



Original Article

Clinicodermatological and Histopathological Spectrum of Cutaneous Manifestations in Patients with Diabetes Mellitus Presenting to A Tertiary Care Hospital In Western India

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ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder commonly associated with a wide range of cutaneous manifestations, which may serve as early indicators of the disease and reflect glycemic control.

Aim: To study the clinicodermatological and histopathological spectrum of cutaneous manifestations in patients with diabetes mellitus.

Materials and Methods: This hospital-based cross-sectional study was conducted over a period of 6 months (1st February 2025 to 31st July 2025) at a tertiary care centre in Western India. A total of 250 patients with diabetes mellitus presenting with cutaneous manifestations were included. Detailed clinical evaluation, relevant laboratory investigations including HbA1c, and histopathological examination in selected cases were performed. Data were analysed using descriptive statistics.

Results: The majority of patients were in the 46–60 years age group with a male predominance. Type 2 diabetes mellitus constituted 92% of cases. Most patients had poor glycemic control (76%). Infectious dermatoses (60%) were more common than non-infectious dermatoses (40%), with fungal infections being the most prevalent. Among non-infectious conditions, diabetic dermopathy and acanthosis nigricans were the most frequent. A significant association was observed between poor glycemic control and increased frequency of infections. Histopathological findings showed high concordance with clinical diagnosis.

Conclusion: Cutaneous manifestations are common in diabetes mellitus and are strongly associated with poor glycemic control. Early recognition and management of these conditions, along with strict glycemic control, are essential for improving patient outcomes.

Keywords: Diabetes mellitus, cutaneous manifestations, fungal infections, diabetic dermopathy, histopathology, glycemic control.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It is one of the most significant global health problems, with a rapidly increasing prevalence, particularly in developing countries such as India [1]. The disease is associated with multiple systemic complications affecting various organs, including the skin.

Cutaneous manifestations are frequently encountered in patients with diabetes mellitus and may be among the earliest indicators of the disease. It has been reported that approximately 30–70% of diabetic patients develop skin manifestations during the course of their illness [2]. These manifestations can be broadly classified into infectious and non-infectious dermatoses and may reflect the severity and duration of diabetes.

Infectious dermatoses are more common in diabetic patients due to impaired immune response, microangiopathy, and a hyperglycemic environment that promotes microbial growth. Fungal infections, particularly dermatophytosis and candidiasis, are the most frequently observed, followed by bacterial and viral infections [3]. Non-infectious manifestations include diabetic dermopathy, acanthosis nigricans, necrobiosis lipoidica, pruritus, and xerosis, which are related to metabolic and vascular alterations [4].

The pathogenesis of these cutaneous manifestations is multifactorial and involves microvascular damage, neuropathy, immune dysfunction, and alterations in collagen metabolism. Poor glycemic control has been shown to significantly increase the risk and severity of dermatological conditions in diabetic patients [5].

Histopathological examination plays an important role in confirming dermatological diagnoses, especially in atypical or overlapping presentations. Clinicopathological correlation improves diagnostic accuracy and provides insights into disease mechanisms [6].

Several studies have also demonstrated that skin manifestations in diabetes may be associated with systemic complications, thus acting as markers of disease severity [7]. However, there is limited comprehensive data from tertiary care centres in Western India evaluating both clinical and histopathological aspects. Hence, the present study was undertaken to assess the clinicodermatological and histopathological spectrum of cutaneous manifestations in patients with diabetes mellitus.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based, observational cross-sectional study conducted in the Department of Dermatology at the National Institute of Medical Sciences, Jaipur, Rajasthan, a tertiary care centre catering to patients from urban and rural areas of Western India.

Study Duration

The study was carried out over a period of 6 months, from 1st February 2025 to 31st July 2025.

Study Population

The study included 250 patients diagnosed with diabetes mellitus who presented with cutaneous manifestations to the Dermatology Outpatient Department (OPD) and Inpatient Department (IPD) during the study period.

Inclusion Criteria

- Patients aged ≥ 18 years diagnosed with diabetes mellitus (Type 1 or Type 2)
- Patients presenting with one or more cutaneous manifestations
- Patients willing to participate and provide informed consent

Exclusion Criteria

- Patients with cutaneous manifestations not related to diabetes mellitus
- Patients on immunosuppressive therapy or with known immunodeficiency disorders
- Patients unwilling to give consent

Data Collection

A detailed history was obtained from all patients, including:

- Demographic details (age, sex)
- Duration and type of diabetes mellitus
- Treatment history (oral hypoglycemic agents/insulin)
- History of associated systemic illnesses

A thorough general physical examination and detailed dermatological examination were performed. All cutaneous findings were recorded and classified into:

- Infectious dermatoses (bacterial, fungal, viral)
- Non-infectious dermatoses (e.g., diabetic dermopathy, acanthosis nigricans, necrobiosis lipoidica, etc.)

