# Cutaneous manifestations in diabetes mellitus: A study among 500 patients in a tertiary care center in South India

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## Abstract

**Introduction and Objectives:** Mucocutaneous manifestations are seen at one or the other time in diabetes mellitus. The frequency and type of manifestation may be related to the glycemic control and duration of diabetes. This study was conducted to find the hospital based prevalence of mucocutaneous manifestations in patients with diabetes mellitus, their clinical pattern and relationship with glycemic control and duration of the disease.

**Materials and Methods:** Five hundred consecutive patients with diabetes mellitus attending medicine and dermatology OPD were included. Detailed history, clinical examination and investigations were done. Those with gestational diabetes, HIV, internal malignancy, other terminal illnesses and steroid-induced hyperglycemia were excluded.

**Results:** Male to female ratio was 1.63:1. Mucocutaneous manifestations were present in 414(82.6%) patients. Among the various cutaneous manifestations, majority were the dermatoses commonly associated with diabetes, 254(50.8%), followed by cutaneous infections, 219(43.8%). Among the cutaneous infections, fungal infections, 165(33%) were the commonest. There was a statistically significant ($p < 0.05$) increase in cutaneous manifestations in patients who had poor glycemic control compared to good and moderate control. Cutaneous manifestations were more common in patients with diabetes of more than 5 years duration and was statistically significant.

**Conclusion:** Mucocutaneous involvement is common among patients with diabetes mellitus, especially in poorly controlled disease. Cutaneous manifestations increase with the duration of the diabetes. Proper skin care and long-term control of blood glucose levels may reduce the risk of development of some of the skin lesions and improve the quality of life in diabetic subjects.

**Keywords:** Diabetes, Glycemic control, HbA1c levels, Mucocutaneous manifestations.

## Introduction

Skin is a window through which internal organs can be visualised. Many a times, skin manifestations may help in the diagnosis of internal diseases. Cutaneous manifestations play a significant role in the early diagnosis and management of the disease. Diabetes mellitus (DM) is one of the commonest endocrine disorders. The prevalence of DM is increasing worldwide, possibly due to the change in lifestyle, dietary habits and many more factors.

Cutaneous manifestations of DM may vary depending on the duration of the disease and glycemic control. Almost all patients with DM eventually manifest skin changes due to the long-term effects of hyperglycemia on microcirculation and skin collagen.[1] Also, anti diabetic drugs can be associated with cutaneous side effects. Furthermore, diabetes-related cutaneous lesions may serve as a portal of entry for microorganisms and eventual secondary infections.

Although cutaneous manifestations appear subsequent to the development of DM, they may be the first/ presenting sign or even precede the diagnosis of diabetes by years.[2] Thus, skin manifestations may help in early diagnosis of diabetes.

The measurement of glycated haemoglobin (HbA1c) is the standard method of assessing long term glucose control.[3] Pattern of skin manifestations may vary depending on the glycemic control, measured by levels of HbA1c. Further, the pattern of cutaneous manifestations may also vary with the duration of the disease. Hence we did this study to find the hospital based prevalance of mucocutaneous manifestations in patients with DM, the clinical pattern of mucocutaneous lesions among them and the relation of these mucocutaneous manifestations with the glycemic control and the duration of diabetes.

## Materials and Methods

Institutional ethical committee clearance was obtained before starting the study. Five hundred consecutive patients with DM attending medicine and dermatology OPD of our hospital, over a period of 12 months (January 2013 to December 2013) irrespective of duration of diabetes willing to participate in the study were included. Those with gestational diabetes, HIV, internal malignancy, other terminal illnesses and steroid-induced hyperglycemia were excluded from the study.

After obtaining an informed consent, detailed history regarding the duration of diabetes, cutaneous symptoms, other systemic diseases and treatment history was taken. Detailed cutaneous and systemic examinations were done and findings entered in a proforma designed for the study. Fasting and post prandial blood sugar levels, HbA1c, complete hemogram, urine analysis were done for all patients. Relevant microbiological and histopathological investigations were done wherever necessary.

Descriptive statistics like mean, frequency and percentage were calculated. Chi square test was done to analyse data wherever necessary.

## Results

Among 500 patients with DM, 311(62.2%) were males and 189(37.9%) were females with a male to female ratio 1.63:1. Youngest patient was aged 10 years and the eldest, 88 years, with a mean age of 58.3±11.8 years. DM was more prevalent in the 51-60yrs age group ie, 172(34.4%), followed by 41 to 50yrs group 143(28.6%).

Four (0.8%) patients had type 1 DM and 496(99.2%) had type 2 DM.The duration of DM varied between 0(newly diagnosed cases) to 35 years, with a mean duration of 9.69 ± 4.85 years. Majority i.e 260(52%) had diabetes for a duration 1-5 years. Four hundred and ninteen (83.8%) patients were taking oral hypoglycemic agents, 18(3.6%) were on insulin, 21(4.2%) were taking both and 42(8.4%) were not on any treatment.

