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PREVALENCE OF CUTANEOUS MANIFESTATIONS OF DIABETES MELLITUS: A HOSPITAL- BASED CROSS-SECTIONAL STUDY IN NORTHERN TANZANIA
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PREVALENCE OF CUTANEOUS MANIFESTATIONS OF DIABETES MELLITUS: A HOSPITAL- BASED CROSS- SECTIONAL STUDY IN NORTHERN TANZANIA

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ABSTRACT

***Background*: Diabetes mellitus is a non- communicable disease with an increasing prevalence in developing countries. Skin manifestations in this condition are due to metabolic derangements or chronic degenerative complications. Skin manifestations are commonly observed after developing clinical diabetes mellitus, but may also precede the diagnosis of the disease.**

***Objective*: To determine the prevalence and the spectrum of cutaneous diseases in patients with diabetes mellitus**

***Design*: A hospital- based descriptive cross sectional study.**

***Setting*: Regional Dermatology Training Center at Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania.**

***Results*: A total of 544 patients with diabetes mellitus were recruited. The majority (64.2%, n= 349) were females with a male to female ratio of 1:1.8 and mean age of 54.8 years (SD±18.4). The overall prevalence of cutaneous manifestations in diabetic patients was 43.9% (n=239). Some patients had more than one skin condition giving a total of 297 skin conditions diagnosed in 239 patients. From a total of 297 skin conditions, there were 150 (50.5%) primary non-infectious skin conditions in patients with diabetes. Infections accounted for 38.0% (n=113), whereas 6.7 % (n=16) were skin conditions due to complications of diabetes and 7.6% (n=18) were skin reactions caused by treatment for diabetes**

***Conclusions*: Primary non-infectious cutaneous manifestations of diabetes mellitus are the most frequent manifestations as compared with infectious cutaneous manifestations in our setting.**

INTRODUCTION

It is estimated that there are about 382 million individuals with diabetes mellitus (DM) worldwide and it is projected that this will increase to about 592 million diabetics by the year 2035 (1). The International Diabetes Federation estimated that more than 70% of individuals with type 2 DM will be in developing countries by the year 2030 (2_. The prevalence of DM in Tanzania was estimated at 7.8% (1).

Hyperglycaemia affects small cutaneous blood vessels and collagen fibres, which increases the risk for skin complications (3). Occasionally, cutaneous manifestations may be the first presenting sign or precede the diagnosis by many years (4). The prevalence of DM is expected to increase worldwide including the developing countries. There is lack of local data on the prevalence of skin conditions in diabetics in the population. The objective of this study was to assess the prevalence and the type of skin diseases affecting DM patients.

MATERIALS AND METHODS

This was a hospital- based cross- sectional study conducted at the Kilimanjaro Christian Medical

Centre (KCMC), a referral hospital in Moshi, Northern Tanzania. Data were collected at the diabetic outpatients' clinic between November 2013 and April 2014. All the 544 patients who attended the clinic during the study period were included. No patient declined to participate. The spectrum of skin diseases considered in this study was based on previous reviews (5,6). Behm *et al* (5) and Levy *et al* (6) grouped skin diseases in DM into four major groups: primary non-infectious skin conditions associated with diabetes, cutaneous infections associated with diabetes, skin disorders due to complications of diabetes and skin reactions caused by treatment of diabetes. The diagnosis of skin disease was made clinically by considering the history and the morphological features. In cases where clinical diagnosis was not clear, relevant laboratory and histopathological investigations were pursued.

Statistical package for social sciences (SPSS Inc. Chicago, Illinois, USA) version 16 was used for statistical analyses. Ethical clearance was obtained from the Kilimanjaro Christian Medical University College ethical review committee and informedwritten consent was obtained from all participants or caregivers.

RESULTS

There were more females with a male to female ratio of 1: 1.8. The age of the participants ranged from two years to 94 years with a median of 56 years. The mean BMI was 26.18 (SD±7.33) kg / m^2 and 451(82.9%) of the 544 patients had type 2 diabetes. The mean duration of the disease was 9.3(SD±0.33) years. Patients with or without cutaneous manifestations showed no statistical differences with regards to the gender, the age, the body mass index and the duration of the disease Table 1.

Table 1

Demographic and Clinical characteristics of diabetic patients attending the KCMC diabetic clinic

Variable	Skin condition		p-value
	No (n=544, (%)	Yes (n=239, (%)	
Gender:			
Male	195 (35.8)	85 (35.6)	
Female	349 (64.2)	154 (64.4)	0.904
Age (years):			
Mean(SD; Range)	54.8 (18.4; 2-94)		
30 or younger	72 (13.2)	26 (10.9)	
31 - 50	90 (16.5)	43 (18.0)	0.137
51 - 70	287 (52.8)	130 (54.4)	0.160
Older than 70	95 (17.5)	40 (16.7)	0.434
Body Mass Index (Kg/m^2):			
Mean (SD)	26.18(±7.33)	26.4 (±5.2)	0.103
Type of diabetes:			
Type 1	93 (17.1)	37 (15.5)	
Type 2	451 (82.9)	202 (84.5)	0.376
Duration of diabetes (months):			
Less than 12	15 (34.9)	28 (65.1)	
12 - 36	39 (39.0)	61 (61.0)	0.643
37 – 60	28 (39.4)	43 (60.6)	0.628
More than 60	158 (47.9)	172 (52.1)	0.108

A total of 239 (43.9%) DM patients had skin manifestations. Among the 239 patients with skin manifestations, 297 skin diseases were diagnosed, with 188 (78.7%) DM patients having a single skin condition while 44 (18.4%) had two and seven (2.9%) patients had three or more skin diseases. Among the 297 skin diseases diagnosed, 150 (50.5%) were primary non-infectious skin diseases associated with DM. In the other three categories, infectious conditions accounted for 38.0% (n=113), while cutaneous adverse drug reactions anti-diabetics and cutaneous complications of diabetes mellitus were noted in 18 (6.1%) and 16 (5.4%) patients, respectively.

