

Cutaneous Manifestations of Diabetes Mellitus in a Tertiary Care Hospital in Eastern India: A Cross-sectional Study

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Abstract

Background: Diabetes mellitus is a chronic metabolic disorder and is a major public health problem worldwide. Skin diseases can appear as the first sign of diabetes or can develop at any time in the course of the illness. **Purpose:** This study aimed to determine the pattern and prevalence of skin manifestations in patients with diabetes mellitus. **Methods:** An observational cross-sectional study was done on 80 Type 1 and Type 2 diagnosed diabetes mellitus patients and with informed consent, they were thoroughly examined for their respective skin disorders. **Results:** Among 80 patients, 35% of patients had infectious skin lesions, whereas 20% had noninfectious dermatosis only. More than one type of dermatosis was seen in 45% of patients. Candidal balanoposthitis was the most common fungal infection. **Limitation:** Limited sample in a single center. **Conclusion:** Infections were more prevalent compared to noninfectious disease in a population with uncontrolled diabetes mellitus. Pruritus was the most common disorder among the other diabetic complications.

Keywords: Cutaneous infection, diabetes mellitus, glycosylated hemoglobin

INTRODUCTION

Diabetes mellitus, a chronic metabolic disorder characterized by elevated fasting and postprandial blood glucose levels, has become one of the major public health problems all over the world. The skin is affected both by acute metabolic derangements and chronic degenerative complications of diabetes and can manifest anytime in the course of illness.^[1] It has been seen, that the overall prevalence of skin disorders in both types of diabetes mellitus varies from 51% to 97% in different regions worldwide.^[2] Some cutaneous manifestations can have a direct correlation with diabetic control and duration and thus can be of prognostic significance.^[3] Diabetes mellitus is a metabolic disease and with passing years, there has been increase in the prevalence of skin disorders too in this population, mainly among the uncontrolled diabetics which ultimately have a negative effect on quality of life of such patients. Thus, a study of dermatological manifestations in diabetics may enlighten us with the various commonly associated skin disorders with diabetes and thereby helping in early diagnosis and proper management of these disorders in the diabetic population.

METHODS

A total of 80 patients diagnosed with Type 1 and Type 2 diabetes mellitus attending the Dermatology and Endocrinology Department, Nilratan Sircar Medical College and Hospital, Kolkata, from March 2020 to February 2021 were enrolled. With their informed consent, a detailed history was taken regarding the duration of diabetes, type, and duration of treatment. Necessary hematological investigations were done. Detailed dermatological examination involving inspection and palpation was done. Relevant microbiological and histopathological investigations were done as and whenever needed to confirm the diagnosis of lesions. The exclusion criteria were as follows: gestational diabetes mellitus, hyperglycemia due to steroid intake, known case of internal malignancy, impaired glucose tolerance, and diagnosed HIV patient.

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Received: 14 September 2023, **Revised:** 04 December 2023,

Accepted: 11 December 2023, **Published:** 02 July 2024

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How to cite this article: Barman S, Achar A, Sengupta N, Chowdhury J, Bhakta A. Cutaneous manifestations of diabetes mellitus in a tertiary care hospital in Eastern India: A cross-sectional study. *J Dermatol Dermatol Surg* 2024;28:29-32.

Access this article online

Quick Response Code:



Website:
www.jddsjournal.org

DOI:
10.4103/jdds.jdds_47_23

Statistical analysis

The statistical software Medcalc was used for the analysis. The Pearson's Chi-square test is used to find the significant relation wherever required. An alpha level of 5% has been taken, i.e. if any $P < 0.05$ it has been considered statistically significant.

