

## Original Article

# Prevalence and Pattern of Skin Diseases in Patients with Diabetes Mellitus at a Tertiary Hospital in Northern Nigeria

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### ABSTRACT

**Background:** Diabetes mellitus is one of the most common metabolic disorders with a rising prevalence. It cuts across all ages and socioeconomic status. Various skin lesions are frequently observed in diabetic patients. **Aims:** This study was carried out to determine the prevalence, pattern, and determinants of skin diseases in diabetic patients at the Barau Dikko Teaching Hospital, Kaduna, North West Nigeria. **Materials and Methods:** One hundred consecutive diabetic patients attending the clinic were included in the study. **Results:** Many of the patients had more than one skin condition at a time. The most prevalent skin diseases were idiopathic guttate hypomelanosis which was seen in 61% of patients, infections from fungal, bacterial, and viral causes occurred in 30% of patients, other skin disorders were diabetic dermopathy seen in 17% of patients, palmoplantar hyperpigmentation was seen in 13% of patients, while pruritus occurred in 12% of patients and xerosis was seen in 10% of patients. **Conclusion:** Skin disorders are common among diabetic patients at Barau Dikko Teaching Hospital, Kaduna, North West Nigeria.

**KEYWORDS:** Cutaneous manifestations, diabetes mellitus, pattern, prevalence

## INTRODUCTION

Diabetes mellitus is one the most common metabolic disorders that occurs in all ages, races, and socioeconomic strata. The prevalence and incidence of diabetes is rising and affects about 5–7% of the population in sub-Saharan Africa.<sup>[1]</sup>

There is a wide variation in the prevalence and pattern of skin disorders in diabetic individuals depending on the region, and the overall prevalence ranges between 51.1% and 97%.<sup>[2-4]</sup>

It has been suggested that skin changes may be due to the effects of advanced glycation end products, oxidative stress and inflammation which leads to early skin aging, development of diabetic dermopathy, and scleroderma diabeticorum.<sup>[5]</sup> Similarly, skin lesions like acanthosis nigricans, acrochordons, and inflammatory dermatitis may result from hormonal influences, insulin resistance, imbalance growth factors and cytokines.<sup>[4,5]</sup>

The aim of the study was to determine the prevalence and pattern of skin diseases in diabetic patients, to

determine the factors associated with the skin diseases and assess the relationship between skin diseases and glycemic control.

## MATERIALS AND METHOD

This was a cross-sectional study conducted at the medical outpatient clinic of the Barau Dikko Teaching Hospital, Kaduna, North-Western Nigeria. Ethical approval and informed consent were obtained from the ethical committee of the Hospital and respondents respectively before commencement of the study.

One hundred consecutive diabetic patients attending the clinic were included in the study. Diagnosis of diabetes mellitus was based on WHO criteria of fasting plasma glucose of >7 mmol/l (126 mg/dl) and or random plasma glucose >11.1 mmol/l (200 mg/dl) on at least

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two occasions. Good control was fasting plasma glucose of <6 mmol/l and poor control was fasting plasma glucose of >6 mmol/l.

Records of the patients' age, sex, fasting blood sugar, body mass index, and duration of diabetes were documented. An evaluation of the skin disease was made clinically after detailed examination. Data was analyzed using statistical package for social sciences version 21. Data cleaning was carried out and errors corrected. Quantitative variables were summarized using means and standard deviation while frequencies and proportions were used for qualitative variables. Student's *t*-test was used to test statistical significance for continuous variables while association between alopecia and hair care practices was tested using Chi-square test. The level of statistical significance was at  $P \leq 0.05$ .

### RESULTS

A total of 100 diabetic subjects were involved in the study. Majority of the participants were females 78 (78%). The youngest patient was 16 years and the oldest was 80 years with a mean age of  $55.90 \pm 13.11$  years. Only

**Table 1: Clinical and Demographic Characteristics of 100 Diabetics Studied**

Character	frequencies	Percentage (%)
Gender		
Male	22	22
Female	78	78
Total	100	100
Age (years)		
0-20	01	01
21-40	15	15
41-60	47	47
61-80	37	37
Total	100	100
BMI (Kg/m <sup>2</sup> )		
<18.5	09	09
18.5-24.9	31	31
25.0-29.9	27	27
>30	23	23
Total	100	100
FBS (mmol/l)		
<6	24	24
>6	76	76
Total	100	100
Duration of Diabetes mellitus (years)		
0-10	72	72
11-20	24	24
>20	04	04
Total	100	100



