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Diabetes Foot Ulcer Risk - A Public Health Concern in Rural Pondicherry!!

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ABSTRACT

Background: The risk of diabetes related complications is increasing with the increase in number of diabetes in rural population. Diabetes foot ulcer is a preventable complication of diabetes.

Objective: To assess the diabetes foot ulcer risk among patients with type II diabetes attending a rural health centre in Pondicherry.

Materials and Methods: This facility based cross sectional study was conducted among 121 diabetics attending a rural health centre in Pondicherry during the study period. Detailed foot examination including vascular and neurological assessment was done using standard procedure. The risk for diabetes foot ulcer was categorised as per risk classification by American Diabetic Association.

Results: About 17% of the diabetes patients had risk for developing diabetes foot ulcer. Of the total diabetics with risk for foot ulcer, 5%, 7.5% and 5% were in category 1, category 2 and category 3 respectively. A significant 39% of the diabetics reported not receiving any health education related to foot care.

Conclusion: A significant proportion of diabetics had risk for foot ulcer in the study population. Health education on foot care for all diabetics and close monitoring of foot of diabetics with risk for developing foot ulcer should be included in routine care.

Key words: diabetes, diabetes foot ulcer risk, rural health care

INTRODUCTION

India is considered as the diabetes capital of the world and housed nearly 40 million diabetics one decade back. [1,2] One in every fifth diabetic individual on the earth is an Indian. According to International Diabetes Federation (IDF) estimates, the number of diabetics in India is expected to increase from 51 million (2010) to 87 million by 2030. The diabetes is reported to be more common in south Indian states compared to north Indian states by ICMR-INDab study. [3] About one quarter of diabetes resides in rural India and shows an increasing trend. [4,5] The incidence of diabetes was estimated to be 8.7 million per year. [5]

More than half the diabetics in India are reported to have uncontrolled blood sugar level. [6–10] The uncontrolled blood sugar is associated with both micro and macro vascular complications and Indians are more susceptive to micro-vascular complication than diabetes patients from other countries. [11] Neuropathy, trauma a result of barefoot walking and other environmental factors and poor awareness on complications of diabetes are common antecedent factors for development of foot ulcer among diabetics in rural India. [12,13] The lifetime risk of foot ulcer among diabetics is 15% and specifically 8% among rural diabetics. Amputation among diabetics is about 4-24% but can up to 85%. [14,15] Once an ulcer develops, the risk of recurrence increases by 50%. [16]

Care of diabetes foot ulcer is associated with high cost and best way to avoid cost is prevention of ulcer through educating patient, capacity building of health professionals and multidisciplinary approach. [15,17,18] Self examination of foot by diabetes patient daily and examination by a doctor yearly is an important component of comprehensive diabetes care and prevention of diabetes foot ulcer. [19] Only about a quarter of the diabetes patients reported to have received foot care examination at a primary care setting and nearly 45% found to have poor foot care practices. [20]

The assessment of peripheral neuro-musculovascular functions is important and requires technical expertise. The onus lies both on the health personnel and the patient. However, in a resource poor setting like India the follow up examination for all the diabetics for development of foot ulcer during every visit is not feasible.

Risk stratification for diabetes foot ulcer serves as an important tool for prevention of morbidity and mortality associated with foot complications among diabetes patients. [21] Literature on risk stratification for diabetes foot ulcer is limited and confined to tertiary health care setting. [22,23] In this background, this study was planned to assess the risk for diabetes foot ulcer at a primary health care setting in a rural health centre of Pondicherry.

MATERIALS AND METHODS

This facility based cross sectional study was conducted during the month of January and February 2016 at a Rural Health cum Training Centre (RHTC) in Puducherry. The RTHC is attached to the Department of Preventive and Social Medicine of a tertiary health care institution in Puducherry and is located about 15 kilometers from the parent institution. The RHTC caters to a population of about 9000 residing in four villages. The RHTC provides family folder based comprehensive promotive, preventive and curative health care services including the outreach health care services to the catchment population. The RHTC also serves as a training centre for interns and other paramedical graduates on various aspects of health care in primary health care setting. A special clinic on management of chronic diseases is conducted every Wednesday at the RHTC. About 150 diabetes patients from the four villages are registered in the chronic disease clinic. The diabetes patients attend the chronic disease clinic for health check up on monthly basis unless otherwise indicated. Apart from disease management the patients are educated on various aspects of control of diabetes and its complications as well as self care of diabetes.

