GMR
The Original

PATTERN OF CUTANEOUS MANIFESTATIONS AND THEIR ASSOCIATION WITH GLYCAEMIC CONTROL AND DURATION OF DIABETES MELLITUS: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

Dr. Karthick.G[1], Dr. Govindarajan.R[2]*, Dr. Malliga.S[3]

[1]Assistant Professor Department Of Pathology Shri Sathya Sai Medical College and Research Institute (Sri Balaji Vidyapeeth University (DU), Chennai campus), Ammapettai, Nellikuppam Post, Chengalpattu District, Tamilnadu, 603108, India karthikhbk27@gmail.com
[2]Professor & Head, Department of Pathology, Shri Sathya Sai Medical College & Research Institute, (Sri Balaji Vidyapeeth University (DU), Chennai campus), Ammapettai, Nellikuppam Post, Chengalpattu District Tamilnadu, 603108, India gjhospital@yahoo.com
[3]Assistant professor, Department of Pathology, Aarupadai Veedu Medical College and Hospital, Kirumampakkam, Vinayaka Mission's Research Foundation (Deemed to be University), Puducherry, 607 402, India. drmalliga1992@gmail.com
Corresponding Author*: Dr. Govindarajan. R, E-mail: gjhospital@yahoo.com

ABSTRACT
Background: Cutaneous abnormalities are common in diabetes mellitus and may reflect chronic hyperglycaemia, insulin resistance, infection susceptibility, neuropathy, or vascular injury. Recognition of these findings during routine care can provide clinically useful clues to metabolic control and systemic complications.
Objectives: To describe the clinical and pathological spectrum of cutaneous manifestations in patients with diabetes mellitus and to examine their relationship with glycaemic control and duration of diabetes.
Materials and Methods: This hospital-based cross-sectional analytical study included 50 patients with diabetes mellitus evaluated at Shri Sathya Sai Medical College and Research Institute, Tiruporur, during 2024–2025. Demographic characteristics, type and duration of diabetes, treatment, fasting and postprandial glucose, glycated haemoglobin (HbA1c), body mass index, cutaneous findings, and documented diabetic complications were assessed. Histopathological, scraping, culture, or surgical specimen findings were considered when clinically available. Continuous variables were compared using the Mann–Whitney U test and categorical associations using Fisher's exact test.
Results: The mean age was 49.16±11.62 years, and 45 (90.0%) patients had type 2 diabetes. Cutaneous manifestations were present in 43 (86.0%) patients. Xerosis was most frequent (82.0%), followed by diabetic dermopathy (70.0%), acanthosis nigricans (56.0%), pruritus (54.0%), candidiasis (54.0%), dermatophytosis (36.0%), bacterial infection (36.0%), skin tags (34.0%), and diabetic foot lesions (18.0%). Patients with cutaneous manifestations had higher median HbA1c [8.8% (IQR 7.7–10.25) versus 6.7% (IQR 6.45–6.9)] and longer diabetes duration [11.0 years (IQR 6.5–17.0) versus 2.0 years (IQR 2.0–3.5)]; both $p<0.001$. Manifestations occurred in 1/7 (14.3%) patients with HbA1c <7.0%, 22/23 (95.7%) with HbA1c 7.0–8.9%, and all 20 patients with HbA1c ≥9.0%.
Conclusion: Cutaneous involvement was frequent and was strongly associated with poorer glycaemic status and longer duration of diabetes in this cohort. Routine skin examination, coupled with selective pathological confirmation of atypical or complicated lesions, may support earlier recognition of infection, neuropathic or vascular injury, and inadequate metabolic control.

KEYWORDS: Acanthosis nigricans; cutaneous infection; diabetic dermopathy; glycated haemoglobin; histopathology; xerosis.

INTRODUCTION

Diabetes mellitus has become a major clinical and public-health concern in India. The ICMR-INDIAB national survey estimated a weighted diabetes prevalence of 11.4%, demonstrating that metabolic disease is no longer confined to selected urban groups and that its complications will increasingly be encountered across levels of healthcare.[1] Much of the clinical attention is appropriately directed towards renal, retinal, neural, cardiovascular, and lower-limb outcomes. The skin, however, often provides an earlier and more accessible account of the same metabolic injury.
Cutaneous manifestations in diabetes encompass a wide spectrum. Some lesions, including diabetic dermopathy, bullosis diabeticorum, necrobiosis lipoidica, and diabetic foot disease, have a relatively close relationship with

diabetes. Others, such as xerosis, pruritus, acanthosis nigricans, skin tags, and bacterial or fungal infections, are not exclusive to the disease but occur in patterns shaped by hyperglycaemia, insulin resistance, immune dysfunction, microangiopathy, autonomic dysfunction, and altered epidermal barrier function.[2,3] The clinical relevance is therefore broader than cosmetic morbidity. A seemingly minor finding may signal poor metabolic control, peripheral neuropathy, vascular compromise, or an evolving infection.

