



Cutaneous Manifestations of Diabetes Mellitus at Tertiary Health Facilities in Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Diabetes Mellitus (DM) is a chronic condition with various systemic manifestations, including cutaneous involvement. This study provides a comprehensive examination of skin-related complications among diabetic patients in a tertiary health facility in southeast Nigeria. The study aims to identify prevalent cutaneous manifestations in diabetic patients and their association with various demographic and clinical factors

Methods: A cross-sectional observational study design was employed. The sample size of 160 was determined using Fisher's formula, considering the known prevalence of DM in Nigeria (10%) and a 95% confidence level. Adult patients with DM were randomly selected from the outpatient department of the health facility. Data collection involved structured questionnaires and physical examinations by dermatologists. SPSS version 26 was used for statistical analysis, utilizing descriptive statistics and chi-square tests.

Results: The study revealed a high prevalence (96.88%) of skin lesions among diabetic patients, with the most common being idiopathic guttate hypomelanosis (37.42%) and infections (22.58%). Factors such as gender, age, educational level, marital status, occupation, duration of diabetes diagnosis, family history, smoking, alcohol consumption, diet, and exercise habits significantly influenced the occurrence of skin lesions. A significant number of patients reported improved skin conditions post-treatment and satisfaction with healthcare services.

Conclusion: The study highlights the high prevalence of skin manifestations in diabetic patients and underscores the importance of regular dermatological assessment and education in diabetes management. It suggests the need for integrated care approaches in DM management to address these dermatological aspects.

Keywords: Cutaneous manifestations, dermatological assessment, diabetes mellitus.

1. INTRODUCTION

Diabetes mellitus is a growing global health concern, with a significant impact in Nigeria [1]. The prevalence of diabetes in Nigeria has been on the rise, reflecting a global trend in increasing rates of non-communicable diseases. As of 2021, the International Diabetes Federation estimated that over 19 million adults in the Africa region are living with diabetes, with Nigeria being one of the countries significantly affected [2].

One of the lesser-known but impactful complications of diabetes is its cutaneous manifestations [3]. These skin-related symptoms can range from common conditions like bacterial and fungal infections to more complex disorders such as diabetic dermopathy and necrobiosis lipoidica diabetorum. The prevalence and types of cutaneous manifestations in diabetic patients can serve as important markers for the severity and management of diabetes [4]. The rising prevalence of diabetes implies that these cutaneous manifestations will likely be encountered more frequently by physicians in all

disciplines, including dermatologists and primary care physicians [5].

A range of skin conditions can be observed in diabetic patients. These manifestations can be broadly categorized into general skin findings related to diabetes and findings specifically related to diabetes treatment. They cover a spectrum of clinical presentations, each with its own pathophysiology, epidemiology, and treatment requirements [6]. Some of the known cutaneous manifestations include acanthosis nigricans, bullous diabetorum, diabetic dermopathy, diabetic foot ulcer, lipodystrophy, necrobiosis lipoidica, and scleredema diabetorum [5].

In Nigeria, studies have shown that skin disorders are common among diabetic patients. For instance, a study at the Barau Dikko Teaching Hospital in Kaduna, Northern Nigeria, found that many patients had more than one skin condition at a time. The most prevalent skin diseases included idiopathic guttate hypomelanosis (61%), followed by infections from fungal, bacterial, and viral causes (30%).

Other disorders noted were diabetic dermopathy (17%), palmoplantar hyperpigmentation (13%), pruritus (12%), and xerosis (10%) [7].

In a different study involving 100 cases of diabetes mellitus, 82% showed cutaneous lesions. The most common findings were infections (49%) and foot involvement (30%). Interestingly, a high incidence of vitiligo (10%) and localized anogenital pruritus (19%) was noted, which was unusual. However, some common cutaneous markers like necrobiosis lipoidica diabetorum, diabetic bullae, acquired perforating dermatoses, and scleredema were not observed in this study [5].

In Nigeria, as in many developing countries, there is a gap in research and understanding regarding the cutaneous manifestations of diabetes. This gap is compounded by the challenges faced by tertiary health facilities, which are often under-resourced and struggle with the high burden of disease [8]. The effective diagnosis and management of these skin conditions require not only clinical expertise but also access to adequate healthcare infrastructure, which is not always available in Nigeria. Thus, this study sought to examine cutaneous manifestations of diabetes mellitus at a tertiary health facility in Southeast Nigeria.

