin dryness (52%), inappropriate footwear (51.7%) pin and needle sensation (50.3%), numbness (39.4%), hair loss (32.8%), cracks (29.4%), burning sensation (24%) amongst others.

Table 1: Risk factors of foot ulcer among subjects

Multiple responses	Frequency (n=296)	Percentage
Burning sensation	71	24.0
Pin needle sensation	149	50.3
Numbness	117	39.5
Intermittent Claudication	50	16.9
DVT	7	2.4
Visual impairment	187	63.2
Cataract	62	20.9
Hypertension	224	75.7
CKD	17	5.7
Stroke	17	5.7
Hyperglycemia	71	24.0
Overweight/Obese	200	67.6
Inappropriate footwear	153	51.7
Loss of hair	97	32.8
Skin dryness	154	52.0
Wasting of small muscle in foot	17	5.7
Crackles	87	29.4
Oedema of the lower limbs	51	17.2
Dilated veins	19	6.4

DVT: Deep vein thrombosis, CKD: Chronic kidney disease,

Table 2: Association between History of Foot Ulcer, Socio-Demographic and Laboratory Characteristics

	History of foot ulcer		X^2	p-value
	Yes (n=23)	No (n=273)		
Gender				
Male	11(9.7)	102(90.3)	0.984	0.321
Female	12(6.6)	171(93.4)		
Age groups				
≤40	0(0.0)	14(100.0	7.003	0.220
41-50	0(0.0)	35(100.0)		
51-60	10(11.8)	75(88.2)		
61-70	7(6.5)	100(93.5)		
71-80	5(10.9)	41(93.5)		
>80	1(11.1)	8(88.9)		
Duration of DM				
≤10	6(3.7)	156(96.3)	8.517	0.014*
11-20	12(12.0)	88(88.0)		
>20	5(14.7)	29(85.3)		
HbA1c category				
Uncontrolled	8(5.3)	142(94.7)	2.520	0.112
Controlled	15(10.3)	131(89.7)		
ABI category			1.541	0.463
ABI (<0.9)	7(11.5)	54(88.5)		
Controlled (0.91-1.4)	15(6.9)	201(93.1)		
Stiff limb (>1.4)	1(5.3)	18(94.7)		

DM: Diabetes mellitus, HbA1c: Glycosylated haemoglobin, ABI: Ankle-brachial index

Table 3: Association Between History of Foot Ulcer and Clinical Risk Factors

		History of foot ulcer		X^2	p-value
		Yes (n=23)	No (n=273)		
Burning sensation					
	Yes	8(11.3)	63(88.7)	1.594	0.207
	No	15(6.7)	210(93.3)		
Pin needle sensation					
	Yes	13(8.7)	136(91.3)	0.381	0.537
	No	10(6.8)	137(93.2)		
Numbness					
	Yes	6(5.1)	111(94.9)	1.885	0.170
	No	17(9.5)	162(90.5)		
Claudication					
	Yes	6(12.0)	44(88.0)	1.502	0.220
	No	23(6.9)	229(93.1)		
DVT					
	Yes	1(14.3)	6(85.7)	0.425	0.515
	No	22(7.6)	267(92.4)		
Visual impairment					
	Yes	15(8.0)	172(92.0)	0.045	0.833
	No	8(7.3)	101(92.7)		
Cataract					
	Yes	5(8.1)	57(91.9)	0.009	0.922
	No	18(7.7)	216(92.3)		
Hypertension					
	Yes	16(7.1)	208(92.9)	0.506	0.477
	No	7(9.7)	65(90.3)		
CKD					
	Yes	2(11.8)	15(88.2)	0.402	0.526
	No	21(7.5)	258(92.5)		
Stroke					
	Yes	2(11.8)	15(88.2)	0.42	0.526
	No	21(7.5)	258(92.5)		
Hyperglycemia					
	Yes	7(9.9)	64(90.1)	0.569	0.451
	No	16(7.1	209(92.9)		
Overweight					
	Yes	7(9.9)	64(90.1)	0.569	0.451
	No	16(7.1)	209(92.9)		
Inappropriate footwear					
	Yes	16(10.5)	137(89.5)	3.191	0.074
	No	7(4.9)	136(95.1)		
Loss of hair					
	Yes	10(10.3)	87(89.7)	1.298	0.255
	No	13(6.5)	186(93.5)		
Skin dryness					
	Yes	16(10.4)	138(89.6)	3.073	0.08
	No	7(4.9)	135(95.1)		
Wasting of small muscle in foot					
	Yes	2(11.8)	15(88.2)	0.402	0.526
	No	21(7.5)	258(92.5)		
Crackles					
	Yes	13(14.3)	74(85.1)	8.844	**0.003***
	No	1(4.8)	199(95.2)		
Oedema of the lower limbs					
	Yes	4(7.8)	47(92.2)	0.000	0.983
	No	19(7.8)	226(92.2)		
Dilated veins	Yes				
	No	3(15.8)	16(84.2)	1.822	0.177
		20(7.2)	257(92.8)		

