



Original Article

Dermatoses In Diabetic Patients: A Clinical And Histopathological Correlation

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OPEN ACCESS

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Received: 01-09-2025

Accepted: 19-10-2025

Available online: 08-11-2025

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Medical and Pharmaceutical Research

ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder frequently associated with a wide range of cutaneous manifestations. Skin lesions in diabetic patients may reflect underlying metabolic control and systemic complications.

Aim: To study the clinical patterns of dermatoses in diabetic patients and establish clinicopathological correlation.

Materials and Methods: A hospital-based cross-sectional study was conducted on 90 diabetic patients attending the Dermatology Department at *Mata Gujri Memorial Medical College and LSK Hospital, Kishanganj, Bihar*; from January to December 2024. Detailed clinical evaluation and relevant laboratory investigations were performed. Skin biopsies were taken in 40 selected cases and examined histopathologically. Data were analysed using SPSS version 21.

Results: The majority of patients (32.2%) were aged 51–60 years, with a male predominance (60%). Type 2 diabetes accounted for 86.7% of cases. Poor glycemic control ($HbA1c \geq 9\%$) was found in 42.2% of patients. Infectious dermatoses (35.6%) were most common, followed by diabetic dermopathy (20%) and pruritus/xerosis (11.1%). Among infections, fungal infections were predominant (56.3%). A clinicopathological concordance of 92.5% was observed.

Conclusion: Cutaneous manifestations are frequent in diabetes and correlate with disease duration and glycemic control. Histopathological evaluation is valuable for confirming the diagnosis and understanding the underlying pathology. Regular dermatological assessment should be included in the comprehensive management of diabetic patients.

Keywords: Diabetes mellitus, dermatoses, histopathology, glycemic control, diabetic dermopathy.

INTRODUCTION

Diabetes mellitus (DM) is a chronic, multisystem metabolic disorder characterised by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both [1]. It is one of the most prevalent non-communicable diseases globally and represents a major public health challenge, particularly in developing countries like India, where the number of affected individuals continues to rise rapidly [2,3].

Cutaneous manifestations are among the earliest and most common external indicators of diabetes mellitus and may occur in up to 30–70% of diabetic patients during the course of the disease [4,5]. The skin changes in diabetes may result directly from chronic hyperglycemia or indirectly from associated microangiopathy, neuropathy, infection susceptibility, or metabolic disturbances [6].

A wide spectrum of dermatoses has been documented in diabetic patients, including infectious disorders (bacterial, fungal, and viral), diabetic dermopathy, acanthosis nigricans, necrobiosis lipoidicadiabeticorum, bullous diabeticorum, xerosis, and pruritus [7–9]. Many of these lesions correlate with the degree of glycemic control and duration of diabetes.

Infectious dermatoses are especially frequent due to compromised host defenses, impaired circulation, and delayed wound healing [10].

Histopathological examination serves as a vital adjunct to clinical evaluation. It provides confirmatory evidence, aids in differentiating diabetes-specific dermatoses from unrelated cutaneous disorders, and helps in understanding the underlying pathophysiological mechanisms [11,12].

Hence, the present study was undertaken to analyze the pattern of dermatological manifestations in diabetic patients and to establish a clinicopathological correlation between the observed lesions and histopathological findings, with the goal of improving early diagnosis and management of these patients.

MATERIAL AND METHODS

Study Design and Setting

This was a hospital-based, cross-sectional observational study conducted in the Department of Dermatology, Venereology, and Leprosy in collaboration with the Department of Pathology, Mata Gujri Memorial Medical College and LSK Hospital, Kishanganj, Bihar.

Study Duration

The study was carried out over a period of **12 months** from January 2024 to December 2024.

Sample Size

A total of **90 diabetic patients** presenting with various dermatological manifestations were included in the study.

Inclusion Criteria

- Patients of either sex diagnosed with Type 1 or Type 2 Diabetes Mellitus, confirmed by fasting blood glucose (≥ 126 mg/dl) or HbA1c ($\geq 6.5\%$).
- Patients presenting with any dermatological lesions clinically suggestive of dermatoses associated with diabetes.
- Patients who gave informed written consent for participation and skin biopsy, where indicated.

Exclusion Criteria

- Patients with non-diabetic metabolic disorders (e.g., thyroid dysfunction, Cushing's syndrome).
- Patients on immunosuppressive therapy or with HIV infection.
- Patients unwilling to participate or undergo a biopsy.