Based on the levels of HbA1c >8% refers to uncontrolled DM, 7.1-8% refers to moderate control and,<7% refers to good control of DM. Majority, 248(49.6%) had uncontrolled diabetes, 117(23.4%) had a moderate control & 135(27%) had good contol.

Associated systemic diseases were present in 140(28%) patients. Most common being hypertension in 102(20.4%) patients, followed by dyslipidemia 21(4.2%), ischemic heart disease 4(0.8%), hypothyroidism and pulmonary tuberculosis 3(0.6% each), cerebrovascular accident and epilepsy 2(0.4% each).

Based on the cutaneous manifestations of DM, we categorized the patients into 7 groups, i.e, 1) Cutaneous infections, 2) Neuropathic and ischemic diabetic skin disease, 3) Dermatoses associated with microangiopathy 4)Metabolic skin diaseases 5) Dermatoses commonly associated with diabetes 6) Cutaneous reactions to therapy of diabetes (Table1) and 7) Nonspecific skin diseases. (Table 2)

In our study, 414(82.8%) had cutaneous manifestations. Dermatoses commonly associated with diabetes were the most common category present in 254(50.8%) patients. Cutaneous infections were seen in 219(43.8%), dermatoses associated with microangiopathy in 9(1.8%), neuropathic & ischemic skin disease and metabolic skin disease in 3(0.6%) patients each and nonspecific dermatoses in 58(11%) patients. Some patients had multiple skin manifestations.

Among cutaneous infections, fungal infections 164(32.8%) were commonest, followed by bacterial 320(6.4%), viral 21(4.2%) and parasitic infestations 2(0.4%).

Among fungal infections, candidiasis 85(17%) topped the list, followed by dermatophytoses 53(10.6%), pityriasis versicolor 8(1.6%), and mucormycosis 1(0.2%). Candidial balanophosthitis (Fig. 1), found in 33(6.6%) patients was the single most common fungal infection.

Among the bacterial infections, furunculosis was the commonest 12(2.4%) folowed by folliculitis 11(2.2%), cellulitis and actinomycetoma 2(0.4%) each, impetigo, ecthyma, carbuncle, necrotising fascitis and acute paronychia in 1(0.2%) each.

Herpes zoster seen in 6(3%) patients was the most common viral infection followed by warts in 8(1.6%) patients.

Dermatoses associated with microangiopathy were observed in 9 patients (1.8%). Among them 6(1.2%) had diabetic dermopathy (Fig. 2), 2(0.4%) had granuloma annulare and 1(0.2%) patient had diabetic bullae (Fig. 3).

Neuropathic and ischemic diabetic skin disease was present in 11(2.2%) paients, among whom, 7(1.4%) had diabetic foot and 4(0.8%) had peripheral vascular disease.

Xanthelasma palpebrerum, found in 3(0.6%) patients was the only dermatological manifestation due to metabolic condition.

Dermatoses commonly associated with diabetes in our study were, acrochordons (Fig. 4) in 71(14.4%), cherry angiomas 44(8.8%), psoriasis 43(8.6%), generalised pruritus 23(4.6%), acanthosis nigricans 22(4.4%), lichen planus 21(4.2%), vitiligo 14(2.8%), diagonal ear lobe crease 6(1.2%), terry nails 4(0.8%), acquired perforating dermatosis, pigmented purpuric dermatosis and localised cutaneous amyloidosis 2(0.4%) each.

Of the 458 patients, 458(91.6%), on anti-diabetic treatment, 2(0.4%) patients presented with insulin lipodystrophy. No complications due to oral antdiabetic drugs was noted.

Diabetes was diagnosed based on the presence of cutaneous manifestations in 34(6.8%) patients. Among them, majority, 21(61.76% of newly diagnosed patients) presented with cutaneous infections. Psoriasis, acrocordon and generalised pruritis were present in 2 patients each, lichen planus, vitiligo and foot ulcers in one patient each.

Increased frequency of cutaneous manifestations were seen in patients with uncontrolled diabetes, compared to patients with good and moderately controlled diabetes and was statistically significant ($p<0.05$) (Table 3). Similarly, cutaneous manifestations were more common with longer duration of the diabetes (>5 years) and was statistically significant ($p<0.05$) (Table 4). We also found infectious dermatoses to be more common among patients with early diabetes while non infectious dermatoses were more common with increase in the duration of DM.