All the diabetes patients aged 30 years and above attending the chronic disease clinic in the month of January and February 2016 were approached for the study. Proxy patient and patient not willing to participate were excluded from the study. A total of 121 diabetes patient were included for the study after obtaining verbal informed consent.

Information was collected by medical doctors using a semi structured pretested questionnaire. The information included socio-demographic characteristics, disease duration, prior health education on diabetic foot and history of prior ulcer/amputation. Feet examination which included dermatologic, musculoskeletal, neurologic and vascular component as prescribed by Comprehensive Foot Examination and Risk Assessment Committee was done by the trained investigators. [19]

Dermatologic examination included skin texture, blisters, nail dystrophy, presence of crack, trauma, ulcer, corn, callosity and infection at or below the level of ankle. Musculoskeletal / foot deformity examination included examining foot for any muscle atrophy, muscle contracture, Charcot arthropathy, claw toe, hammer toe and any undue bony prominence. Neurological examination included examining for loss of protective sensation (LOPS). LOPS was checked testing for fine touch at four points; metatarsal head of 1st, 3rd and 5th toe and plantar surface of tip of great toe. Peripheral arterial disease (PAD) was assessed checking for pulse on dorsalis pedis artery at 1st intermetatarsal space and posterior tibial artery at posterior to lateral malleolous.

All the data collected were entered in Microsoft excel and descriptive analysis was done using SPSS version 20. Based on comprehensive foot examination as mentioned earlier the diabetes foot risk stratification was done. [19]

RESULTS

The mean (standard deviation) age of the study population was 56.13 (10.82) years and ranged from 30 years to 76 years. Majority of the study population were female (58.7%), had formal education (62%) and belonged to below poverty line category of socio-economic status (83.5%). (Table 2) More than half of the study population had diabetes for less than 5 years (53.7%). All the study population were using only oral hypoglycaemic drugs. About one third study population had received health education on management of diabetes including foot care.

About 17.4% of the diabetes patients were found to have risk for diabetes foot. The distribution of various diabetes foot risk attributes are given in the table 3.

Table 1: Socio-economic details of the study population (N=121)

Variable	Frequency (%)
Gender	
Female	71 (58.7)
Male	50 (41.3)
Education	
No formal education	46 (38)
Had formal education	75 (62)
Occupation	
Unemployed/retired	40 (33.1)
Housewife	32 (26.4)
Employed	49 (40.5)
Socio-economic status	
Red	101 (83.5)
Yellow	20 (16.5)
Duration of diabetes (years)	
<5	65 (53.7)
5 – 10	45 (37.2)
>10	11 (9.1)

Table 2: Distribution of foot risk attributes among study population (N=121)

Variable	Frequency (%)
Loss of protective sensation (LOPS)	
No loss	114 (94.2)
Unilateral	3 (2.5)
Bilateral	4 (3.3)
Nail deformity	
No	74 (61.2)
Unilateral	14 (11.6)
Bilateral	33 (27.3)
Dermatological deformity	
No	36 (29.8)
One foot	13 (10.7)
Both feet	72 (59.5)
Physical deformity	
Present	3 (2.5)
Absent	118 (97.5)
Vascular deformity	
No	111 (91.7)
At least one	9 (7.4)
All four	1 (0.8)
Ulcer/infection/amputation	
No	114 (94.2)
Yes	7 (5.8)
Diabetes foot risk	
No	100 (82.6)
Yes	21(17.4)

Nail deformity = thickened, lytic lesion
Dermatological deformity = crack, corn, callosity, infection

About 5.5% of the diabetics had either unilateral or bilateral loss of protective sensation. In nearly 8% of the diabetics, the arterial pulse of dorsalis pedis and / or posterior tibial artery were not palpable suggesting of PAD. Around 6% of the diabetics had history of ulcer / amputation of toe in the past. (Table 3). The distribution of patients who had risk for diabetes foot ulcer was 5%, 7.4% and 5% in risk category 1, 2 and 3 respectively.