Indian hospital-based studies have consistently documented substantial dermatological morbidity among patients with diabetes, although the reported distribution varies with case selection, age, climate, diabetes type, metabolic status, and diagnostic definitions. Xerosis and diabetic dermopathy have been prominent in some cohorts, whereas infections and markers of insulin resistance have predominated in others.[4–7] This variation is particularly relevant in coastal Tamil Nadu, where heat, humidity, footwear practices, delayed presentation, and competing priorities in chronic disease care may influence both infection risk and the stage at which lesions are recognised.

The Department of Pathology contributes to this assessment when the clinical appearance is atypical, when infection or inflammatory disease requires confirmation, or when chronic ulceration raises concern for deeper tissue change. Integrating clinical morphology with glycaemic parameters and selective pathological evaluation can therefore produce a more useful account than a simple list of skin disorders. The present study was undertaken to determine the pattern of cutaneous manifestations among patients with diabetes mellitus and to evaluate their association with glycaemic control and duration of disease.

MATERIALS AND METHODS

Study design and setting

A hospital-based cross-sectional analytical study was conducted in the Department of Pathology, Shri Sathya Sai Medical College and Research Institute, Tiruporur, Tamil Nadu.

Study period

The study was carried out during 2024–2025.

Study population

Fifty patients with diabetes mellitus who underwent clinical evaluation during the study period and had documented demographic, metabolic, and cutaneous findings were included. Both type 1 and type 2 diabetes mellitus were represented.

Clinical and biochemical assessment

The recorded variables comprised age, sex, type and duration of diabetes, treatment modality, fasting plasma glucose, postprandial plasma glucose, HbA1c, body mass index (BMI), and obesity status. Information regarding microvascular and macrovascular complications was also recorded where available.

Assessment of cutaneous manifestations

Cutaneous findings were documented under diabetic dermopathy, acanthosis nigricans, skin tags, xerosis, pruritus, dermatophytosis, candidiasis, bacterial infection, diabetic foot lesions, and other clinically diagnosed skin disorders. The presence of any one of these findings was treated as a cutaneous manifestation for the primary analysis. Infective involvement was defined by the presence of dermatophytosis, candidiasis, or bacterial infection.

Pathological evaluation

Skin scraping, tissue biopsy, wound biopsy, culture, or surgical specimen examination was undertaken when clinically indicated. Clinically characteristic lesions that were not sampled remained classified according to their recorded clinical diagnosis. Pathological findings were used to characterise selected atypical, granulomatous, bullous, infectious, ulcerative, or gangrenous lesions.

Outcome measures

The primary outcome was the proportion of patients with at least one cutaneous manifestation. Secondary outcomes included the frequency of individual lesions and their relationship with glycaemic control, duration of diabetes, BMI category, and diabetic complications. HbA1c was grouped as <7.0%, 7.0–8.9%, and ≥9.0%. Duration was grouped as <5 years, 5–9 years, and ≥10 years. For selected two-group comparisons, HbA1c was dichotomised at 7.0% and diabetes duration at 10 years.

Statistical analysis

Continuous variables were summarised using mean±standard deviation and, where appropriate, median with interquartile range (IQR). Categorical variables were expressed as frequency and percentage. Continuous variables were compared between patients with and without cutaneous manifestations using the Mann–Whitney U test. Fisher's exact test was used for categorical comparisons because several contingency-table cells contained small counts. A two-sided p-value <0.05 was considered statistically significant. As the analyses were exploratory, no formal adjustment for multiple comparisons was applied.

Ethical considerations

The study used clinical, biochemical, and pathological information recorded during routine patient care. No additional intervention or alteration in clinical management was undertaken for research purposes. Personal identifiers were excluded during analysis, and confidentiality was maintained in accordance with institutional ethical principles.

RESULTS

Baseline profile

The study included 50 patients, with equal representation of men and women. The mean age was 49.16±11.62 years (range 28–69 years). Type 2 diabetes accounted for 45 (90.0%) cases, while 5 (10.0%) had type 1 diabetes. The mean duration of diabetes was 10.60±6.66 years. Mean HbA1c was 8.72±1.66%, and 43 (86.0%) patients had HbA1c ≥7.0%. Twenty-two patients (44.0%) were overweight and 16 (32.0%) were obese. Insulin alone was the most frequent treatment category, used by 25 (50.0%) patients. Baseline findings are summarised in Table 1.

Table 1. Baseline demographic, diabetic, metabolic, and treatment characteristics (n=50).