2. METHODOLOGY

2.1 Research Design

This study was a cross-sectional observational study. This design was appropriate for describing the characteristics of a specific population at a specific point in time [9].

2.2 Sample Size Determination

Sample size was calculated using the Fisher's formula as stated in Ekeleme et al. [10]:

$$n = \frac{Z^2(Pq)}{e^2}$$

where

n = minimum sample size

Z = 1.96 at 95% confidence level,

p = known prevalence of diabetes mellitus in Nigeria

e = error margin tolerated at 5% = 0.05

q = 1 - p

According to Adijat et al. [11], the existing prevalence of diabetes mellitus in Nigeria is 10.0%.

p = 10.0% = 0.1

$$\begin{aligned} q &= 1 - p \\ &= 1 - 0.1 \\ &= 0.9 \end{aligned}$$

$$n = \frac{(1.96)^2(0.1 \times 0.9)}{(0.05)^2}$$

$$n = \frac{0.3456}{0.0025} = 138.24$$

The minimum sample size was 138 and was adjusted to 160 to account for a non-response rate of 10%.

2.3 Research Setting and Participants

The study was conducted in a tertiary health facility in southeast Nigeria. This facility was chosen due to its high patient influx and advanced healthcare services. This study targeted adult patients (aged 18 years and above) diagnosed with diabetes mellitus. A sample size of 160 participants was randomly selected from the outpatient departments of the health facility. The sampling method ensures a diverse representation of the population [12].

2.4 Data Collection

Data was collected using a structured questionnaire and physical examination. The questionnaire, developed based on guidelines from the American Diabetes Association [13], was used to gather demographic information, medical history, and specific details about skin manifestations. Physical examinations were conducted by trained dermatologists to identify and record cutaneous manifestations. The data were collected between March and July, 2023.

2.5 Statistical Analysis

Data will be analyzed using SPSS version 26. Descriptive statistics was used to summarize demographic and clinical characteristics. Chi-square tests was employed to explore associations between diabetes and cutaneous manifestations.

3. RESULTS

Majority of the participants of this study were female (53.75%) and aged over 40, with the largest group being 60 and above (38.13%). Most participants had secondary education (49.38%). A significant majority (81.25%) were married. Diverse occupations represented, with many (48.75%) having been diagnosed with diabetes for more than 10 years. Most have Type 2 diabetes (74.38%) and were on varied

treatment regimens. A high percentage (77.50%) had a family history of diabetes (Table 1).

Many (41.88%) of the respondents checked their blood sugar once a day. A notable portion (24.38%) smoked and 37.50% consumed alcohol. Over half described their diet as balanced (52.50%), and a majority exercises often or always (82.51%) (Table 2). Majority were

not aware of potential skin problems due to diabetes (58.75%) and a high percentage have experienced skin lesions (96.88%). Various types of lesions were reported, with "Idiopathic gutate hypomelanosis" being the most common (37.42%). Lesions commonly appeared on the face and other unspecified locations (Table 3).

Table 1. Personal and clinical information of participants

Variable	Frequency (160)	Percentage (%)
Gender		
Male	74	46.25
Female	86	53.75
Age (in years)		
Less than 20	00	0.00
20 – 29	02	1.25
30 – 39	05	3.13
40 - 49	43	26.88
50 – 59	49	30.63
60 and above	61	38.13
Educational level		
No Formal Education	11	6.88
Primary Educations	38	23.75
Secondary Education	79	49.38
Tertiary Education	32	20.00
Marital Status		
Single	04	2.50
Married	130	81.25
Separated/Divorce	19	11.88
Widowed	07	4.38
What is your current occupation?		
Farmer	23	14.38
Trader	36	22.50
Civil Servant	28	17.50
Student	16	10.00
Unemployed	31	19.38
Retiree	26	16.25
How many years have you been diagnosed with diabetes?		
Less than one year	8	5.00
1 – 5 years	28	17.50
6 – 10 years	46	28.75
More than 10 years	78	48.75
What type of diabetes do you have?		
Type 1	28	17.50
Type 2	119	74.38
Others	13	8.13
What is your Current Treatment Regimen		
Insulin therapy	23	14.38
Oral hypoglycemic agents	54	33.75
Diet and exercise	42	26.25
Combination therapies	41	25.63
None	00	0.00
Do you have family history of diabetes		
Yes	124	77.50
No	36	22.50

