Original Article

Prevalence of Cutaneous Manifestations in Type 2 Diabetes Mellitus: A Cross-sectional Study of 200 Patients from Maharashtra

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Abstract

Background: Cutaneous manifestations are common in patients with Type 2 Diabetes Mellitus (T2DM) and may serve as important external indicators of underlying metabolic dysfunction. Early identification of these dermatoses aids in better glycaemic control and prevention of complications. The objective is to determine the prevalence and pattern of various cutaneous manifestations in patients with Type 2 Diabetes Mellitus. **Material and Methods:** A cross-sectional observational study was conducted on 200 diagnosed patients with Type 2 Diabetes Mellitus attending the outpatient department of Dermatology and Medicine over a period of nine months (March–December 2024). Detailed dermatological examination was performed, and findings were correlated with glycaemic control and duration of diabetes. **Results:** Out of 200 patients, 118 (59%) were males and 82 (41%) females. The mean age was 54.6 ± 10.3 years. Cutaneous manifestations were observed in 172 (86%) patients. Infections (58%), xerosis (42%), diabetic dermopathy (31%), acanthosis nigricans (27%), pruritus (22%), and candidiasis (18%), were the most frequent lesions. Poor glycaemic control (HbA1c above 8 percent) found more cases of skin infections. There was a significant correlation between dermopathy and neuropathic ulcers and duration of diabetes ($p < 0.05$). **Conclusion:** The prevalence of the skin manifestation was high in the patients affected by Type 2 diabetes, particularly in the infections and xerosis. Consistent check-ups on the skin should be part of diabetes treatment, where skin complications should be detected and treated as early as possible.

Keywords: Type 2 Diabetes Mellitus, Cutaneous manifestations, Skin infections, Diabetic dermopathy, Prevalence.

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Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from insulin resistance and/or impaired insulin secretion. The prevalence of T2DM is rapidly increasing worldwide, especially in developing countries like India. Chronic hyperglycemia affects multiple organ systems, including the skin.[1]

Cutaneous manifestations are frequently observed in diabetic patients and may either precede, coincide, or follow the diagnosis of diabetes. The pathophysiological mechanisms include microangiopathy, neuropathy, abnormal carbohydrate metabolism, and susceptibility to infections. Recognition of these skin changes is clinically significant as it may assist in early detection of diabetes and its complications.[2]

Patients, the healthcare system, and society are all heavily burdened by diabetes mellitus (DM), the most prevalent endocrine illness. In the USA, around 11 million people have been diagnosed with diabetes, with 90% of those cases being insulin independent.[3] Signs of macrovascular problems include pigmented purpuric dermatosis and acanthosis nigricans, two cutaneous symptoms associated with diabetes mellitus. Over the course of their chronic illness, at least 30% of DM patients experience various cutaneous problems.[4,5]

Four categories are used to classify cutaneous manifestations of diabetes mellitus: (1) cutaneous diseases that have a weak to strong correlation with the disease; (2) cutaneous infections; (3) cutaneous symptoms of complications from the disease; and (4) cutaneous reactions to DM treatments.[6,7] Long-term diabetes mellitus results in damage to body cells and persistent, irreversible physiological alterations, which can lead to biochemical, structural, and functional abnormalities.[8,9]

Cutaneous complications of DM provide a clue to the current and past metabolic status of the patient. Approximately 20 to 50% of individuals get cutaneous infections, which frequently coexist with moderate blood glucose control. Immune response decrease, peripheral vascular illnesses, peripheral neuropathy, and microvascular circulation problems all contribute to an increased risk of infection.[10] Patients with uncontrolled diabetes are more vulnerable to common cutaneous infections, such as staphylococcal infections, which can be more severe. Nail

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infections caused by bacteria are among the several forms of infection.[11] Several fungal diseases prevalent in the vaginal region and the corners of the lips (angular cheilitis) are caused by a fungus known as Candida albicans, which also affects diabetic individuals.[11] DM is strongly associated with localised candidiasis infection in the female vaginal area, and candidiasis infection (moniliasis) might be regarded as an early indication of undetected DM.[12]

This study aims to assess the prevalence and spectrum of cutaneous manifestations among patients with T2DM and to analyse their association with glycaemic control and disease duration.

Materials and Methods

Study Design: A hospital-based cross-sectional observational study.

Study Setting and Duration: Conducted in the Department of Department of skin and VD, RK Damani Medical College over a period of 9 months (March–December 2024).

Sample Size: 200 diagnosed patients of Type 2 Diabetes Mellitus.

Inclusion Criteria:

- Patients aged >30 years with Type 2 Diabetes Mellitus.
- Willing to participate and give informed consent.

Exclusion Criteria:

- Patients with Type 1 Diabetes Mellitus.
- Those on long-term systemic corticosteroids or immunosuppressive therapy.
- Patients with other chronic systemic illnesses.