Characteristic	Value
Age, years	49.16±11.62 (28–69)
Sex, male/female	25 (50.0)/25 (50.0)
Type 1 diabetes	5 (10.0)
Type 2 diabetes	45 (90.0)
Duration of diabetes, years	10.60±6.66
Fasting glucose, mg/dL	152.80±27.04
Postprandial glucose, mg/dL	227.64±42.80
HbA1c, %	8.72±1.66
HbA1c <7.0%	7 (14.0)
HbA1c 7.0–8.9%	23 (46.0)
HbA1c ≥9.0%	20 (40.0)
BMI, kg/m²	28.07±3.21
Normal BMI	12 (24.0)
Overweight	22 (44.0)
Obese	16 (32.0)
Diet control	5 (10.0)
Oral antidiabetic agents alone	15 (30.0)
Oral agents with insulin	5 (10.0)
Insulin alone	25 (50.0)

Values are mean±standard deviation, n (%), or mean±standard deviation (range), as applicable. BMI: body mass index; HbA1c: glycated haemoglobin.

Spectrum of cutaneous manifestations

At least one cutaneous manifestation was present in 43 (86.0%) patients, whereas 7 (14.0%) had no recorded lesion (Figure 1). Xerosis was the most frequent finding, affecting 41 (82.0%) patients. Diabetic dermopathy was present in 35 (70.0%), acanthosis nigricans in 28 (56.0%), and both pruritus and candidiasis in 27 (54.0%) patients each. Dermatophytosis and bacterial infection were each observed in 18 (36.0%), skin tags in 17 (34.0%), and diabetic foot lesions in 9 (18.0%). Overall, at least one fungal or bacterial infection was present in 35 (70.0%) patients. The distribution is shown in Table 2 and Figure 2.

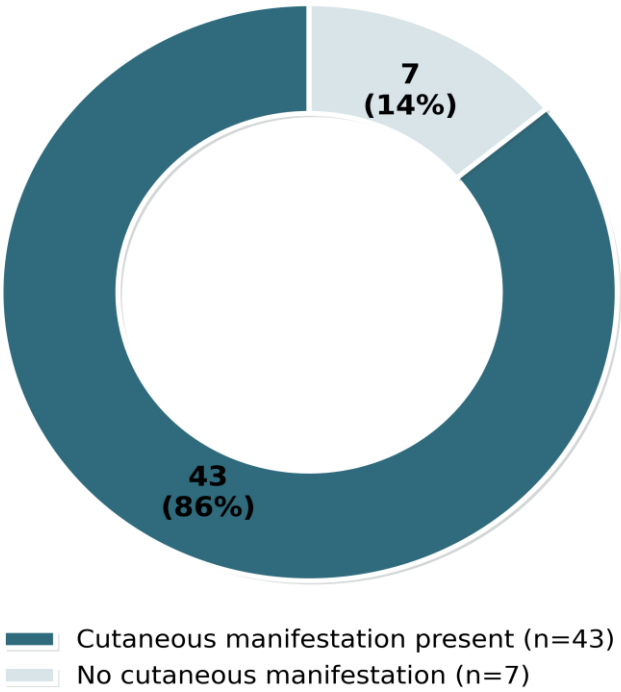

Figure 1. Overall prevalence of cutaneous manifestations among patients with diabetes mellitus.
The donut chart displays patient counts and percentages.

Table 2. Distribution of cutaneous manifestations and diabetic complications (n=50).

Finding	n (%)
Any cutaneous manifestation	43 (86.0)
Xerosis	41 (82.0)
Diabetic dermopathy	35 (70.0)
Any fungal or bacterial infection	35 (70.0)
Acanthosis nigricans	28 (56.0)
Pruritus	27 (54.0)
Candidiasis	27 (54.0)
Dermatophytosis	18 (36.0)
Bacterial infection	18 (36.0)
Skin tags	17 (34.0)
Diabetic foot lesion	9 (18.0)
Microvascular complication	22 (44.0)
Macrovascular complication	10 (20.0)

Individual cutaneous manifestations are not mutually exclusive.