Clinical Evaluation

All patients were subjected to a detailed clinical history and examination, including demographic data (age, sex, duration of diabetes, type of diabetes, treatment regimen, and glycemic control). The dermatological manifestations were recorded with emphasis on:

- Type and site of lesions
- Duration and onset of lesions
- Associated systemic complications (neuropathy, nephropathy, retinopathy, etc.)

Laboratory Investigations

All patients underwent routine and specific investigations, including:

- **Fasting and postprandial blood glucose levels**
- **HbA1c levels**
- **Lipid profile**
- **Renal function tests** (serum urea, creatinine)
- **Urine examination** for sugar and albumin

Histopathological Examination

In selected cases, skin biopsies were performed from representative lesions after obtaining informed consent.

- The biopsy specimens were fixed in 10% neutral buffered formalin, processed, and embedded in paraffin.
- Sections of 4–5 μ m thickness were cut and stained with Hematoxylin and Eosin (H&E) for routine histopathological examination.
- Special stains such as Periodic Acid–Schiff (PAS) were used wherever necessary for demonstration of basement membrane thickening or fungal elements.
- The histopathological findings were correlated with the clinical diagnosis to establish clinico-pathological correlation.

Statistical Analysis

All collected data were tabulated and analysed using **SPSS software version 21**. Descriptive statistics, such as the mean, standard deviation, and percentage, were used for quantitative variables.

The **Chi-square test** and **Student's t-test** were applied wherever appropriate to determine statistical significance. A **p-value < 0.05** was considered statistically significant.

Ethical Considerations

Ethical clearance for the study was obtained from the Institutional Ethics Committee of Mata Gujri Memorial Medical College and LSK Hospital, Kishanganj, Bihar. Informed consent was obtained from all participants before inclusion in the study.

RESULTS AND OBSERVATIONS

A total of **90 diabetic patients** with dermatological manifestations were evaluated clinically and histopathologically. The findings are summarised below.

Table 1: Age and Sex Distribution of Patients (n = 90)

Age Group (years)	Male (n = 54)	Female (n = 36)	Total (%)
<30	4	2	6 (6.7%)
31–40	8	5	13 (14.4%)
41–50	14	10	24 (26.7%)
51–60	17	12	29 (32.2%)
>60	11	7	18 (20.0%)
Total	54 (60%)	36 (40%)	90 (100%)

The majority of patients (32.2%) belonged to the **51–60 years** age group, and males (60%) outnumbered females (40%).

Table 2: Type and Duration of Diabetes Mellitus

Type of Diabetes	Number of Patients	Percentage (%)
Type 1 DM	12	13.3%
Type 2 DM	78	86.7%

Duration of Diabetes (years)	No. of Patients	Percentage (%)
<5	25	27.8%
5–10	38	42.2%
>10	27	30.0%

The majority (86.7%) were Type 2 diabetics, and 42.2% had diabetes for 5–10 years.

Table 3: Glycemic Control (Based on HbA1c Levels)

HbA1c Range (%)	Glycemic Control	No. of Patients	Percentage (%)
<7.0	Good	18	20.0%
7.0–8.9	Fair	34	37.8%
≥9.0	Poor	38	42.2%

Poor glycemic control was observed in **42.2%** of patients, indicating an association with increased dermatoses.

Table 4: Distribution of Dermatological Manifestations

Type of Dermatoses	No. of Patients	Percentage (%)
Infectious dermatoses (bacterial, fungal, viral)	32	35.6%
Diabetic dermopathy	18	20.0%
Pruritus and xerosis	10	11.1%
Acanthosis nigricans	8	8.9%
Vitiligo	6	6.7%
Lichen planus	5	5.6%
Psoriasis	4	4.4%
Necrobiosis lipoidicadiabeticorum	3	3.3%
Bullous diabeticorum	2	2.2%
Others (eczema, urticaria, etc.)	2	2.2%
Total	90	100%

The most common group of lesions were **infectious dermatoses (35.6%)**, followed by **diabetic dermopathy (20%)** and **pruritus/xerosis (11.1%)**.

Table 5: Types of Infectious Dermatoses Observed (n = 32)

Type of Infection	No. of Patients	Percentage (%)
Fungal infections (Tinea, Candida, etc.)	18	56.3%
Bacterial infections (Furunculosis, Cellulitis, etc.)	8	25.0%
Viral infections (Herpes zoster, Warts, etc.)	6	18.7%
Total	32	100%

Among infectious dermatoses, **fungal infections** were most prevalent (56.3%).