Methodology: All patients were subjected to a detailed history and dermatological examination. Data on age, gender, duration of diabetes, treatment, and glycaemic control (HbA1c levels) were recorded. The presence of cutaneous manifestations was documented and categorized as:

1. Infections (bacterial, fungal, viral, parasitic)
2. Non-infectious dermatoses associated with diabetes
3. Dermatoses due to diabetic complications (neuropathy, angiopathy)
4. Skin reactions secondary to anti-diabetic drugs

Statistical Analysis: Data were analyzed using SPSS version 26. Descriptive statistics were used for prevalence. Chi-square test was applied to assess association between duration/glycaemic control and skin manifestations. A p-value <0.05 was considered statistically significant.

Results

[Table 1] presents the demographic characteristics of the 200 patients included in the study. Out of the total, 118 patients (59%) were males and 82 (41%) were females, showing a slight male predominance. Participants were aged with the mean age being 54.6 ± 10.3 years and most of the patients fall under the category of middle-aged and elderly as is the case of Type 2 Diabetes Mellitus.

Based on the years of diabetes, there were 68 patients (34%), 82 patients (41%), and 50 patients (25%), who were less than 5 years of diabetes, 5-10 years, and more than 10 years of diabetes respectively. Such a distribution demonstrates that the most common number of patients had a moderate disease duration and it can affect the number and type of cutaneous manifestations.

Comprehensively, it can be noted that the study population was mainly middle-aged men with a moderate length of diabetes, as this demographic characterizes the common Type 2 Diabetes Mellitus clinical practice.

Table 1: Demographic Profile

Variable	No. of Patients (n=200)	Percentage (%)
Males	118	59
Females	82	41
Mean Age (years)	54.6 ± 10.3	—
Duration <5 years	68	34
Duration 5–10 years	82	41
Duration >10 years	50	25

Table 2: Prevalence of Cutaneous Manifestations

Type of Lesion	No. of Cases	Percentage (%)
Infections	116	58
Xerosis	84	42
Diabetic dermopathy	62	31
Acanthosis nigricans	54	27
Pruritus	44	22
Candidiasis	36	18
Vitiligo	12	6
Diabetic foot ulcer	10	5
Drug-induced eruptions	8	4

[Table 2] provides a summary of different forms of cutaneous manifestations witnessed among the 200 patients with Type 2 Diabetes Mellitus. One or more skin lesions were observed in 172 patients (86% of all participants) and thus demonstrates the significant rates of skin dermatological involvement in diabetes patients.

The most prevalent type of lesions were the infections that were detected in 116 patients (58%). These were bacterial, fungal, and viral infections, which are emblematic of how the immunity of diabetic persons is weakened and uncontrolled glycemic levels to make diabetic persons very susceptible to infections.

The second most common was xerosis (dry skin) that was identified in 84 patients (42%), which was probably related

to autonomic dysfunction and skin dehydration. Diabetic dermopathy (atrophic, hyper pigmented. macules on shins) was observed in 62 patients (31 percent), and was usually correlated with old-age disease.

Insulin resistance was observed as acanthosis nigricans was found in 54 patients (27%), and generalized pruritus was found in 44 patients (22%). Candidiasis was identified in 36 patients (18%), very often in intertriginous ones. The uncommon manifestations were vitiligo (6%), diabetic foot ulcers (5%), and those induced by drugs (4%).

In general, the table indicates that the clinical profile of skin changes in diabetic patients is dominated by infectious and metabolic-related dermatoses that should be highlighted as the necessity of the regular skin examination to be used as a component of diabetes management.

Table 3: Correlation with Glycaemic Control

Type of Skin Lesion	Good Glycaemic Control(HbA1c ≤ 7%, n = 72)	Poor Glycaemic Control(HbA1c > 7%, n = 128)	Total (n)	p-value
Infections	28 (38.9%)	88 (68.8%)	116	<0.01
Xerosis	22 (30.6%)	62 (48.4%)	84	0.04
Diabetic Dermopathy	16 (22.2%)	46 (35.9%)	62	0.06
Acanthosis Nigricans	14 (19.4%)	40 (31.3%)	54	0.07
Pruritus	10 (13.9%)	34 (26.6%)	44	0.05
Candidiasis	6 (8.3%)	30 (23.4%)	36	0.02
Vitiligo	4 (5.6%)	8 (6.3%)	12	0.84
Diabetic Foot Ulcer	2 (2.8%)	8 (6.3%)	10	0.31
Drug-Induced Eruptions	2 (2.8%)	6 (4.7%)	8	0.49

Note: Statistical significance assessed using Chi-square test; $p < 0.05$ considered significant.