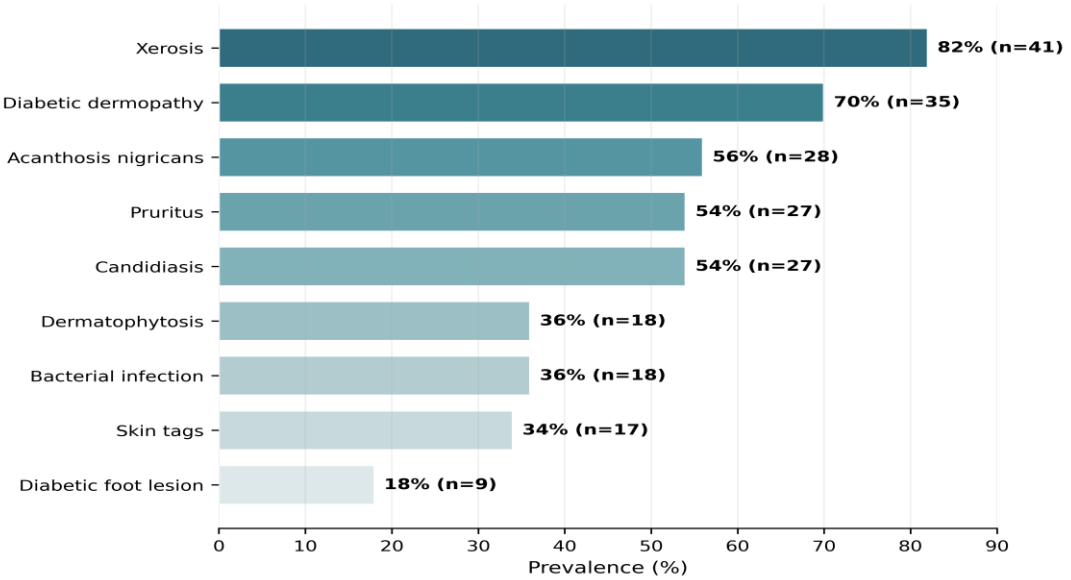

Figure 2. Frequency of the principal cutaneous manifestations.
Horizontal bars show prevalence; labels provide percentage and number of patients.

Among other recorded disorders, granuloma annulare occurred in 4 (8.0%) patients. Eczema, psoriasis, lichen planus, urticaria, keloid, cellulitis, venous ulcer, and gangrene were each recorded once. Microvascular complications were present in 22 (44.0%) patients, most commonly peripheral neuropathy in 9, non-proliferative retinopathy in 6, and proliferative retinopathy in 3. Macrovascular complications were present in 10 (20.0%) patients; coronary artery disease was recorded in 4, peripheral arterial or vascular disease in 4, and stroke in 2.

Relationship with metabolic and clinical variables

Patients with cutaneous manifestations were older and had longer diabetes duration, higher fasting and postprandial glucose, higher HbA1c, and higher BMI than those without manifestations. Each of these comparisons was statistically significant (Table 3). The median HbA1c was 8.8% (IQR 7.7–10.25) in patients with skin findings compared with 6.7% (IQR 6.45–6.9) in those without findings ($p<0.001$). Median duration was 11.0 years (IQR 6.5–17.0) versus 2.0 years (IQR 2.0–3.5), respectively ($p<0.001$).

Table 3. Comparison of continuous variables according to the presence of cutaneous manifestations.

Variable	Manifestation present (n=43)	No manifestation (n=7)	Mann–Whitney U	p-value
Age, years	52.0 (44.5–59.5)	33.0 (31.5–36.0)	281.0	<0.001
Duration of diabetes, years	11.0 (6.5–17.0)	2.0 (2.0–3.5)	290.0	<0.001
Fasting glucose, mg/dL	155.0 (138.5–179.5)	115.0 (111.0–119.0)	298.5	<0.001
Postprandial glucose, mg/dL	232.0 (206.0–269.5)	170.0 (162.5–172.5)	299.0	<0.001
HbA1c, %	8.8 (7.7–10.25)	6.7 (6.45–6.9)	292.5	<0.001
BMI, kg/m²	28.8 (27.05–30.95)	23.2 (22.75–24.15)	289.0	<0.001

Values are median (interquartile range). BMI: body mass index; HbA1c: glycated haemoglobin.

The prevalence of any cutaneous manifestation increased across HbA1c categories: 14.3% among patients with HbA1c <7.0%, 95.7% among those with HbA1c 7.0–8.9%, and 100% among those with HbA1c ≥9.0% (Figure 3). Using the dichotomous threshold, manifestations were observed in 42/43 (97.7%) patients with HbA1c ≥7.0% compared with 1/7 (14.3%) patients with HbA1c <7.0% (Fisher's exact $p<0.001$). Both any infection and diabetic dermopathy were also associated with HbA1c ≥7.0% ($p<0.001$ for each).