RESULTS

The mean age of the study population was 53 ± 11 years with a range from 31 to 84 years. The study population comprised 42 males and 38 females, with the ratio of male-to-female approximately 1:1. About 37% of the diabetic patients had a family history of diabetes mellitus. It was observed that the majority (58%) of the study population had a history of hypertension, followed by dyslipidemia (30%). The mean body weight was 30 ± 3 . About half (53%) of the study population were in the category of obesity Type 1. The mean duration of diabetes mellitus was 4.1 ± 3 years. The majority of our study population (81%) was on oral hypoglycemic agents, whereas only 6% were on insulin therapy. Infections were the most common dermatosis among the study population and were positively associated with glycosylated hemoglobin levels ($P = 0.02$). Fungal infection was the most common among all the infections in our study. About 77% of the study sample was affected. It was followed by bacterial infection (25%) and viral infection (5%). Candidal balanoposthitis was the most common fungal infection. Fungal infection was seen to be more common with uncontrolled diabetes mellitus overall than the controlled diabetic patients. Five patients had diabetic foot ulcers, and it was most prevalent in uncontrolled diabetes mellitus; four of the five were hypertensive. Overall, pruritus was the most common dermatosis under noninfectious category, followed by skin tags and acanthosis nigricans.

DISCUSSION

Diabetes mellitus is the most common endocrine disorder with a significant burden on the patients, health-care system, and the society. Diabetes mellitus is seen to affect 8.3% of the population, among which 80% population get affected one or more type of skin disorder.^[4-6] In our study, more than one type of dermatosis was seen in 45% of patients. Cutaneous manifestations were grouped under infectious and noninfectious dermatoses. Among 80 patients, infectious skin lesion was found in 35% of patients, whereas 20% of them had noninfectious dermatosis only. In a study done by Baloch *et al.*^[7] among 90 patients, infectious skin lesion was found in 65 patients and noninfectious in 25 patients, whereas studies were done by Chatterjee *et al.*, Nigam *et al.*, recorded 40.9%, and 26.5% diabetic patients with infection, respectively.^[8-9] Diabetes patients are susceptible to infections, probably due to hyperglycemia and defects in polymorphonuclear leukocyte function. Infections were the most common dermatosis among the study population which had a statistically significant association with glycosylated hemoglobin levels [Table 1]. That means, infections are more common in uncontrolled

diabetes mellitus patients ($P = 0.02$). Fungal infection was the most common among all the infections in our study and about 77% of the study sample was seen to be affected. It was followed by bacterial infection (25%) and viral infection (5%). Raghu *et al.*, Rangunatha *et al.*, and Goyal *et al.* showed that fungal infections were the most common which was similar to this study.^[10-12] Candidal balanoposthitis was the most common fungal infection among others [Figure 1]. Out of 42 male patients, about 19 were affected with candidal balanitis. Out of 19, 16 of them had uncontrolled diabetes mellitus with hemoglobin A1c $> 7\%$. Bacterial infections such as recurrent furuncles and carbuncles were mainly noticed in those with poor glycemic control. Fungal infections were seen to be more common with uncontrolled diabetes mellitus overall than the controlled diabetic patients. Thus, emphasizing the point that better control of the disease might inhibit these types of dermatological manifestations.

Table 1: Relationship between bacterial and fungal infection with glycemic index

	<7%	>7%
Fungal infection		
Candidal balanoposthitis	2	17
Candidal vulvovaginitis	1	6
Intertrigo	1	5
Onychomycosis	0	4
Pityriasis versicolor	0	5
Dermatophytosis	3	15
Both dermatophytosis and candidiasis	1	2
Bacterial infection		
Recurrent furunculosis	1	7
Folliculitis	0	2
Carbuncles	0	4
Cellulitis	0	2
Erythrasma	0	1
Erysipelas	0	1
Pitted keratolysis	0	1
Paronychia	1	1



Figure 1: Candidal balanoposthitis



Figure 2: Psoriasis



Figure 3: Skin tags



Figure 4: Diabetic foot ulcer

Noninfective skin lesions were seen in 20% of cases. A study done by Baloch *et al.*^[7] showed about 28% were affected with noninfectious dermatoses. Overall, pruritus was the most common dermatosis under noninfectious