Among the 150 primary non-infectious skin diseases associated with DM, pruritus was the main complaint in 90 (60.0%) patients while perforating dermatosis was the least common Table 2. A total of 113 cutaneous infections were encountered and the majority (108, 95.6%) was fungal infection, mainly candida, while the remaining five infections were viral three and bacterial two.

All 16 patients with cutaneous disorders due to a diabetic complication had a diabetic foot ulcer. A total of 512 patients were on medical treatment and 18 (3.5%) developed complications due to treatment. Among these 18 patients, 12 (66.7%) were using insulin, five (27.8%) were on oral hypoglycaemic drugs and one (5.6%) used both insulin and oral hypoglycaemic drugs. The cutaneous adverse drug reactions to insulin were lipohypertrophy (eight cases), purpura (three cases) and keloids (two cases), while oral hypoglycaemic drugs caused exanthematous drug eruption (four cases) and exfoliative dermatitis (one case).

Table 2
Distribution of 297 skin conditionsseen in 239 diabetic patients

Skin condition	Frequency	Percentage
Primary non-infectious skin conditions associated with DM		
Pruritus	90	60.0
Xerosis	19	12.7
Diabetic dermopathy	8	5.3
Acrochordons	6	4.0
Bullous diabeticorum	5	3.4
Vitiligo	5	3.4
Granuloma annulare	3	2.0
Acanthosis nigricans	3	2.0
Eruptive xanthomas	2	1.3
Pigmented purpuric dermatosis	2	1.3
Diabetic thick skin	2	1.3
Necrobiosis lipoidica	2	1.3
Kaposi`s sarcoma	2	1.3
Perforating dermatoses	1	0.7
Cutaneous infections		
Fungal infection	104	92.0
Viral infections	5	4.4
Bacterial infection	3	2.7
Infestation	1	0.9
Disorders due to DM complications		
Diabetic foot ulcer	15	93.8
Foot gangrene	1	6.2
Reactions to DM treatment		
Insulin	13	72.2
Oral hypoglycaemic	5	27.8

DISCUSSION

Diabetes mellitus (DM) is the most common endocrine disorder with complications affecting every organ including the skin. The prevalence of cutaneous disorders in this study is within the estimated range of 30% to 70% as reported in a previous review (7). Primary non-infectious skin diseases associated with DM were the most frequently encountered followed by infectious conditions. Diabetic complications and cutaneous adverse drug reactions due to anti-diabetics were relatively rare. This study was conducted at a tertiary institution with a functional diabetic- and skin clinic. Therefore, the results may not reflect the cutaneous manifestations in poorly controlled diabetes and inaccessible skin care services elsewhere in Africa.

There was no observed statistical association between the development of cutaneous disorders and disease factors such as the gender, the age, the duration of DM and the type of DM. The association of cutaneous manifestation with these factors have been inconsistently reported (7-9). Although this study did not show association, cutaneous manifestations of DM generally appear after development of the disease and the duration of DM determines the risk of development of diabetic complications (7,8). Similarly diabetic dermopathy tends to develop in elderly men, whereas necrobiosis lipoidica develops generally in women in the third and the fourth decade of life (9).

Xerosis and pruritus were the most common conditions encountered and affected 109 (20.0%) patients. This is slightly lower than that 25% reported in earlier study (10). The frequent use of emollients in warm and humid tropical environment may have reduced the risk for dry skin in these patients. However, age may be a confounder for the high prevalence of xerosis in the elderly.

In this study, six patients had acrochordons and three had acanthosis nigricans. Acanthosis nigricans is generally seen more often in patients with obesity and type 2 DM (11). This prevalence is lower in this study although the majority (82.9%) of the patients had type 2 DM. However, this may be explained by the lower obesity in patients in this study (mean BMI of 26.18kg/m^2) as compared to that reported in most Western studies (12). Patients with DM are at increased risk of cutaneous infection because of hyperglycaemia, altered cellular immunity and vascular insufficiency (13). The prevalence of skin infection in DM patients is estimated to range from 20 to 50% (5,8,14,15). The rate of skin infections (20.8%, 113/544) in this study is similar to that reported in other studies except for lower bacterial infections. Previous reports showed that about 5-10% of patients had bacterial infections (8, 14, 15) whereas in this study only three patients had bacterial infections. However, the infected diabetic foot was not considered as a primary bacterial infection.

Cutaneous complication arising because of treatment of DM was seen in 7.6% of the patients. The majority of these complications were lipodystrophy due to insulin injection. Adverse reaction to insulin generally occurs within the first month of therapy (16). The use of highly purified human insulin and rotation of the injection area may have minimised the risk for complications at the injection site. Cutaneous reactions to oral hypoglycaemic drugs were generally reported to be rare and transient (5,7) a finding also confirmed in the current study. Cutaneous manifestations presenting with changes in skin colour such as rubeosis faciei and carotinemia were not encountered in this study, although rubeosis faciei was reported to affect 60% of the DM patients (6). Absence of this condition in this study could be an underestimation because of difficulties in assessing skin colour changes in individuals with dark skin.

In conclusion, the spectrum of skin manifestations due to DM in this study population is similar to that in other parts of the world. Primary non-infectious skin conditions associated with DM are common. Pruritus and fungal infections are the most common cutaneous manifestations in DM patients.

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