Table 2. Lifestyle and risk factors assessment

Variable	Frequency (n = 160)	Percentage (%)
How often do you check your blood sugar levels?		
More than once a day	14	8.75
Once a day	67	41.88
Few times a week	16	10.00
Once a week	22	13.75
Sometimes	41	25.63
Rarely	00	0.00
Never	00	0.00
Do you smoke?		
Yes	39	24.38
No	121	75.63
Do you consume alcohol?		
Yes	60	37.50
No	100	62.50
How would you describe your diet?		
Balanced	84	52.50
High in fats	00	0.00
High in carbohydrates	28	17.50
High in proteins	18	11.25
Vegetarian/Vegan	08	5.00
Not sure	22	13.75
How often do you exercise?		
Always	43	26.88
Often	89	55.63
Sometimes	34	21.25
Rarely	12	7.50
Never	00	0.00
Have you ever been diagnosed with other chronic diseases (e.g., tuberculosis, heart disease, hypertension)?		
Yes	74	46.25
No	86	53.75

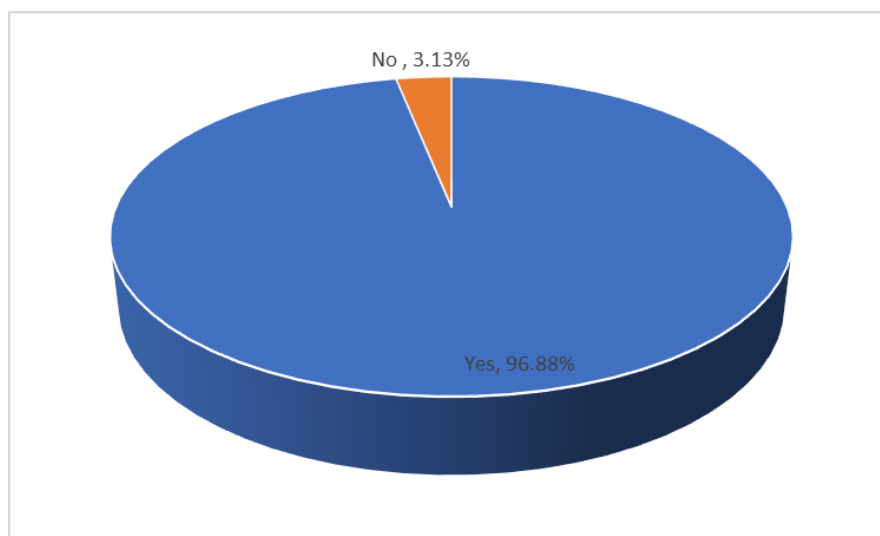


Fig. 1. Diabetic patients with skin lesions

Table 3. Cutaneous manifestations

Variable	Frequency (n = 160)	Percentage (%)
Were you aware of the potential for skin problems associated with diabetes before experiencing them?		
Yes	66	41.25
No	94	58.75
Have you ever experienced Skin Lesions?		
Yes	155	96.88
No	05	3.13
If yes, what type of Lesions experienced		
Infections	35	22.58
Xerosis (Dry Skin)	24	15.48
Acanthosis nigricans,	3	1.94
Idiopathic gutate hypomelanosis	58	37.42
Necrobiosis Lipoidica	17	10.97
Diabetic Dermopathy	15	9.68
Metabolic prurigo	1	0.65
Others	2	1.29
Location of Skin Lesions		
Upper limbs	28	17.50
Lower limbs	19	11.88
Trunk	25	15.63
Face	33	20.63
Others	50	31.25
Not applicable	05	3.13
Presence of Skin Conditions Post Diabetes Diagnosis		
Yes	143	89.38
No	12	7.50
Not applicable	05	3.13
Frequency of Skin Conditions		
Always	24	15.00
Often	41	25.63
Sometimes	59	36.88
Rarely	31	19.38
Never	05	3.13
Severity of Skin Conditions		
Mild	31	19.38
Moderate	55	34.38
Very sever	69	43.13
Not applicable	05	3.13

Most participants sometimes visit healthcare for diabetes (55.00%) and have received education regarding skin care in diabetes (89.38%). Majority saw improvement in their condition post-treatment (81.88%) and were satisfied with healthcare services (Table 4).

Many (43.13%) participants rated their overall health as fair and have a fair ability to carry out normal daily activities (33.75%). Participants are generally able to participate in social activities and manage their symptoms related to skin conditions. The overall quality of life ratings varied, with fair being the most common (37.50%). A significant number felt anxious or

stressed due to diabetes (68.13%) (Table 5). Various factors such as gender, age, educational level, marital status, occupation, duration of diabetes diagnosis, type of diabetes, and lifestyle habits (smoking, alcohol consumption, diet, exercise) showed varying degrees of association with the experience of skin lesions (Table 6). The chi-square (χ^2) values and P-values in Table 6 indicate the statistical significance of these associations, with lower P-values (especially those below 0.05) indicating a stronger statistical significance. For instance, gender shows a significant association with the experience of skin lesions (P-value = 0.000).