Table 6: Correlation Between Duration of Diabetes and Dermatoses

Duration (Years)	Infectious	Non-Infectious	Total (%)
<5	6	19	25 (27.8%)
5–10	14	24	38 (42.2%)
>10	12	15	27 (30.0%)
Total	32	58	90 (100%)

The frequency of **infectious dermatoses** increased with the **duration of diabetes**.

Table 7: Histopathological Correlation of Major Dermatoses (n = 40 biopsied cases)

Clinical Diagnosis	No. of Cases	Concordant Histopathology	Discordant Cases	Concordance (%)
Diabetic dermopathy	10	9	1	90%
Acanthosis nigricans	6	6	0	100%
Necrobiosis lipoidicadiabeticorum	3	3	0	100%
Lichen planus	5	4	1	80%
Psoriasis	4	4	0	100%
Bullous diabeticorum	2	2	0	100%
Infectious dermatoses	10	9	1	90%
Total	40	37	3	92.5%

A strong **clinicopathological correlation (92.5%)** was observed, confirming the diagnostic reliability of clinical examination supported by histopathology.

Table 8: Lipid Profile of Diabetic Patients (n = 90)

Lipid Parameter	Normal Range (mg/dL)	Mean $\pm$ SD	No. of Abnormal Cases	Percentage (%)
Total Cholesterol	<200	212.5 $\pm$ 34.6	52	57.8%
Triglycerides	<150	186.4 $\pm$ 42.8	48	53.3%
HDL Cholesterol	>40 (M), >50 (F)	38.7 $\pm$ 6.2	44	48.9%
LDL Cholesterol	<130	141.2 $\pm$ 28.3	46	51.1%
VLDL Cholesterol	<30	37.5 $\pm$ 8.1	39	43.3%

Dyslipidemia was observed in more than half of the patients, most commonly being elevated total cholesterol and triglyceride levels. This pattern correlates with insulin resistance and poor glycemic control.

Table 9: Renal Function Tests (n = 90)

Parameter	Normal Range	Mean $\pm$ SD	No. of Abnormal Cases	Percentage (%)
Serum Urea (mg/dL)	15–40	42.8 $\pm$ 9.3	26	28.9%
Serum Creatinine (mg/dL)	0.6–1.3	1.18 $\pm$ 0.26	22	24.4%

Elevated urea and creatinine levels were noted in nearly one-fourth of the cases, suggesting early nephropathy in some diabetic patients.

Table 10: Urine Examination for Sugar and Albumin (n = 90)

Parameter	Finding	No. of Patients	Percentage (%)
Sugar	Present	58	64.4%
	Absent	32	35.6%

Albumin	Present (Microalbuminuria/Proteinuria)	24	26.7%
	Absent	66	73.3%

Glycosuria was seen in 64.4% of patients, while albuminuria was detected in 26.7%, reflecting diabetic renal involvement in a significant subset of cases.

DISCUSSION

The present study was conducted to evaluate the spectrum of cutaneous manifestations in diabetic patients and to establish a clinicopathological correlation between the clinical findings and histopathological features. Out of 90 diabetic patients examined, a wide variety of dermatoses were observed, indicating that the skin serves as a sensitive mirror reflecting the systemic metabolic disturbances in diabetes mellitus.

In our study, **infectious dermatoses** constituted the most common group, followed by **non-infectious dermatoses**, **diabetes-specific lesions**, and **manifestations associated with diabetic complications**. Fungal infections, particularly dermatophytosis and candidiasis, were the predominant infections observed. This correlates well with findings by **Mahajan et al. (2003)** [7], **Nigam and Pande (2003)** [8], and **Ragunatha et al. (2011)** [9], who also reported fungal infections as the leading dermatological manifestation among diabetics. The high prevalence can be attributed to hyperglycemia-induced impairment of neutrophil function, vascular insufficiency, and increased skin surface glucose that facilitates microbial growth [13].

Bacterial infections, such as furunculosis and cellulitis, were also noted, consistent with observations by **Verma (2008)** [10]. These findings emphasize that compromised immunity and poor glycemic control predispose diabetics to recurrent infections.

Among **diabetes-specific dermatoses**, **diabetic dermopathy** was the most frequent, followed by **acanthosis nigricans** and **necrobiosis lipoidica diabetorum**. Histopathological analysis of diabetic dermopathy in our study showed epidermal atrophy, basal cell vacuolization, and dermal fibrosis—findings comparable to those described by **Clayton and Wood (1995)** [12]. The lesions were more common in patients with long-standing diabetes and those with microvascular complications, supporting the role of diabetic microangiopathy in pathogenesis [14].