Laboratory Investigations

Relevant laboratory investigations were performed, including:

- Fasting blood sugar (FBS)
- Postprandial blood sugar (PPBS)

- Glycated hemoglobin (HbA1c)
- Other investigations as required

Histopathological Examination

Skin biopsies were performed in selected cases where clinical diagnosis was uncertain or required confirmation. Specimens were processed and examined under light microscopy using standard staining techniques (Hematoxylin and Eosin stain). Histopathological findings were correlated with clinical diagnosis.

Outcome Measures

- Spectrum of cutaneous manifestations in diabetic patients
- Correlation between clinical and histopathological findings
- Association of skin manifestations with duration and control of diabetes

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of National Institute of Medical Sciences. Written informed consent was obtained from all participants prior to inclusion in the study.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using appropriate statistical software. Descriptive statistics such as mean, standard deviation, frequencies, and percentages were used. Chi-square test was applied to assess associations between categorical variables. A p-value of <0.05 was considered statistically significant.

RESULTS AND OBSERVATIONS

A total of 250 patients with diabetes mellitus presenting with cutaneous manifestations were included in the study.

Table 1: Age Distribution of Patients (n = 250)

Age Group (years)	Number of Patients (n)	Percentage (%)
18–30	30	12%
31–45	70	28%
46–60	95	38%
>60	55	22%
Total	250	100%

Majority of patients (38%) were in the 46–60 years age group.

Table 2: Gender Distribution

Gender	Number (n)	Percentage (%)
Male	140	56%
Female	110	44%
Total	250	100%

The majority of males predominance was observed.

Table 3: Type of Diabetes Mellitus

Type of Diabetes	Number (n)	Percentage (%)
Type 1 DM	20	8%
Type 2 DM	230	92%
Total	250	100%

Majority (92%) had Type 2 diabetes mellitus.

Table 4: Duration of Diabetes

Duration	Number (n)	Percentage (%)
<5 years	80	32%
5–10 years	95	38%
>10 years	75	30%
Total	250	100%

Most patients had diabetes duration of 5–10 years.

Table 5: Glycemic Control (HbA1c Levels)

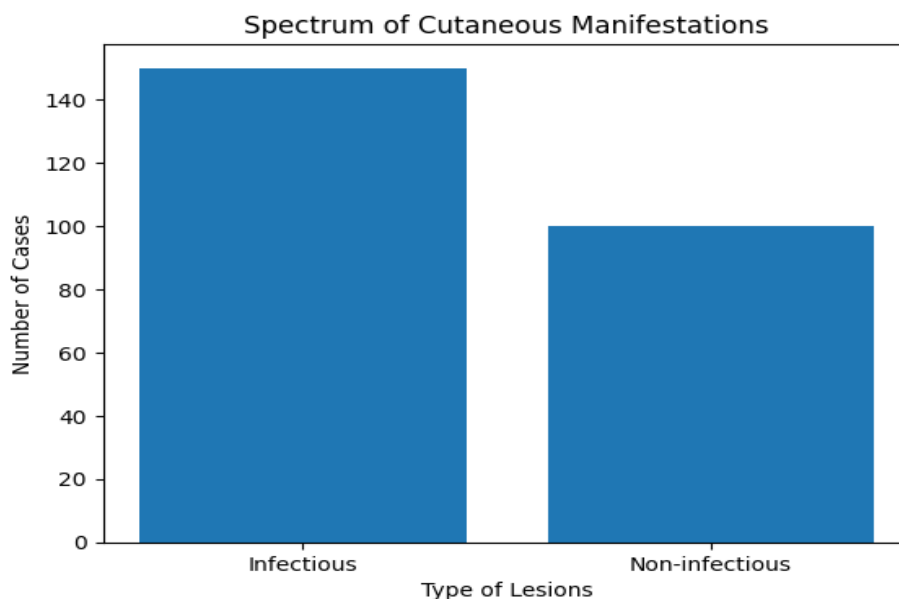
HbA1c Level	Number (n)	Percentage (%)
<7% (Controlled)	60	24%
≥7% (Uncontrolled)	190	76%
Total	250	100%

Majority (76%) had uncontrolled diabetes.