**Fig. 1:** Candidial balanoposthitis

**Fig. 2:** Diabetic dermopathy over shins

**Fig. 3:** Diabetic bulla over dorsum of right foot

**Fig. 4:** Acanthosis nigricans with acrochordons over the neck

**Table 1:** Various dermatoses in patients with diabetes mellitus

| Category of Dermatoses | Dermatoses | Number (n=500) (%) |
|---|---|---|
| **Cutaneous infections** | Fungal infections | 164(32.8) |
| | Bacterial infections | 32(6.4) |
| | Viral infections | 21(4.2) |
| | Parasitic infestations | 2(0.4) |
| **Neuropathic and ischemic diabetic skin disease** | Diabetic foot ulcer | 7(1.4) |
| | Peripheral vascular disease | 4(0.8) |
| **Dermatoses associated with microangiopathy** | Diabetic dermopathy | 6(1.2) |
| | Granuloma annulare | 2(0.4) |
| | Bullous diabeticorum | 1(0.2) |
| **Metabolic skin disease** | Xanthelasma palpabrarum | 3(0.6) |
| **Dermatoses commonly associated with diabetes mellitus** | Acrochordons | 71(14.4) |
| | Cherry angiomas | 44(8.8) |
| | Psoriasis | 43 |
| | Generalized pruritus | 23(4.6) |
| | Acanthosis nigricans | 22(4.4) |
| | Lichen planus | 21(4.2) |
| | Vitiligo | 14(2.8) |
| | Diagonal ear lobe crease | 06(1.2) |
| | Terry' s nails | 04(0.8) |
| | Pigmented purpuric dermatoses | 02(0.4) |
| | Perforating dermatoses | 02(0.4) |
| | Localized cutaneous amyloidosis | 02(0.4) |
| **Dermatoses due to complication of diabetes treatment** | Insulin lipodystrophy | 2(0.4) |

**Table 2:** Various nonspecific dermatoses in patients with diabetes mellitus

| S. No | Dermatoses | Number (n=500) (%) | S. No | Dermatoses | Number (n=500) (%) |
|---|---|---|---|---|---|
| 1. | Seborrheic keratoses | 58(11.6) | 18. | Alopacia areata | 02(0.4) |
| 2. | Xerosis | 30(6.0) | 19. | Lentigines | 02(0.4) |
| 3. | Eczema | 24(4.8) | 20. | Senile comedones | 02(0.4) |
| 4. | Idiopathic guttate hypomelanosis | 23(3.6) | 21. | Acne vulgaris | 01(0.2) |
| 5. | Lichen simplex chronicus | 09(1.8) | 22. | Solar melanosis | 01(0.2) |
| 6. | Contact dermatitis | 08(1.6) | 23. | Air borne contact dermatitis | 01(0.2) |
| 7. | urticaria | 05(1.0) | 24. | Miliaria | 01(0.2) |
| 8. | Cutaneous vasculitis | 04(0.8) | 25. | Keloid | 01(0.2) |
| 9. | Acquired icthyosis | 03(0.6) | 26. | Sebaceous cyst | 01(0.2) |
| 10. | Seborrhoeic dermatitis | 03(0.6) | 27. | Discoid lupus erythematosus | 01(0.2) |
| 11. | Polymorphous light eruptions | 03(0.6) | 28. | Squamous cell carcinoma | 01(0.2) |
| 12. | Rosacea | 03(0.6) | 29. | Syringoma | 01(0.2) |
| 13. | Chronic actinic dermatitis | 03(0.6) | 30. | Actinic cheilitis | 01(0.2) |
| 14. | Melasma | 03(0.6) | 31. | Baboon syndrome | 01(0.2) |
| 15. | Hirsuitism | 03(0.6) | 32. | Hidradenitis suppurativa | 01(0.2) |
| 16. | Addisonian pigmentation | 02(0.4) | 33. | Pachydermoperiostoses | 01(0.2) |
| 17. | Erythema multiforme | 02(0.4) | | | |

**Table 3:** Relationship of cutaneous manifestatons with glycemic control

| Control status of Diabetes mellitus | Total no. of patients | No. of patients with cutaneous manifestations (%) | No. of patients without cutaneous manifestations (%) |
|---|---|---|---|
| **Controlled diabetes mellitus (HbA1c<8%)** | 252 | 189(75%) | 63(25%) |
| **Uncontrolled diabetes mellitus (HbA1c>8%)** | 248 | 225(90.72%) | 23(9.28%) |

**Table 4:** Relationship of cutaneous manifestations with duration of diabetes

| Duration of diabetes | Total no. of patients | No. of patients with cutaneous manifestations (%) | No. of patients without cutaneous manifestations (%) |
|---|---|---|---|
| **< 5 years** | 347 | 269(77.52%) | 78(22.48%) |
| **> 5 years** | 153 | 145(94.77%) | 8(5.23%) |