Nearly 40% of the diabetics reported not receiving health education on foot care practices. Though statistically not significant, the diabetes foot risk was found to be more common among male, elderly, diabetics with no formal education, unemployed, with disease duration more than 10 years and had never received health education on foot care. (Table 4)

DISCUSSION

The prevalence of diabetes is increasing in rural India as a result of urbanization, changing life style and many environmental modifications. At the same time nearly half the diabetic population in India have poor glycemic control a condition closely related with peripheral neuropathy and occlusive arterial diseases. These are among the preceding events for diabetic foot ulcer.

The reported prevalence of foot at risk for ulcer among diabetics is as high as 66%. [22-26] Most of the studies have been conducted in a tertiary or referral health care setting or mixed primary health care setting with referral centre for diabetes complications. Kishore et al from a tertiary care institute in North India reported nearly 52% of diabetics to be having risk for diabetes foot ulcer. Lack of literature on diabetes foot risk classification at rural health care setting alone restrain from comparison.

In this study, first of its kind to our knowledge, we found nearly 18% of the diabetes patients having risk for developing diabetes foot ulcer. Of the total diabetes having risk for foot ulcer, about 5%, 8% and 5% were in category 1, 2 and 3 respectively. Proportionately the diabetes foot ulcer risk was higher among male, elderly, individuals not having formal education and those with longer duration of diabetes. Prior research also supports the fact that male, illiteracy and longer duration of disease makes the diabetics at higher risk for foot ulcer. [21] It was found that the proportion of individuals with risk for diabetes foot ulcer increases with increase in duration of diabetes showing consistent upward trend. Kishore et al also reported similar finding from a tertiary care institution in North India. [22] Strikingly it was noted that nearly 39% of the diabetes reported not being received health education on foot care. The receipt of health education on foot care didn't show any statistically significant difference in risk for developing diabetes foot ulcer. In a study based on tertiary care institution, only about 12% of diabetics had reported receiving health education on foot care from health professionals. [13]

Diabetes foot ulcer risk stratification is an import tool which helps in deciding upon the management and frequency follow up schedule. [21] During

Table 3: Univariate analysis showing relationship between diabetes foot risk and sociodemographic variables (N=121)

Variable	Diabetes foot risk		P value
	Absent(%)	Present(%)	
Gender			
Female	60 (84.5)	11 (15.5)	0.519
Male	40 (80)	10 (20)	
Age groups (years)			
< 40	7 (87.5)	1 (12.5)	0.156
40-59	54 (88.5)	7 (11.5)	
>60	39 (75)	13 (25)	
Education			
No formal education	37 (80.4)	9 (19.6)	0.615
Had formal education	63 (84)	12 (16)	
Occupation			
Unemployed	30 (75)	10 (25)	0.083
Housewife	25 (78.1)	7 (21.9)	
Employed	45 (91.8)	4 (8.2)	
Duration (years)			
<5	57 (87.7)	8 (12.3)	0.126
5-10	36 (80)	9 (20)	
>10	7 (63.6)	4 (36.4)	
Health education received			
No	39 (83)	8 (17)	0.938
Yes	61 (82.4)	13 (17.6)	

None of the variable showed statistically significant association with diabetes foot risk

a three year follow up of diabetes patients, Kishore et al has reported increase in occurrence of foot ulcer as the risk category increases. [22] Hence, very close and frequent monitoring of Diabetes in higher category of risk is needed compared to lower categories. Individuals in Category 0 need simple health education which can be delivered by any health personnel. Other categories may need accommodative or prescriptive foot ware along with the health education on foot care practices. The diabetes in category 2 and 3 may need vascular consultation from a specialist. The diabetes foot examination can be done annually for category 0 patients but others require frequent assessment.

The current study is based on rural primary health care setting and the medical doctors were the data collectors. The current study had used the standard procedures and criteria to identify the foot deformity, LOPS and PAD. Diabetes foot ulcer risk categorization has been done based on Comprehensive Foot Examination and Risk Assessment Committee of American Diabetes Association. Nearly one fifth of the diabetics could not be contacted because they didn't attend the NCD clinic and proxy attendance during the study period. PAD was assessed based on clinical finding of pulselessness of dorsalis pedis and posterior tibialis artery. No angiogram could be performed for conformation. Hence, generalization to other primary health care setting should be done carefully.

CONCLUSION

One in every five diabetics was found to have risk for developing diabetes foot ulcer in our study. Risk for diabetes foot ulcer is a public health concern even in rural setting. Risk stratification will help in identifying diabetes that need frequent follow up and referral, thereby making the health professionals more effective in diabetes foot ulcer management.

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