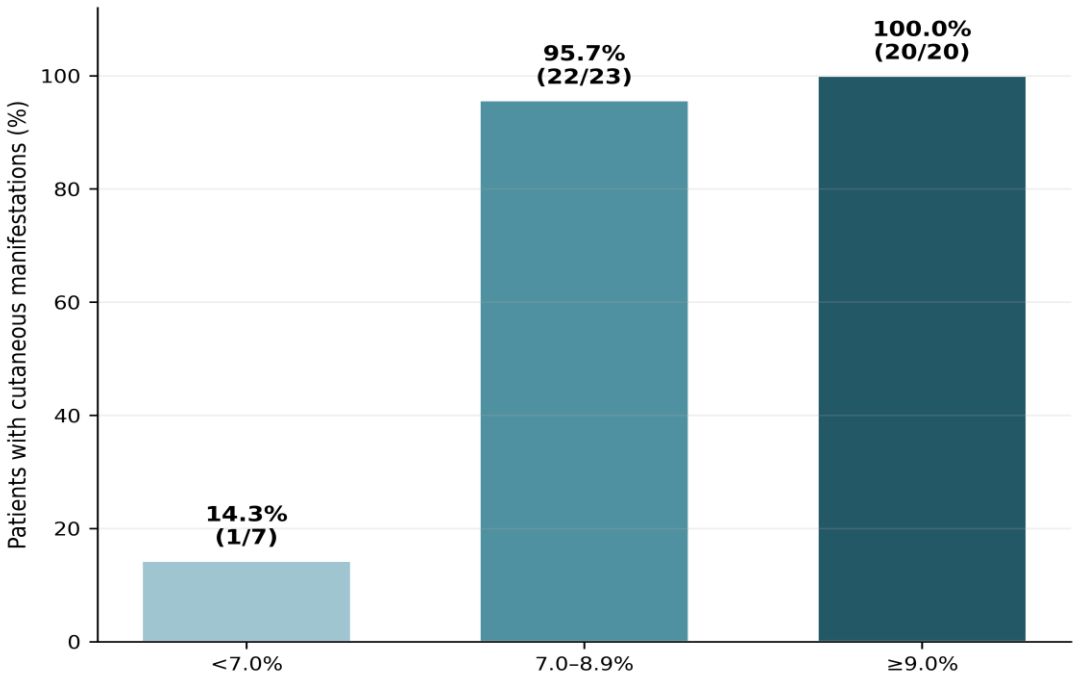

Figure 3. Prevalence of cutaneous manifestations across HbA1c categories.
Bars display the percentage and observed fraction within each glycaemic category.

A parallel gradient was seen with diabetes duration. Cutaneous manifestations affected 45.5% of patients with duration <5 years, 93.3% with duration 5–9 years, and all patients with duration ≥10 years (Figure 4). Any infection was present in 24/24 (100%) patients with diabetes duration ≥10 years compared with 11/26 (42.3%) among those with shorter duration ($p<0.001$). All 9 diabetic foot lesions occurred in the ≥10-year group ($p<0.001$). Selected categorical associations are presented in Table 4.

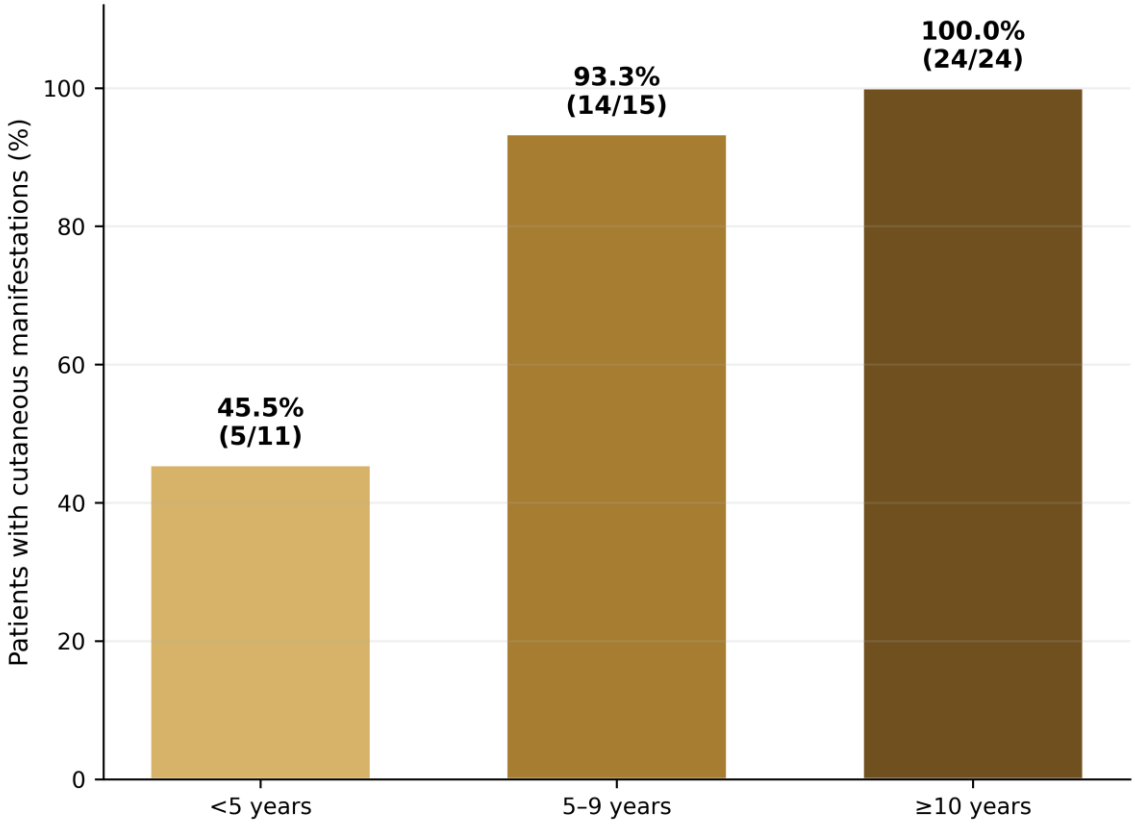

Figure 4. Prevalence of cutaneous manifestations according to duration of diabetes.
Bars display the percentage and observed fraction within each duration category.