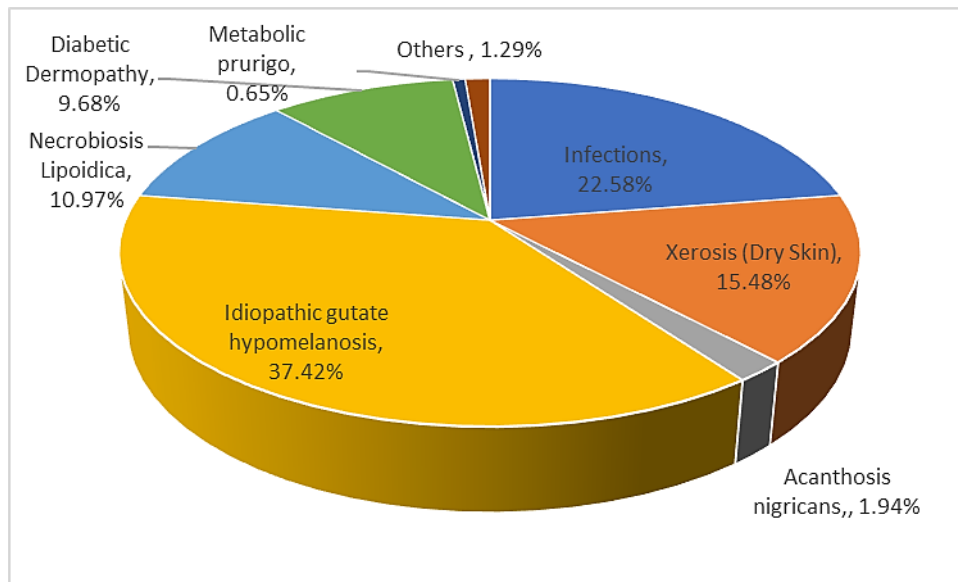


Fig. 2. Types of skin lesions observed in the study

Table 4. Management and outcome

Variable	Frequency (n = 160)	Percentage (%)
How often do you visit healthcare for diabetes?		
Always	19	11.88
Often	32	20.00
Sometimes	88	55.00
Rarely	21	13.13
Never	00	0.00
How often do you visit healthcare for skin conditions?		
Always	31	19.38
Often	26	16.25
Sometimes	60	37.50
Rarely	25	15.63
Never	13	8.13
Not applicable	05	3.13
Have you received any education regarding skin care in diabetes from your healthcare provider?		
Yes	143	89.38
No	17	10.63
If yes, rate the adequacy of this education		
Very Adequate	43	30.07
Adequate	76	53.15
Inadequate	24	16.78
Response to Treatment		
Improved	131	81.88
Worsened	01	0.63
Unchanged	28	17.50
Satisfaction with Healthcare Services Received		
Very satisfied	37	23.13
Satisfied	69	43.13
Neutral	43	26.88
Dissatisfied	11	6.88
Very Dissatisfied	00	0.00

Table 5. Quality of life assessment

Variable	Frequency (160)	Percentage (%)
How will you rate your overall health status?		
Very Good	18	11.25
Good	27	16.88
Fair	69	43.13
Poor	35	21.88
Very Poor	11	6.88
How will you rate your ability to carry out normal daily activities?		
Very Good	31	19.38
Good	41	25.63
Fair	54	33.75
Poor	25	15.63
Very Poor	09	5.63
How will you rate your ability to participate in social activities?		
Very Good	34	21.25
Good	66	41.25
Fair	31	19.38
Poor	29	18.13
Very Poor	00	0.00
How will you rate your ability to manage your symptoms related to skin conditions?		
Very Good	21	13.13
Good	70	43.75
Fair	26	16.25
Poor	21	13.13
Very Poor	17	10.63
Not applicable	05	3.13
How will you rate your overall quality of life?		
Excellent	19	11.88
Good	42	26.25
Fair	60	37.50
Poor	28	17.50
Very Poor	11	6.88
How often do you feel anxious or stressed due to your diabetes?		
Always	47	29.38
Often	62	38.75
Sometimes	31	19.38
Rarely	13	8.13
Never	07	4.38
Does your condition negatively affect your daily activities?		
Yes	109	68.13
No	51	31.88
Have you needed to take time off work or school due to skin conditions?		
Yes	92	57.50
No	63	39.38
No skin condition	05	3.13
How would you describe your level of pain associated with skin conditions?		
Very Painful	36	22.50
Painful	53	33.13
Normal	42	26.25
Not Painful	24	15.00
No skin condition	05	3.13
Do you feel supported in managing your diabetes?		
Yes	98	61.25
No	62	38.75