Table 2: Cutaneous manifestations of study subjects

Types of diseases	Frequency (%)
Candidal balanoposthitis	19 (24)
Candidal vulvovaginitis	7 (9)
Intertrigo	6 (7)
Onychomycosis	4 (5)
Pityriasisversicolor	5 (6)
Dermatophytosis	18 (22)
Recurrent furunculosis	8 (10)
Folliculitis	2 (2)
Carbuncles	4 (5)
Cellulitis	2 (3)
Erythrasma	1 (1)
Erysipelas	1 (1)
Pitted keratolysis	1 (1)
Paronychia	2 (3)
Herpes simplex	3 (4)
Herpes zoster	2 (2)
Acanthosis nigricans	8 (10)
Skin tags	10 (12)
Xanthelasma	1 (1)
Eruptive xanthoma	1 (1)
Diabetic foot ulcer	5 (6)
Diabetic dermopathy	1 (1)
Granuloma annulare	2 (2)
Lichen planus	6 (7)
Psoriasis	4 (5)
Pruritus	13 (16)
Xerosis	6 (7)
Necrobiosis lipoidica	1 (1)
Allergic contact dermatitis	1 (1)
Keloid	3 (4)
Acquired ichthyosis	2 (3)

category, followed by skin tags and acanthosis nigricans. Similar results were seen in studies by Baloch *et al.* where pruritus (46.7%), skin tags (21.1%), and acanthosis nigricans (16.7%) were the most common dermatoses, whereas another similar study, found 19% of patients with acanthosis nigricans which were more or less similar to our findings.^[7,13] Among the miscellaneous group of diseases, pruritus (16%) was the most common complaint among others; followed by xerosis (7%), lichen planus (7%), psoriasis (5%) [Figure 2], keloid (4%), granuloma annulare (2%), acquired ichthyosis (3%), necrobiosis lipoidica (1%), and allergic contact dermatitis (1%). Out of 13 patients with complaints of pruritus, about 70% of them had uncontrolled diabetes mellitus. A study done by Bhat *et al.* and Chatterjee *et al.* had 12% and 50% of the study sample with complaints of pruritus, respectively.^[8,14]

Among noninfectious dermatosis, obesity and hyperlipidemia-related skin diseases were seen in about 25% of the study population. The most common manifestation was skin tag (12%) [Figure 3] followed by acanthosis nigricans (10%), xanthelasma (1%), and eruptive xanthoma (1%). It was observed that most of the preobese patients had obesity and

hyperlipidemia-related skin disorders in comparison to other patients in other body mass index ranges.

Diabetic foot ulcer [Figure 4] was found in 5 (6%) cases and it was most prevalent in uncontrolled diabetes mellitus, but the association was not statistically significant. Most of the diabetic ulcers were Grade 2 ulcers according to the Wagner Classification. Another significant finding was, out of five patients of diabetic foot ulcer, four of them were hypertensive. The relationship between hypertension and diabetes was explained by a group of scholars, where it was hypothesized that hypertension was found to accelerate the process of microangiopathy among diabetics and thus it proves our findings.^[15]

The present study showed about four patients affected with psoriasis (5%) which signifies psoriasis to be associated with metabolic syndrome. In our study, necrobiosis lipoidica was present in only 1%, a manifestation significantly associated with diabetes mellitus. Dermatoses that are less commonly associated with diabetes according to previous studies, such as keloid and acquired ichthyosis were observed in our study. In our study, there were no dermatological complications due to insulin therapy, as most of our study population was noncompliant as well as unaware of the disease. The varied skin manifestations along with its frequency seen in our study population are given in Table 2.

CONCLUSION

Clinical dermatological lesions are quite common in patients with diabetes mellitus, more in uncontrolled diabetic patients, which may have a negative effect on the quality of life of patients as well as have far-reaching health implications with some of them. Thus, early diagnosis and proper management of dermatological comorbidities, both infectious and noninfectious in diabetic patients is highly warranted by the treating physician at times in conjunction with dermatologists, wherever appropriate.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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