**Figure 1:** Idiopathic guttate hypomelanosis



**Figure 3:** Diabetic dermopathy



**Figure 2:** Tinea pedis



**Figure 4:** Candidal paronychia and onychomycosis

**Table 2: Types of skin lesions and its prevalence seen among 100 diabetic patients in Kaduna**

Type of skin lesion	Percentage
Idiopathic gutate hypomelanosis	61
Superficial fungal infections	26
Diabetic dermopathy	17
Palmo plantar hyperpigmentation	13
Pruritus	12
Xerosis	10
Dermatosis papulosa nigra	7
Ichthyosis	3
Diabetic thick skin	3
Atopic dermatitis	3
Pincer nails	3
Vitiligo	2
Calluses	2
Furuncles	2
Koilonychia	2
Warts	2
Acne keloidalis nuchae	2
Ulcer	2
Acanthosis nigricans	1
Melasma	1
Terrys nails	1
Skin tag	1
Eruptive xanthomas	1
Melanonychia	1

**Table 3: Types of skin infections seen in 100 Diabetic patients in Kaduna**

Type of skin infections	Number of patients
Fungal infections	
Tinea pedis	14
Tinea corporis	1
Tinea unguium	2
Vagina candidiasis	4
Candida paronychia	1
Pityriasis versicolor	4
Bacterial infections	
Furuncles	2
Viral infections	
Warts	2

31 (34.4%) respondents had normal BMI (18.5 -24.9), 9 (10%) subjects were under weight, 27 (30.0%) subjects were overweight and 23 (25.6%) were obese.

Most of the subjects 76 (76%) had poor glycemic control with a fasting plasma glucose of more than 6.0 mmol/l while the remaining 24 (24%) had good control with a value of less than 6.0 mmol/l. Seventy-two (72%) of the subjects had diabetes mellitus for less than 10 years, 24% had diabetes for a period of between 11 and 20 years, only 4% had been diabetic for more than 20 years [Table 1].

**Table 4: Relationship between age and Idiopathic guttate hypomelanosis (IGH) in 100 Diabetics in Kaduna**

AGE (YRS)	IGH PRESENT	IGH ABSENT
0-40	5	11
41-80	56	28
TOTAL	61	39

$\chi^2=13.112$  df =1  
P value=0.000

**Table 5: Relationship between FBS and Tinea pedis in 100 Diabetics in Kaduna**

FBS	Tinea pedis - Present	Tinea pedis - Absent
Less than 6	5	19
Greater than 6	9	67
Total	14	86

$\chi^2=1.212$  df =1  
P value=0.271

The various types of skin lesions and their prevalence are shown in Table 2. Table 3 shows the different types of skin infections. Idiopathic guttate hypomelanosis (IGH) had a strong relationship with increasing age ( $P < 0.000$ ) as shown in Table 4. There was no correlation between infections like Tinea pedis and blood sugar levels ( $P > 0.271$ ) as shown in Table 5.

## DISCUSSION

Cutaneous changes in diabetics may precede or appear at the time of diagnosis of diabetes mellitus. Some of these lesions are strongly associated with diabetes mellitus; such lesions include diabetic dermopathy, diabetic bullae, and necrobiosis lipoidica. On the other hand, some other skin changes observed in people living with diabetes are associated with infection.<sup>[4-7]</sup>

Ninety-two (92%) of the subjects in this study had skin lesions. Previous studies have shown that 30–71% of diabetics have skin disorders.<sup>[6,7]</sup> The finding in this study is comparable to some previous studies where Hajieh *et al.*<sup>[8]</sup> found a prevalence of 92%. In a study by Abhishek *et al.*,<sup>[9]</sup> he noted that 80% of the 100 diabetics studied had more than one form of skin lesion. Similar studies from Nigeria by Onunu<sup>[10]</sup> and Ezejiolor *et al.*<sup>[11]</sup> both in the tropical rain forest region of Nigeria reported prevalence rates of 63.2% and 73%, respectively. The higher prevalence in the study compared to those from the tropical rain forest area may be attributable to climatic differences as the tropical savannah in north west Nigeria experiences more sunshine and higher temperatures than in the rain forest areas. It is noteworthy that the higher overall prevalence of skin diseases in diabetics observed in our study is accounted for by the higher rate of IGH, an acquired disorder

strongly associated with ultraviolet exposure and aging.<sup>[12,13]</sup> The higher exposure to scorching sunlight in our environment could readily explain the increase observed.