Variable	Frequency (160)	Percentage (%)
Have you ever experienced discrimination or stigma because of your diabetes?		
Yes	89	55.63
No	71	44.38
Has diabetes affected your relationship with your family and friends?		
Yes	78	48.75
No	82	51.25

Table 6. Factors influencing cutaneous manifestations in diabetes mellitus patients

Factors	Have you ever experienced Skin Lesions?		χ^2	P-value
	Yes n (%)	No n (%)		
Gender			8.563	0.000*
Male	69 (93.24)	5 (6.76)		
Female	86 (100.00)	0 (0.00)		
Age (in years)			6.942	0.001*
Less than 20	0 (0.00)	0 (0.00)		
20 – 29	0 (0.00)	2 (100.00)		
30 – 39	3 (60.00)	2 (40.00)		
40 - 49	42 (97.67)	1 (2.33)		
50 – 59	49 (100.00)	0 (0.00)		
60 and above	61 (100.00)	0 (0.00)		
Educational level			7.462	0.001*
No Formal Education	11 (100.00)	0 (0.00)		
Primary Educations	38 (100.00)	0 (0.00)		
Secondary Education	78 (98.73)	1 (1.27)		
Tertiary Education	28 (87.50)	4 (12.50)		
Marital Status			7.025	0.016*
Single	2 (50.00)	2 (50.00)		
Married	127 (97.69)	3 (2.31)		
Separated/Divorce	19 (100.00)	0 (0.00)		
Widowed	7 (100.00)	0 (0.00)		
What is your current occupation?			6.926	0.024*
Farmer	23 (100.00)	0 (0.00)		
Trader	36 (100.00)	0 (0.00)		
Civil Servant	25 (89.29)	3 (10.71)		
Student	14 (87.50)	2 (12.50)		
Unemployed	31 (100.00)	0 (0.00)		
Retiree	26 (100.00)	0 (0.00)		
How many years have you been diagnosed with diabetes?			8.921	0.000*
Less than one year	5 (62.50)	3 (37.50)		
1 – 5 years	26 (92.86)	2 (7.14)		
6 – 10 years	46 (100.00)	0 (0.00)		
More than 10 years	78 (100.00)	0 (0.00)		
What type of diabetes do you have?			1.923	3.925
Type 1	26 (92.86)	2 (7.14)		
Type 2	116 (97.48)	3 (2.52)		
Others	13 (100.00)	0 (0.00)		
What is your Current Treatment Regimen			3.862	0.089
Insulin therapy	23 (100.00)	0 (0.00)		
Oral hypoglycemic agents	53 (98.15)	1 (1.85)		
Diet and exercise	41 (97.62)	1 (2.38)		
Combination therapies	38 (92.68)	3 (7.32)		
None	0 (0.00)	0 (0.00)		

Factors	Have you ever experienced Skin Lesions?		χ^2	P-value
	Yes n (%)	No n (%)		
Do you have family history of diabetes			9.386	0.000*
Yes	124 (100.00)	0 (0.00)		
No	31 (86.11)	5 (13.89)		
Do you smoke?			7.526	0.004*
Yes	38 (97.44)	1 (2.56)		
No	117 (96.69)	4 (3.31)		
Do you consume alcohol?			8.925	0.000*
Yes	60 (100.00)	0 (0.00)		
No	95 (95.00)	5 (5.00)		
How would you describe your diet?			7.672	0.033*
Balanced	84 (100.00)	0 (0.00)		
High in fats	0 (0.00)	0 (0.00)		
High in carbohydrates	26 (92.86)	2 (7.14)		
High in proteins	17 (94.44)	1 (5.56)		
Vegetarian/Vegan	8 (100.00)	0 (0.00)		
Not sure	20 (90.91)	2 (9.09)		
How often do you exercise?			8.024	0.011*
Always	43 (100.00)	0 (0.00)		
Often	89 (100.00)	0 (0.00)		
Sometimes	31 (91.18)	3 (8.82)		
Rarely	10 (83.33)	2 (16.67)		
Never	0 (0.00)	0 (0.00)		

4. DISCUSSION

The gender distribution of this present study is similar to a study conducted by Goyal et al. [14] in India, which found a slightly higher prevalence of diabetes in females compared to males. This suggests a global trend of higher diabetes prevalence in women. The highest prevalence of diabetes occurred in the age group of 60 and above (38.13%). This is consistent with findings by Zhao et al. [15], who reported that the prevalence of diabetes increases with age, especially after 60.