Table 4. Selected associations of cutaneous outcomes with glycaemic control and diabetes duration.

Outcome	Comparison group 1	n/N (%)	Comparison group 2	n/N (%)	Fisher exact p
Any cutaneous manifestation	HbA1c <7.0%	1/7 (14.3)	HbA1c ≥7.0%	42/43 (97.7)	<0.001
Any infection	HbA1c <7.0%	0/7 (0.0)	HbA1c ≥7.0%	35/43 (81.4)	<0.001
Diabetic dermopathy	HbA1c <7.0%	0/7 (0.0)	HbA1c ≥7.0%	35/43 (81.4)	<0.001
Any cutaneous manifestation	Duration <10 years	19/26 (73.1)	Duration ≥10 years	24/24 (100)	0.010
Any infection	Duration <10 years	11/26 (42.3)	Duration ≥10 years	24/24 (100)	<0.001
Diabetic foot lesion	Duration <10 years	0/26 (0.0)	Duration ≥10 years	9/24 (37.5)	<0.001

Infection includes dermatophytosis, candidiasis, or bacterial infection. HbA1c: glycated haemoglobin.

Cutaneous manifestations were also more frequent in type 2 than type 1 diabetes [41/45 (91.1%) versus 2/5 (40.0%), p=0.016]. All 38 overweight or obese patients had at least one cutaneous manifestation compared with 5/12 (41.7%) patients in the normal BMI category (p<0.001). Skin findings were present in all 22 patients with a documented microvascular complication compared with 21/28 (75.0%) without such a complication (p=0.014). The association with macrovascular complications was not statistically significant (p=0.319).

Pathological findings

Histopathological, scraping, culture, or surgical specimen findings were documented in 17 patients. Biopsy supported necrobiosis lipoidica in four patients and a palisading or granulomatous pattern compatible with granuloma annulare in four. Intraepidermal bullae were demonstrated in two patients with diabetic bullae, and a lichenoid infiltrate supported lichen planus in one. Skin scraping showed fungal hyphae in one patient. Ulcer specimens demonstrated mixed, acute, or chronic inflammation, while one amputation specimen showed gangrenous tissue. The findings are summarised in Table 5.

Table 5. Pathological and microbiological findings in clinically selected lesions.

Clinical lesion/category	Recorded pathological or microbiological finding	Number
Necrobiosis lipoidica	Necrobiotic collagen/necrobiosis on skin biopsy	4
Granuloma annulare	Palisading or granulomatous inflammation	4
Diabetic bullae	Intraepidermal bulla	2
Lichen planus	Lichenoid inflammatory infiltrate	1
Dermatophytosis	Fungal hyphae on skin scraping	1
Chronic or infected ulcer/gangrene	Mixed, acute, or chronic inflammation, or gangrenous tissue	6
Complicated wound	Positive wound culture	1

Findings are not mutually exclusive because more than one lesion or investigation was recorded in selected patients. Seventeen patients underwent at least one tissue, scraping, culture, or surgical specimen evaluation.

DISCUSSION

The present study demonstrated a high burden of cutaneous disease among patients with diabetes mellitus. More than four in five patients had at least one manifestation, and the pattern was not restricted to a single mechanism. Barrier dysfunction, markers of insulin resistance, fungal and bacterial infections, microangiopathic lesions, pruritus, and diabetic foot involvement frequently coexisted. The most clinically important observation was the steep increase in cutaneous involvement across worsening HbA1c and longer disease duration. These findings should be interpreted as associations rather than causal effects, yet the gradient was consistent across several outcomes.

The observed prevalence of 86.0% is higher than the 76.8% reported by Ragunatha et al. and the 73.9% described in the large Eastern Indian cohort of Chatterjee et al.[5,7] Differences in recruitment, lesion

definitions, age structure, metabolic control, and the extent of active dermatological examination can readily shift prevalence estimates. A study from Iran likewise identified pruritus, infections, xerosis, and diabetic dermopathy among the leading findings, reinforcing that multiple categories usually overlap rather than appearing in isolation.[8] The high proportion in the present cohort may also reflect the predominance of type 2 diabetes, poor glycaemic control, and relatively long disease duration.

Xerosis was the commonest finding, affecting 82.0% of patients. Goyal et al. also identified xerosis as the leading manifestation, although at a lower frequency of 44%.[4] The present value is close to the 82% xerosis reported among South Indian patients with diabetic peripheral neuropathy by Dogiparthi et al.[13] Hyperglycaemia-related barrier disturbance, reduced stratum corneum hydration, autonomic dysfunction, and altered sweat-gland activity offer plausible explanations.[2,3] Clinically, xerosis is easily dismissed. Yet fissuring and excoriation can become portals for secondary infection, especially in patients with impaired sensation or delayed wound recognition.