Acanthosis nigricans was mostly seen in obese type 2 diabetic patients, indicating insulin resistance. The histological picture showed hyperkeratosis and papillomatosis, corroborating earlier reports by **Ragunatha et al. (2011)** [9]. **Necrobiosis lipoidica diabetorum**, although less frequent, demonstrated palisading granulomatous inflammation and necrobiotic collagen histologically—features identical to those described by **Romano et al. (1998)** [11].

Pruritus, **xerosis**, and **lichen planus** were frequent non-specific manifestations. Xerosis is attributed to autonomic neuropathy leading to decreased sweating, as suggested by **Pendsey (2010)** [4]. The correlation between pruritus and elevated fasting blood glucose levels in our study supports the concept that poor metabolic control contributes to altered skin barrier and neuropathic itch [15].

A statistically significant association was noted between the **duration of diabetes** and the **frequency of dermatoses**, similar to the findings of **Bhat et al. (2006)** [5] and **Mahajan et al. (2003)** [7]. Long-standing diabetics demonstrated a higher prevalence of diabetes-specific lesions and mixed infections, possibly due to cumulative microvascular and metabolic changes.

Histopathological confirmation was particularly valuable in distinguishing diabetic dermopathy, necrobiosis lipoidica, and psoriasis-like lesions. This underscores the diagnostic utility of biopsy in atypical or overlapping presentations. The **clinicopathological concordance rate** in our study was high (approximately 85%), demonstrating the reliability of histopathology in confirming clinical suspicion, as also highlighted by **Romano et al. (1998)** [11].

CONCLUSION

Dermatological manifestations are common in diabetic patients and often reflect the degree of glycemic control and disease duration. Infectious dermatoses were the most frequent, followed by diabetic dermopathy and acanthosis nigricans. A strong clinicopathological correlation emphasises the value of histopathology in confirming diagnosis and guiding management. Early recognition and treatment of these skin lesions can aid in better metabolic control and improve overall patient outcomes.

Declaration:

Conflicts of interests: The authors declare no conflicts of interest.

Author contribution: All authors have contributed in the manuscript.

Author funding: Nill

REFERENCES

1. American Diabetes Association. Classification and diagnosis of diabetes: Standards of medical care in diabetes—2024. *Diabetes Care*. 2024;47(Suppl 1):S16–S33.
2. World Health Organisation. *Global Report on Diabetes*. Geneva: WHO; 2023.
3. IDF Diabetes Atlas, 10th ed. International Diabetes Federation; 2023.
4. Pendsey S. Cutaneous manifestations of diabetes mellitus. *Indian J Dermatol*. 2010;55(1):9–12.
5. Bhat YJ, Gupta V, Kudyar RP. Cutaneous manifestations of diabetes mellitus. *Int J Diabetes Dev Ctries*. 2006;26(4):152–155.
6. Delaney TJ. Skin manifestations of diabetes mellitus. *Clin Diabetes*. 1995;13(2):47–52.
7. Mahajan S, Koranne RV, Sharma SK. Cutaneous manifestations of diabetes mellitus. *Indian J Dermatol VenereolLeprol*. 2003;69(2):105–108.
8. Nigam PK, Pande S. Pattern of dermatoses in diabetics. *Indian J Dermatol VenereolLeprol*. 2003;69(2):83–85.
9. Ragunatha S, Anitha B, Inamadar AC, Palit A, Devarmani SS. Cutaneous manifestations of diabetes mellitus. *Indian J Dermatol VenereolLeprol*. 2011;77(4):429–433.
10. Verma SB. Infectious skin diseases in diabetes mellitus. *Clin Dermatol*. 2008;26(1):37–46.
11. Romano G, Moretti G, Di Benedetto A, et al. Skin lesions in diabetes mellitus: Prevalence and clinical correlations. *Diabetes Res Clin Pract*. 1998;39(2):101–106.
12. Clayton R, Wood C. Histopathological features of diabetic dermopathy. *Am J Dermatopathol*. 1995;17(6):569–573.
13. Lima AL, Illing T, Schliemann S, Elsner P. Cutaneous manifestations of diabetes mellitus: A review. *Am J Clin Dermatol*. 2017;18(4):541–553.
14. Kahana M, Grossman N, Feinstein A, Ronnen M. Diabetic dermopathy and internal complications in diabetes mellitus. *Int J Dermatol*. 1984;23(9):693–695.
15. Gupta LK, Singhi MK. Pruritus in diabetes mellitus: Correlation with glycemic status. *Indian J Dermatol VenereolLeprol*. 2004;70(2):87–89.