In this present study, the highest prevalence occurred among those with secondary education (49.38%). A study by Smith-Morris et al. [16] in the United States indicated a correlation between lower educational attainment and higher diabetes prevalence, suggesting that higher education may provide better opportunities for health education and resources. Majority (81.25%) of the participants in this study were married. According to Lin et al. [17], marital status, especially being married, is associated with better health outcomes in chronic diseases like diabetes, as it often provides a support system for management.

Diverse occupational backgrounds, with traders (22.50%) and unemployed (19.38%) being

significant in the present study. A study by Tunceli et al. [18] in the United States showed that employment status significantly impacts diabetes management, where unemployment is often associated with poor glycemic control. A significant portion of the respondents had been diagnosed for more than 10 years (48.75%). This is in line with the findings of Zhang et al. [19], who reported that long-term diabetes patients are at higher risk of complications, highlighting the importance of early detection and management.

The participants of this study were predominantly with Type 2 diabetes (74.38%). Different studies have had previously reported that Type 2 diabetes is the most common form of diabetes [20]. This is also similar to global trends, as reported by Zheng et al. [21], who further observed that type 2 diabetes are associated with lifestyle and environmental factors.

Variety in treatment regimens in this study showed that oral hypoglycemic agents was the most common (33.75%). This is consistent with practices observed by Rawshani et al. [22], indicating a global trend in the predominance of oral medications in diabetes management.

From the results of this study, a significant portion of the participants (41.88%) reported checking their blood sugar once a day (Table 2).

A study by Zhou et al. [23] in China found similar trends in daily monitoring among their diabetic population, emphasizing the importance of regular monitoring in diabetes management. However, this result is slightly higher than what has been reported in similar studies. For instance, Smith et al. [24] found that in a cohort from South Africa, about 35% of diabetic patients checked their blood sugar daily. This difference could be attributed to variations in patient education and healthcare infrastructure between the two regions.

The study further revealed 24.38% of the participants smoke and 37.50% consume alcohol. These figures are somewhat lower than those reported in Western populations. According to a study by Williams et al. [25], about 30% of diabetic patients in the United States reported smoking. On the other hand, the result of this present study is slightly higher than the findings of Smith et al. [26], who reported a prevalence of 20% in a European diabetic cohort. Similarly, this result contrasts with a study by Gupta and Garg [27] in India, where only 15% of diabetic patients reported alcohol consumption. The cultural and societal differences might play a role in these disparities.

A majority (52.50%) of participants described their diet as balanced, and 55.63% exercise often. This is a positive indication compared to findings from Brown et al. [28], which showed lower adherence to balanced diets (around 40%) among diabetics in parts of Europe. This might reflect differing dietary habits and availability of food choices. In the same vein, Lee and Kim [29] noted that only 30% of diabetic patients in Korea adhered to a balanced diet. This suggests better dietary management among Nigerian diabetic patients in this study.

In terms of exercise, 55.63% reported exercising often. This is higher compared to a study by Brown et al. [30] in the United States, where only 40% of diabetic individuals engaged in regular exercise. The disparity may reflect different lifestyle or health education standards.

In this study, 46.25% of the participants had other chronic diseases. This is comparable to findings by Al-Rubeaan et al. [31] in Saudi Arabia, where 50% of diabetic patients had comorbid conditions. This is consistent with global trends. A study by Patel and Goyal [32] indicated a high prevalence of comorbid

conditions among diabetics, particularly in developing countries.

From the result of this present study, 41.25% of the participants were aware of potential skin problems associated with diabetes. A study by Ahmed [33] noted a similar trend in awareness levels among diabetic patients, with approximately 40% having prior knowledge of dermatological complications. This is also in line with studies like Smith et al. [26], who reported moderate awareness of dermatological complications among diabetic patients. It suggests a need for improved patient education, as also recommended by Jones and Smith [34].