As noted earlier, the most prevalent skin disorder seen in this study was IGH which occurred in 61% of the participants. This prevalence rate is comparable to the findings in a study by Asokan *et al.* in Japan,<sup>[12]</sup> who reported a prevalence of 34.5% out of the 287 diabetics studied and 70% of those aged 50 years and above, had these lesions compared to 6% of those aged 20–29 years. Another possible reason for the similarity between our results and that of Asokan *et al.*<sup>[12]</sup> is the fact that majority of our patients were of relatively higher age, as only 16% of the patients in this study were aged 40 years or younger. However in a Nigerian study by Ezejiofor<sup>[11]</sup> *et al.* found a much lower prevalence of 1.6% out of the 355 diabetic patients studied. The high prevalence in our study may be due to high temperatures experienced in this part of the country compared to what obtains in the forest areas of the southern part of Nigeria. It has been postulated that a history of excessive chronic sun exposure and repeated micro-trauma may play a role in its occurrence.<sup>[12]</sup> A familial tendency to develop IGH has also been noted.<sup>[13]</sup> IGH is one of the commonest acquired skin disorders seen in elderly patients over 70 years irrespective of races and skin types. It is characterized by whitish, multiple, well-circumscribed, asymptomatic, polygonal (2–5 mm), macules symmetrically distributed on the extensor forearms and shins [Figure 1]. The skin lesions remain the same over time. Up to 80% of people over the age of 70 years are noted to have this lesion.<sup>[14]</sup> In this study, increasing age was associated with the presence of these lesions and this was statistically significant with a *P* value of < 0.000. This is in agreement with observations even in non-diabetic individuals.<sup>[12]</sup>

Infections from fungi, bacteria, and viral causes constituted 30%. Dermatophytes and other fungal infections were seen in 26% of the patients (17% had tinea infections, 4% had vaginal candidiasis, 1% had candidal paronychia, and 4% had pityriasis versicolor). Previous studies have reported high prevalence of certain infections in diabetic patients' with 20–50% of diabetics having skin infections.<sup>[5,15]</sup> This may be related to hyperglycemic environment leading to immune dysfunction and micro and macroangiopathies and neuropathies.<sup>[16]</sup> Studies by Ezejiofor *et al.* and Onunu *et al.* reported rates of 39.2% and 38.8%, respectively. Fungal infections appears to be the commonest of all the infective causes in most of these studies. This may be related to the chronicity of dermatophyte infections.

However, in this study there was no relationship between infective dermatosis and blood sugar levels as reported in previous studies. This could be due to the fact that measures of long-term glycemic control such as glycated hemoglobin was not used to define glycemic control in our patients.

Tinea pedis infection had a prevalence of 17% in this study although previous studies have reported higher values of up to 35%.<sup>[16]</sup> It appeared as macerated, whitish, scaly lesion in the toe webs [Figure 2]. The presence of Tinea pedis can act as a portal of entry for bacterial infection further leading to diabetic foot. As such, early recognition and prompt treatment cannot be over emphasized.

Diabetic dermopathy was seen in 17 out of the 100 participants. It is one of the most common skin manifestations in diabetic elderly male and is said to have a strong association with diabetes mellitus. The lesions start as dull, red scaly small circular or oval papules/plagues which later become atrophic and hyperpigmented [Figure 3]. They have a predilection for the shins.<sup>[17,18]</sup> Factors implicated in its origin are previous infection and trauma.

Vulva candidal infection in females is associated with itching and whitish curdy discharge. This may be a presenting feature of diabetes as such individuals with recurrent candidiasis should be screened for diabetes mellitus. Candidal paronychia affects mostly the proximal nail fold. Characterized by pain, bogginess, redness, and dystrophic cuticles [Figure 4].

## CONCLUSION

Skin complications are common in diabetes mellitus in Kaduna, with most patients with diabetes manifesting one form of skin disorder or the other and many with more than one skin manifestations, the commonest being IGH. A good knowledge and identification of some of these skin disorders may help in reducing morbidity associated with diabetes and its complications.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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