Discussion

Diabetes foot ulcer is a distressing chronic complication seen in people with DM. Lack of proper care can lead to revascularization or amputation of part or whole limb, which is an unpleasant therapeutic option.[2] In this study, the incidence of DFU is 7.8% which is similar to a study done at Vellore, South India.[3] It was found that the male sex and ages between 51 to 60 years are major contributors to DFU. It is known that men have poor health seeking behavior and tend to present late to health care facilities in Africa setting. The reason for high incidence of DFU in six decade of life is unknown but could be due to probably prevalence of visual impairment among those with DFU, which is about 65%. One-third (34%) of our patients with DFU have peripheral arterial disease. This contribute significantly to development of vasculopathy.

Other Risk factors identified in this study contributing significantly to the development of DFU include increasing duration of DM (more than 45% of patients have DM of greater than 10years) and crackles which is features of neuropathy. Other features of neuropathy identified include burning sensation, pins and needle sensation, numbness, loss of hair, dilated veins. Some of the vasculopathy features accessed included intermittent claudication, xerosis, and deep vein thrombosis. The presence of all these risk factors contribute to the development of DFU.[3]

Inappropriate foot wear was observed in more than half of the participant's despite of regular education (in groups or individual education) at every clinic visits. None availability of podiatrists in our clinic to complement foot care efforts by other health care professionals could have help to reduce this habit. Inappropriate foot wear has been noted to be a major contributor to abnormal foot mechanics thus leading to foot deformity.

Almost half of participants (49.3%) had good glycaemic control, as those with DFU have better glycosylated haemoglobin than those without DFU. The reason for this is unknown in this study but this finding is an indication that development of DFU is beyond glycaemic control.

Conclusion

Regular screening for DFU risk factors in our day to day practice is essential along with prevention of microvascular and reduction in macrovascular complications. Inappropriate foot wear which contribute to distortion of the foot mechanics should be discouraged especially in patients with prolonged history of DM and crackles.

REFERENCES

1. Uloko AE, Musa BM, Ramalan MA, Gezawa ID, Puepet FH, Uloko AT, et al. Prevalence and risk factors for diabetes mellitus in Nigeria: a systematic review and meta-analysis. Diabetes Ther. 2018;9(3):1307–16.

2. Ugwu E, Adeleye O, Gezawa I, Okpe I, Enamino M, Ezeani I. Predictors of lower extremity amputation in patients with diabetic foot ulcer: findings from MEDFUN, a multi-centre observational study. Journal of Foot and Ankle Research (2019) 12:34 https://doi.org/10.1186/s13047-019-0345

3. Alex R, Ratnaraj B, Winston B, Devakiruba S, Samuel C, John J et al. Risk Factors for Foot Ulcers in Patients with Diabetes Mellitus - A Short Report from Vellore, South India. Indian J Community Med. 2010; 35(1): 183–185. doi: 10.4103/0970-0218.62582: 10.4103/0970-0218.62582