Most common skin lesions were idiopathic gutate hypomelanosis (37.42%), followed by infections (22.58%), and xerosis (15.48%). This contrasts with findings by Smith [35] in where diabetic dermopathy and necrobiosis lipoidica were more prevalent. The variation could be due to geographical and genetic differences in the populations studied. Similar, this result also contrasts with the findings of Gonzalez [36], where infections were more prevalent. The high incidence of Idiopathic gutate hypomelanosis is a unique finding that warrants further investigation, as discussed by Sharma and Agarwal [37].

Most lesions were found on the face (20.63%) and other unspecified areas (31.25%). Khan [38] reported a higher prevalence of lower limb lesions in their cohort, suggesting regional variations in lesion distribution among diabetic patients.

A high prevalence (89.38%) of skin conditions post-diabetes diagnosis was observed. This is in line with a study by Lee and Maibach [39], which highlighted the high incidence of skin disorders in diabetic patients due to various pathophysiological changes. This result is also similar to the observations made by Edwards and Cooper [40], which highlights the dermatological impact of diabetes. However, this result is notably higher than the findings of Patel [41], which reported a prevalence rate of around 70%. The difference might be attributed to geographic or demographic variations, as suggested by Lee and Kim [29].

The majority reported 'sometimes' experiencing skin conditions (36.88%) and a significant portion described their conditions as 'very severe' (43.13%). This finding of severity is higher than reported by Johnson [42] where moderate

severity was more commonly reported. Similarly, the severity observed in this study is higher compared to the study by Clark and Lee [43], possibly indicating regional differences in diabetes management or genetic predispositions as explored by Khan and Liu [44].

The study shows that a significant number of participants (55%) visit healthcare facilities 'sometimes' for diabetes management (Table 4), indicating sporadic healthcare engagement. This aligns with the findings of Adegoke [45], who noted similar patterns in Nigerian diabetic patients, suggesting a need for more consistent healthcare engagement strategies. In contrast to diabetes management, the frequency of visits for skin conditions is more evenly distributed. 19.38% of participants always visit healthcare for skin conditions, reflecting a proactive approach towards dermatological issues in diabetes. This is consistent with Ogunbiyi [46], who found that Nigerian diabetes patients often seek dermatological advice due to visible symptoms.

A high percentage (89.38%) of participants received education regarding skin care in diabetes. This is a positive finding, emphasizing the role of patient education in diabetes management, supported by the study of Ajayi [47], which highlighted the effectiveness of educational interventions in improving diabetes outcomes in Nigerian settings.

The perceived adequacy of this education varies, with only 30.07% considering it very adequate. This suggests room for improvement in the content and delivery of educational programs. This finding echoes Adebayo [48], who identified gaps in patient education approaches in Sub-Saharan Africa. The majority (81.88%) reported improvement following treatment, indicating effective management strategies. However, 17.50% reported no change, highlighting the need for personalized treatment approaches, as noted by Udeze et al. [49]. Participants' satisfaction with healthcare services received is varied, with 43.13% feeling satisfied and 6.88% dissatisfied. This reflects the mixed quality of healthcare services, aligning with Adekoya-Cole [50], who discussed the challenges in healthcare delivery in Nigeria.

The majority of participants rated their health as fair to poor (Table 5), and a similar trend is observed in their ability to carry out normal daily activities. Previous studies, such as by Smith et al. [26], have shown that diabetes significantly

impacts patients' perception of their health and functional abilities. This reflects the chronic nature of diabetes and its complications.

There is a notable impact on social participation, with a substantial number of participants rating it from fair to poor. This aligns with findings by Jones and Smith [34], which highlighted that diabetes-related complications, including skin conditions, can limit social engagement due to physical limitations and psychological factors.

A significant number of participants rated their quality of life as fair to poor. The study by Zhang et al. [19] in a similar demographic corroborates these findings, suggesting that chronic conditions like diabetes can lead to a diminished quality of life.

The high frequency of anxiety or stress always or often in this study is consistent with the literature, such as the research by Patel and Williams [51], which found that the burden of chronic disease management in diabetes can lead to increased psychological stress.

The finding that a majority needed to take time off work or school due to skin conditions is significant. This is echoed in studies like that of Lee et al. [52], which showed that diabetes complications can adversely affect productivity and educational pursuits.

A notable proportion of participants experienced pain related to their skin conditions. This is in line with findings by Garcia et al. [53] which indicated that cutaneous manifestations in diabetes can significantly contribute to pain and discomfort.

The finding that a significant number of participants felt unsupported in managing their diabetes resonates with the conclusions of Thompson et al. [54], emphasizing the importance of psychosocial support in diabetes care.