Table 6: Spectrum of Cutaneous Manifestations

Type of Lesions	Number (n)	Percentage (%)
Infectious	150	60%
Non-infectious	100	40%
Total	250	100%

Infectious dermatoses were more common than non-infectious.

**Figure: Spectrum of Cutaneous Manifestations****Table 7: Types of Infectious Dermatoses (n = 150)**

Infection Type	Number (n)	Percentage (%)
Fungal	90	60%
Bacterial	40	26.7%
Viral	20	13.3%
Total	150	100%

Fungal infections were the most common.

Table 8: Types of Non-Infectious Dermatoses (n = 100)

Condition	Number (n)	Percentage (%)
Diabetic dermopathy	30	30%
Acanthosis nigricans	25	25%
Pruritus	15	15%
Xerosis	10	10%
Necrobiosis lipoidica	5	5%
Others	15	15%
Total	100	100%

Diabetic dermopathy was the most common non-infectious manifestation.

Table 9: Histopathological Correlation (Biopsied Cases)

Correlation	Number (n)	Percentage (%)
Consistent with clinical diagnosis	45	90%
Inconsistent	5	10%
Total	50	100%

High concordance (90%) between clinical and histopathological diagnosis.

Table 10: Association of Cutaneous Manifestations with Glycemic Control

Glycemic Status	Infectious (n)	Non-Infectious (n)	Total
Controlled	20	40	60
Uncontrolled	130	60	190
Total	150	100	250

Infectious dermatoses were significantly more common in patients with uncontrolled diabetes.

DISCUSSION

Diabetes mellitus is associated with a broad spectrum of cutaneous manifestations resulting from complex metabolic, vascular, and immunological disturbances. In the present study, 250 diabetic patients with skin manifestations were evaluated to analyze their clinicodermatological and histopathological profile.

The majority of patients in this study were in the 46–60 years age group, which is consistent with the higher prevalence of Type 2 diabetes mellitus in middle-aged individuals. A male predominance was observed, similar to findings reported in previous studies [2,5], possibly due to differences in healthcare-seeking behavior and environmental exposure.

Type 2 diabetes mellitus constituted the majority of cases (92%), which aligns with global epidemiological data [1]. Most patients had a disease duration of 5–10 years, suggesting that cutaneous manifestations tend to increase with the chronicity of diabetes.

Poor glycemic control (HbA1c $\geq 7\%$) was observed in the majority of patients, highlighting its significant role in the development of skin manifestations. Previous studies have demonstrated that uncontrolled diabetes predisposes individuals to various dermatological conditions [5,8]. Hyperglycemia impairs neutrophil function, alters cellular immunity, and facilitates microbial growth, thereby increasing susceptibility to infections.

Infectious dermatoses were more common than non-infectious dermatoses in this study, which is consistent with earlier reports [3,8]. Among infections, fungal infections were the most prevalent, followed by bacterial and viral infections. This predominance of fungal infections has been widely documented in diabetic populations [3,9].

Among non-infectious dermatoses, diabetic dermopathy was the most common manifestation, followed by acanthosis nigricans. Diabetic dermopathy is considered a marker of microangiopathy, whereas acanthosis nigricans reflects insulin resistance. Similar findings have been reported in previous studies [4,6,10].

A significant association was observed between poor glycemic control and infectious dermatoses, with patients having uncontrolled diabetes showing a higher frequency of infections. This finding supports previous studies highlighting the role of hyperglycemia in compromising host defence mechanisms [5,11].

Histopathological examination showed a high concordance with clinical diagnosis, emphasising its importance in confirming dermatological conditions, especially in atypical cases. Similar observations have been reported in earlier studies [6,11].

Furthermore, cutaneous manifestations in diabetes have been shown to correlate with systemic complications, including microvascular and macrovascular changes, thereby serving as clinical indicators of disease severity [7,12].

Overall, the findings of this study emphasise that cutaneous manifestations are common in diabetic patients and can serve as valuable indicators of metabolic control and systemic involvement. Early recognition and appropriate management of these conditions can improve patient outcomes and quality of life.

CONCLUSION

Cutaneous manifestations are common in diabetes mellitus, with infectious dermatoses—especially fungal infections—being the most frequent. Non-infectious conditions like diabetic dermopathy and acanthosis nigricans are also significant indicators of underlying metabolic changes. Poor glycemic control is strongly associated with increased skin

involvement. Early recognition and appropriate management, along with good glycemic control, are essential to reduce morbidity and improve patient outcomes.

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