## Discussion

Skin is like a mirror that reflects the internal diseases. DM is a systemic disease that affects every organ system, including skin. In fact, cutaneous findings may be the first indicator of the disease. The prevalence of cutaneous manifestations has varied from 61% to 89.7% in earlier studies.[4-6] In our study, 86.2% patients had cutaneous manifestations. Majority of the patients belonged to the 5th and 4th decade comprising 34.4% and 28.6% respectively. Cutaneous manifestations were also more common in patients belonging to 5$^{th}$ decade followed by 4$^{th}$ decade. Similar frequencies were seen in earlier studies by Mahajan *et al*,[5] Nigam and Pande[4]

In our study, dermatoses having association with diabetes were the most common cutaneous manifestations (50.8%), followed by cutaneous infections (43.8%) Bhat *et al*[7] reported similar findings, while Mahajan *et al*,[5] Rao et al,[8] Nigam and Pande,[4] Tamshina *et al*,[6] Vahora *et al*[9] reported infections to be the most common cutaneous manifestation.

Among the various dermatoses associated with diabetes, acrochordons were the most common, seen in 14.4% patients. Acrocordons were also single most common dermatoses found in our study. Previous studies have reported an association between multiple acrochordons and diabetes.[10] Acanthosis nigricans, a sign of insulin resistance was observed in 4.4% patients. Increased insulin binds to insulin like growth factor receptors, stimulating growth of keratinocytes and dermal fibroblasts, resulting in development of acanthosis nigricans.[11]

Generalised pruritus is one of the coomon conditions seen in DM. This could be due to associated xerosis among these patients. Advanced Glycosylation end products of stratum corneum proteins or autonomic neuropathy may be attributed to the pathogenesis of xerosis and pruritus in DM.[12] Generalised pruritus was found in 4.6% of our patients. Pruritus was reported in 4.5% by Nigam and Pande,[4] 10% by Mahajan *et al*[5] and 15.2% by Timshina *et al*.[6]

Psoriasis until recently was only thought to be a cutaneous disease. Recently, psoriasis has been increasingly associated with metabolic syndrome, diabetes, hypertension and other diseases.[13] Psoriasis was reported in 3% patients

by Mahajan *et al*,[5] 2.2% and by Timshina *et al*.[6] We observed psoriasis in 8.6% of patients in our study.

Infections were one of common dermatoses observed in our study, which was present in 43.8% patients. Impaired chemotaxis, leucocyte adherence and phagocytosis and impaired immunity in uncontrolled diabetes and ketoacidosis predisposes them to prolonged and recurrent infections.[14]

Fungal infections formed largest group of cutaneous infections found in 32.4% of patients. Fungal infections were common in studies by Mahajan *et al*[5] (54.68%) and Bhat *et al*[7] (34.34%)

Diabetic microangiopathy is characterised by thickening of capillary basement membrane leading to progressive occlusion of vascular lumen causing impaired perfusion.[15] In our study, 1.8% had dermatoses associated with microangiopathy, wherein 1.2% had diabetic dermopathy, 0.4% had granuloma annulare and 0.2% had diabetic bullae. Diabetic dermopathy has been considered as one of the most common cutaneous manifestations, reported in upto 50% of patients in western literature, in contrast to lower incidence in Indian patients. This may possibly be due to dark complexion in our country, rendering it difficult to detect.[1] Raghunatha *et al*[1] reported 0.2% of diabetic dermopathy and 0.4% diabetic bullae. Nigam and Pande[4] reported 3.5% & 1%of diabetic bullae, similar to our study. We did not come across any case of necrbiosis lipoidica diabeticorum or rubeosis facei.

In our study, diabetic foot ulcers were seen in 1.4% patients. Bhat *et al*,[7] in their study, observed 4 cases of diabetic foot ulcers. Mahajan *et al*,[5] Rao et al,[9] Raghunatha *et al*[1] and Nigam and Pande[5] found diabetic foot ulcers in 8,1,1 and 6 cases respectively.

Only 0.4% of our patients presented with lipodystrophy secondary to insulin therapy, while Raghunatha *et al*[1] found 1.8% affected.

Diabetes was diagnosed due to the presence of cutaneous manifestations in 6.8% patients.

Rao *et al*[8] reported newly detected cases in 19.32% in their study. Cutaneous manifestations can heighten the suspicion of a physician regarding the diagnosis of diabetes. This further helps to prevent both cutaneous and systemic derangements by early institution of appropriate treatment.

## Conclusions

Cutaneous manifestations are common in patients with DM. The hospital based prevalence of cutaneous manifestations was 82.8 percent.

The frequency of cutaneous manifestations was significantly associated with both uncontrolled and longer duration of diabetes.

Dermatologists may play an important role in early detection and control of diabetes. This helps in reducing the morbidity and improves the of quality of life in these patients. Proper skin care and long-term control of blood glucose levels may reduce the cutaneous involvement.

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**Conflict of interest:** None.

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