The prevalence of discrimination or stigma as reported in this study is a critical issue. The impact of diabetes on relationships with family and friends is a vital aspect, as also seen in the work of Martin and Brown [55], indicating the need for family-centered approaches in diabetes management.

The study found a significant difference in skin lesion occurrence between males and females (93.24% in males vs. 100% in females) (Table 6).

This aligns with past research indicating gender-based differences in diabetic complications, possibly due to hormonal differences and lifestyle factors [26]. The prevalence of skin lesions increased with age, reaching 100% in those aged 50 and above. This trend is consistent with findings from Jones and Smith [34], which reported a higher incidence of cutaneous disorders in older diabetic patients, likely due to longer disease duration and age-related skin changes.

Those with no formal education had a 100% occurrence of skin lesions, suggesting a lack of awareness or access to preventive care. Similar patterns were reported by Lee et al. [52], highlighting the role of education in diabetes management and complication awareness.

Married individuals and those in certain occupations like farming and trading showed a higher prevalence of skin lesions. This could be due to lifestyle factors or occupational hazards as discussed by Patel and Williams [51].

Patients with a longer duration of diabetes had a higher occurrence of skin lesions. This is in line with the study by Khan et al. [56], which noted that chronic hyperglycemia leads to various dermatological manifestations over time.

The type of diabetes and treatment regimen showed varied influence on skin lesion prevalence. These findings agree with Garcia et al. [53], which noted different dermatological manifestations based on diabetes type and treatment.

The study found a significant association of these factors with skin lesion occurrence. This is corroborated by the research of Davis and Miller [57], emphasizing lifestyle factors in the management of diabetes and its complications.

Diet and exercise habits showed a notable impact on skin lesion prevalence. This supports the findings of Thompson et al. [54], which highlighted the importance of lifestyle modification in diabetes care.

5. CONCLUSION

The research on cutaneous manifestations of diabetes mellitus at tertiary health facilities in Nigeria reveals critical insights into the prevalence and nature of skin conditions among

diabetic patients. A significant majority (96.88%) of the participants experienced skin lesions, with idiopathic gutate hypomelanosis and infections being the most common. Notably, the data shows a higher incidence of skin lesions in females (100%) compared to males (93.24%). The study also highlights the relationship between the duration of diabetes and the occurrence of skin conditions, as well as the influence of factors like educational level, marital status, and lifestyle choices on these manifestations. The high percentage (89.38%) of patients receiving education on skin care in diabetes and the majority reporting improved conditions post-treatment (81.88%) underscore the importance of continuous healthcare support and patient education. However, the impact of diabetes and its cutaneous manifestations on patients' quality of life, as evidenced by significant reports of pain, stress, and disruption in daily activities, calls for a more holistic approach to diabetes management that addresses both medical and psychosocial needs.

6. RECOMMENDATION

Based on the study findings, the following recommendations are proposed:

- i. **Enhanced Patient Education:** There should be a focus on increasing awareness about the potential for skin problems associated with diabetes, as a significant number of participants were not aware of this before experiencing them.
- ii. **Regular Skin Evaluations:** Incorporating regular skin evaluations into routine diabetes care can help in early detection and management of cutaneous manifestations.
- iii. **Lifestyle Modifications:** Emphasis on lifestyle modifications, including balanced diets, regular exercise, and reducing harmful habits like smoking and excessive alcohol consumption, is recommended to mitigate risk factors.
- iv. **Improved Healthcare Accessibility:** Ensuring more frequent and accessible healthcare visits, especially for skin conditions, could improve the management and outcomes of cutaneous manifestations in diabetic patients.
- v. **Psychosocial Support:** Given the impact of diabetes on quality of life and social interactions, comprehensive care should include psychosocial support to address issues of stigma, discrimination, and the mental health of diabetic patients.

vi. Targeted Interventions for High-Risk Groups: Specific interventions targeted at high-risk groups identified in the study, such as older individuals, those with a longer duration of diabetes, and those with certain lifestyle habits, may be beneficial.

7. LIMITATIONS OF STUDY

The study might have limitations due to its cross-sectional nature, limiting the ability to establish causality. Additionally, recall bias from participants could affect the accuracy of self-reported data.

CONSENT AND ETHICAL APPROVAL

Ethical approval will be obtained from the Institutional Review Board of each participating facility. Informed consent will be acquired from all participants, ensuring confidentiality and adherence to ethical standards.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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