[Table 3] shows how glycaemic control measured using HbA1c level is associated with the occurrence of different cutaneous manifestation in 200 patients with Type 2 Diabetes Mellitus. A study population was classified in two categories, namely, good glycaemic control (HbA1c 8.00 or less, n = 72), and problematic regulation (HbA1c 8.01 or more, n = 128).

There was clear indication of a trend that revealed that patients who had poor glycaemic control had a higher rate of skin lesions. Infections among them were significantly more prevalent with 68.8 percent of poorly controlled patients and 38.9 percent of well-controlled patients having infections that were statistically significant ($p < 0.01$). On the same note, the xerosis (48.4%), pruritus (26.6%), and the candidiasis (23.4%) were also highly prevalent in the poorly controlled patients ($p < 0.05$).

Despite the fact that diabetic dermopathy (35.9%), and acanthosis nigricans (31.3%) were more common in poor control group, there was no statistical significance. Lesions like vitiligo, diabetic foot and drug induced eruptions did not exhibit any statistically significant difference with glycaemic status ($p > 0.05$).

On the whole, it can be stated that the table shows that the lack of glycaemic controls is strongly connected with the increased risk of infection and xerotic changes of the skin, which underlines the need of the process to control the level of glycemia in order to avoid dermatological complications in diabetic patients.

Discussion

In the current research including 200 patients with Type 2 Diabetes Mellitus, the male gender was 59% and the female 41 with a proportion of 1.4: 1. The average age of the participants was 54.6 -10.3 years and most (41%) respondents had the disease at 5-10 years. [Table 1]

The distinctive demographic trends are not something new in the literature.

The dominance was male (60% out of 120 diabetes patients), and the average age was 53.8 years, which is consistent with the current study (Sahoo et al, 2011).[13] The prevalence of males also reported by Bhat YJ et al,[14] (2003) with the mean of the age was between 50-59 years, in support of the present findings, the 200 diabetic patients were more commonly males, with a male preponderance of 58%.[15] In contrast, the duration of diabetes has shown to be slightly female dominant (52 percent) in the cohort by Kumar et al (2019),[16] and make sense (Sharma et al,[17] (2017)) given that the study duration was 41 percent in our case.

In the present study, the most frequent cutaneous manifestations among 200 patients with Type 2 Diabetes Mellitus were infections (58%), followed by xerosis (42%), diabetic dermopathy (31%), acanthosis nigricans (27%), pruritus (22%), candidiasis (18%), vitiligo (6%), diabetic foot ulcer (5%), and drug-induced eruptions (4%). [Table 2]

Infectious Lesions: Infections formed the largest group (58%) in the present study, consistent with findings by Bhat YJ et al,[14] (2003), who reported infections in 49% of diabetic patients, and Sahoo et al. (2011), who found them in 54%. Raghunatha et al,[15] (2014) also observed infections in 60% of cases, highlighting the susceptibility of diabetic skin to bacterial and fungal infections due to altered immune response and hyperglycemia.

Xerosis (Dry Skin): Xerosis was seen in 42% of our cases, a finding comparable to Raghunatha et al,[15] (2014) (38%) and Sharma et al. (2017) (40%). This may be attributed to autonomic neuropathy and reduced sebaceous gland activity in chronic diabetes.

Diabetic Dermopathy: Diabetic dermopathy was found in 31% of our patients, in agreement with Sahoo et al,[13] (2011) (30%) and Kumar et al,[16] (2019) (28%). These lesions are typical in diabetics who have undergone a prolonged period with microangiopathies.

Acanthosis Nigricans: The rate of acanthosis nigricans (27% in our research) is comparable to Sharma et al,[17] (2017) (25%), and Kumar et al (2019) (24%).[16] This lesion has been associated with resistance to insulin, and hence it is common among Type 2

diabetics.

Pruritus: The percentage of pruritus in our patients was 22, which is consistent with Bhat YJ et al,[14] (2003) (20%) and Raghunatha et al,[15] (2014) (18%). The generalized pruritus can be caused by xerosis or Candida infection.

Candidiasis: Our study matched the result of Sahoo et al,[13] and Kumar et al,[16] regarding Candidiasis (18% vs. 15 and 16 of the number of common fungus, respectively).

Vitiligo and Other Lesions: In 6 percent of patients vitiligo was observed, which is nearly that of Raghunatha et al,[15] (2014) (5%). There were fewer cases of diabetic foot (5%), drug-induced eruptions (4%), but this is in line with what is reported by Kumar et al,[16] (2019) (ulcers 4.5%) and Sharma et al,[17] (2017) (drug reactions 3%).

Conclusion

The Type 2 diabetic patients are extremely affected (86%). The findings that are the most common are infections, xerosis, and diabetic dermopathy. A large number of the lesions, correlate with the length and management of diabetes. Regular diabetic screening should include dermatological screening to make sure that they do not miss complications early in their progression.

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Conflicts of interest

There are no conflicts of interest.

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