Diabetic dermopathy was present in 70.0% and showed a strong relationship with raised HbA1c. Previous Indian studies have reported much lower frequencies, partly because diagnostic criteria and case mix differ.[4,5] Shemer et al. demonstrated that diabetic dermopathy was associated with longer diabetes duration and with retinopathy, nephropathy, and neuropathy.[12] Demirseren et al., in an analysis of 750 patients, similarly examined the relationship between skin disease and extracutaneous diabetic complications.[11] In the present cohort, every patient with a documented microvascular complication had a cutaneous manifestation, supporting the practical value of careful skin inspection as part of systemic risk assessment, while not implying that any individual lesion can replace formal complication screening.

Acanthosis nigricans and skin tags were frequent, especially among overweight and obese patients. These findings are clinically coherent with insulin resistance and the large proportion of type 2 diabetes. Ragunatha et al. found acrochordons to be a prominent marker of insulin resistance in their diabetic-clinic population.[5] The complete occurrence of at least one skin lesion among overweight or obese participants in the present study is striking, but it should be interpreted cautiously because BMI category, age, disease duration, and HbA1c were not adjusted simultaneously in multivariable analysis.

Infective manifestations were another major component. Seventy per cent had at least one fungal or bacterial infection, and infection was strongly associated with HbA1c ≥7.0% and disease duration ≥10 years. Vahora et al. reported infections as the commonest mucocutaneous manifestation in 39.7% of 300 patients, while Chatterjee et al. noted that infective dermatoses were associated with higher HbA1c.[6,7] Dermatophyte disease in diabetes is influenced by local moisture, occlusion, foot care, neuropathy, and vascular status in addition to glucose control; consequently, the literature has not always shown a uniform relationship between infection and glycaemic indices.[15] In a coastal setting such as Tiruporur, humidity and prolonged footwear exposure may be relevant contextual contributors, although these factors were not measured in this study.

Pruritus affected 54.0% of patients. Contemporary work suggests that diabetic itch is multifactorial, involving xerosis, neuropathy, inflammatory mediators, and metabolic disturbance.[14] The substantial overlap between pruritus and xerosis in the present cohort is therefore unsurprising. Treatment should not be limited to symptomatic antipruritic therapy; hydration, infection screening, neuropathy assessment, and metabolic review are often required.

Diabetic foot lesions were confined to patients with diabetes duration of at least 10 years. This pattern is clinically important. Prolonged hyperglycaemia, sensory loss, vascular disease, recurrent trauma, and impaired healing frequently converge in foot disease.[3,13] The pathological records ranged from mixed or chronic ulcer inflammation to gangrenous tissue, illustrating the spectrum encountered by pathology services. Even so, histopathology was selective rather than universal. It was most useful in lesions that were atypical, granulomatous, bullous, chronically ulcerated, or complicated by suspected infection. Necrobiosis lipoidica, granuloma annulare, diabetic bullae, and lichen planus were supported by characteristic tissue patterns in selected cases.

Type 1 diabetes formed only a small subgroup, and fewer of these patients had skin lesions. A large South Asian series of 500 patients with type 1 diabetes showed a different spectrum, with insulin-related changes, limited joint mobility, and xerosis being prominent.[9] Age also influenced the present findings; patients without skin manifestations were considerably younger. Population-based work among elderly patients has shown that age, environmental exposure, and comorbidity may independently increase the burden of xerosis, infections, and other dermatoses.[10] Thus, the apparent association with diabetes type should not be separated from age and duration.

LIMITATIONS

The sample was small and drawn from a single institution, limiting precision and generalisability. Its cross-sectional design does not establish temporal or causal relationships. The group without cutaneous manifestations contained only seven patients, which produced sparse contingency tables and very strong effect estimates; exact tests were therefore used, but the findings still require cautious interpretation. Several exploratory comparisons were performed without adjustment for multiplicity, so individual p-values should not be viewed as definitive evidence in isolation. Selection procedures and potential referral effects may have enriched the cohort for clinically apparent disease. Several skin disorders were diagnosed clinically without tissue confirmation, while

histopathology and microbiology were performed only when indicated. Multivariable modelling was not undertaken because the small group without cutaneous manifestations would not support stable estimation; consequently, the independent contributions of age, BMI, duration, diabetes type, glycaemia, and complications could not be separated.

Despite these constraints, the study provides an integrated clinical, metabolic, and pathological description relevant to routine Indian hospital practice. A skin examination is inexpensive, repeatable, and culturally acceptable. It can be incorporated into diabetes follow-up without adding substantial resource burden. Patients with xerosis, recurrent fungal infection, dermopathy, acanthosis nigricans, pruritus, or foot lesions warrant not only dermatological care but also a review of glycaemic status, neuropathy, vascular health, footwear, and self-care practices.

CONCLUSION

Cutaneous manifestations were present in 86.0% of patients with diabetes mellitus. Xerosis, diabetic dermopathy, acanthosis nigricans, pruritus, and candidiasis predominated. Poorer glycaemic control and longer duration of diabetes were strongly associated with cutaneous involvement, infection, and diabetic foot lesions. Routine dermatological examination, supported by selective histopathological or microbiological assessment when lesions are atypical or complicated, may strengthen integrated diabetes care and facilitate earlier recognition of clinically important complications.

Declarations

Source of Funding: Nil.

Conflict of Interest: None declared.

REFERENCES

1. Anjana RM, Unnikrishnan R, Deepa M, Pradeepa R, Tandon N, Das AK, et al. Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). Lancet Diabetes Endocrinol. 2023;11(7):474–489. doi:10.1016/S2213-8587(23)00119-5.

2. Lima AL, Illing T, Schliemann S, Elsner P. Cutaneous manifestations of diabetes mellitus: a review. Am J Clin Dermatol. 2017;18(4):541–553. doi:10.1007/s40257-017-0275-z.

3. Hines A, Alavi A, Davis MDP. Cutaneous manifestations of diabetes. Med Clin North Am. 2021;105(4):681–697. doi:10.1016/j.mcna.2021.04.008.

4. Goyal A, Raina S, Kaushal SS, Mahajan V, Sharma NL. Pattern of cutaneous manifestations in diabetes mellitus. Indian J Dermatol. 2010;55(1):39–41. doi:10.4103/0019-5154.60349.

5. Ragunatha S, Anitha B, Inamadar AC, Palit A, Devarmani SS. Cutaneous disorders in 500 diabetic patients attending diabetic clinic. Indian J Dermatol. 2011;56(2):160–164. doi:10.4103/0019-5154.80409.

6. Vahora R, Thakkar S, Marfatia Y. Skin, a mirror reflecting diabetes mellitus: a longitudinal study in a tertiary care hospital in Gujarat. Indian J Endocrinol Metab. 2013;17(4):659–664. doi:10.4103/2230-8210.113757.

7. Chatterjee N, Chattopadhyay C, Sengupta N, Das C, Sarma N, Pal SK. An observational study of cutaneous manifestations in diabetes mellitus in a tertiary care hospital of Eastern India. Indian J Endocrinol Metab. 2014;18(2):217–220. doi:10.4103/2230-8210.129115.

8. Azizian Z, Behrangi E, Hasheminasabzavareh R, Kazemlo H, Esmaeeli R, Hassani P. Prevalence study of dermatologic manifestations among diabetic patients. Adv Prev Med. 2019;2019:5293193. doi:10.1155/2019/5293193.

9. Sawatkar GU, Kanwar AJ, Dogra S, Bhadada SK, Dayal D. Spectrum of cutaneous manifestations of type 1 diabetes mellitus in 500 South Asian patients. Br J Dermatol. 2014;171(6):1402–1406. doi:10.1111/bjd.13077.

10. Asokan N, Binesh VG. Cutaneous problems in elderly diabetics: a population-based comparative cross-sectional survey. Indian J Dermatol Venereol Leprol. 2017;83(2):205–211. doi:10.4103/0378-6323.190875.

11. Demirseren DD, Emre S, Akoglu G, Arpaci D, Arman A, Metin A, et al. Relationship between skin diseases and extracutaneous complications of diabetes mellitus: clinical analysis of 750 patients. Am J Clin Dermatol. 2014;15(1):65–70. doi:10.1007/s40257-013-0048-2.

12. Shemer A, Bergman R, Linn S, Kantor Y, Friedman-Birnbaum R. Diabetic dermopathy and internal complications in diabetes mellitus. Int J Dermatol. 1998;37(2):113–115. doi:10.1046/j.1365-4362.1998.00273.x.

13. Dogiparthi SN, Muralidhar K, Seshadri KG, Rangarajan S. Cutaneous manifestations of diabetic peripheral neuropathy. Dermatoendocrinol. 2017;9(1):e1395537. doi:10.1080/19381980.2017.1395537.

14. Stefaniak AA, Krajewski PK, Bednarska-Chabowska D, Bolanowski M, Mazur G, Szepietowski JC. Itch in adult population with type 2 diabetes mellitus: clinical profile, pathogenesis and disease-related burden in a cross-sectional study. Biology (Basel). 2021;10(12):1332. doi:10.3390/biology10121332.

15. Romano C, Massai L, Asta F, Signorini AM. Prevalence of dermatophytic skin and nail infections in diabetic patients. Mycoses. 2001;44(3–4):83–86. doi:10.1046/j.1439-0507.2001.00624.x.