

Original Research Article

A cross sectional study of cutaneous manifestations in 300 patients of diabetes mellitus

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ABSTRACT

Background: Diabetes Mellitus (DM) is a worldwide problem and one of the most common endocrine disorder. The skin is affected by both the acute metabolic derangements and the chronic degenerative complications of diabetes.

Methods: The present study was a one-year cross sectional study from January 2014 to December 2014. All confirmed cases of DM with cutaneous manifestations irrespective of age, sex, duration of illness and associated diseases, willing to participate in the study were included in the study. Routine haematological and urine investigations, FBS, RBS and HbA1c levels were carried out in all patients.

Results: A total of 300 patients of diabetes mellitus with cutaneous manifestations were studied. Majority belonged to the 4th decade (33%) and 3rd decade (27.7%) respectively. Males constituted 65% of the cases and male to female ratio was 1.85:1. Type 2 DM was most commonly observed (96%). Among the 300 diabetic patients, 73 patients (24.3%) had good control of DM with HbA1c levels in the range of 6.5-7% while 132 patients (44%) had a poor control of DM with HbA1c levels >8%. Hypertension was the most commonly associated systemic illness (37.6%). Cutaneous infections (63%) were the most commonly observed manifestation of which fungal infections (35.3%) were most frequently observed. Some of the other dermatoses observed were generalized pruritus (15.3%), acrochordons (11%), acanthosis nigricans (6%), diabetic dermopathy (5.33%), diabetic foot (3%), peripheral vascular disease (2.66%), vitiligo (2.66%), xanthelasma palpebrarum (2.33%), diabetic bullae (1%). Cutaneous infections, dermatoses associated with microangiopathy were more common in the uncontrolled diabetic patients which was statistically significant.

Conclusions: Infections were the most common cutaneous manifestations in diabetics followed by dermatoses most commonly associated with diabetes. Proper skin care and long-term control of blood glucose levels may reduce the risk of some of the skin diseases.

Keywords: Cutaneous manifestations, Diabetes mellitus, Glycosylated hemoglobin

INTRODUCTION

Diabetes Mellitus (DM) is a worldwide problem and one of the most common endocrine disorder affecting 8.3% of the population.¹ Its prevalence is increasing due to increase sedentary lifestyle in the general population. Abnormalities of insulin and elevated blood glucose

levels lead to metabolic, vascular, neurological and immunological abnormalities. The skin is affected by both the acute metabolic derangements and the chronic degenerative complications of diabetes. Although the mechanism of many diabetes associated skin conditions remains unknown. Diabetes has a profound effect on both cells mediated and humoral immunity and also on the

function of polymorphonuclear cells that predisposes these individuals to a variety of infections. Microcirculatory alteration, lipid profile alteration and glycosylation of proteins with production of advanced glycosylated end product and their deposition in the basement membrane results in cutaneous manifestations in diabetic patients.² Endothelial functions also affected in diabetes mellitus.³ Abnormal carbohydrate metabolism, atherosclerosis, microangiopathy, neuropathy and impaired host immune mechanisms all play a role in the pathogenesis of cutaneous complications.⁸ Skin manifestations can be the first presenting sign of diabetes but more often appear in known diabetic patients during the course of the disease as observed in 43-66% of diabetic patients.⁴

The aims and objectives were to study the clinical pattern of cutaneous manifestations in patients of diabetes mellitus, the relation of these cutaneous manifestations with demographic data like age, sex and duration of diabetes, and to compare the cutaneous manifestations in controlled and uncontrolled diabetes.

METHODS

Study includes a total number of 300 patients of type 1 and type 2 diabetes mellitus with cutaneous manifestations attending dermatology OPD were included in study conducted in duration for 1year.

The patients with all confirmed (old and new) cases of diabetes mellitus with cutaneous manifestations irrespective of age, sex, duration of illness and associated diseases, willing to participate in the study were included. The patients not willing to participate in the study were excluded.

Ethical clearance was obtained. In the selected patients, a detailed history with reference to demographic details, family history of similar complaints and of DM, duration of DM treatment details, duration of various symptoms and evolution of lesions was taken. The patients will be clinically examined in good light for various cutaneous manifestations of DM such as skin lesions, nail changes, mucous membrane involvement.

Following investigations were done in all the patients:

- Routine haematological and urine investigations such as Hb%, TC, DC, ESR, RBS, urine routine and microscopy will be done in all patients,
- Fasting blood sugar, random blood sugar,
- Glycosylated (glycated) haemoglobin (HbA1c),
- Investigations will be done to diagnose cutaneous manifestations associated with DM.
 - Potassium hydroxide mount,
 - Gram staining,
 - Bacterial and fungal culture,
 - Skin biopsy,

The comparison of cutaneous manifestations in controlled and uncontrolled diabetes mellitus was done using Chi-square test.

RESULTS

The present study was undertaken to know the spectrum of cutaneous manifestations in diabetes mellitus. Majority belonged to the 4th decade (33%) and 3rd decade (27.7%) respectively (Table 1).

Table 1: Age distribution.

Age	Frequency	Percentage
10-20	2	0.7
21-30	17	5.7
31-40	83	27.7
41-50	99	33.0
51-60	61	20.3
61-70	30	10.0
71-80	8	2.7
Total	300	100.0

Males constituted 65% of the cases and male to female ratio was 1.85:1. About 51.3% of the patients had diabetes for a duration for 1-5years and 22% patients for 6-10 years (Table 2).

Table 2: Duration of diabetes mellitus.

Duration of DM (years)	Frequency	Percentage
<1	57	19.0
1-5	154	51.3
6-10	66	22.0
>10	23	7.7
Total	300	100.0

Type 2 DM was most commonly observed (96%) as compared to Type 1 DM (4%). Majority of the patients had RBS levels in the range of 140-200mg/dl (42.7%), while 62 patients (20.7%) had blood sugar levels of >200mg/dl.

Around 73 patients (24.3) had good control of DM with HbA1c levels in the range of 6.5%-7% while 132 patients (44%) had a poor control of DM with HbA1c levels >8%.

Hypertension was the most commonly associated systemic illness (37.6%) followed by ischemic heart disease (15.33%) and hypothyroidism (5.3%). Among the various cutaneous manifestations observed, cutaneous infections (63%) were the most commonly observed (Table 3). Among the cutaneous infections, fungal infections (35.3%) were most frequently observed, followed by bacterial infections (20%) and viral infections (7.66%). Dermatophytosis was the most commonly observed fungal infections (74 cases) followed by candida infections (16 cases).

Table 3: Pattern of cutaneous manifestations.

Dermatoses	No. of cases	%
Cutaneous infections	189	63
Dermatosis associated with microangiopathy	23	7.67
Neuropathic and ischemic diabetic skin disease	22	7.33
Metabolic disease	7	2.33
Dermatosis more commonly associated with diabetes	140	46.67
Nonspecific manifestations	103	34.33

Table 4: Dermatoses commonly associated with DM.

Dermatoses	No. of cases
Generalized pruritus	46
Acrochordons	33
Acanthosis nigricans	18
Psoriasis	13
Lichen planus	11
Vitiligo	8
Perforating folliculitis	4
Macular amyloidosis	3
Alopecia universalis	2
Progressive pigmented purpura	1
Cherry angiomas	1

Dermatoses associated with microangiopathy were observed in 20 patients (6.66%), of which 16 (5.33%) had diabetic dermopathy and 4 patient (1.3%) had diabetic bullae. Among the 22 patients of neuropathic and ischemic diabetic skin disease (Table 3), 9 patients each (3%) had diabetic foot ulcers, 8 patients (2.66%) had peripheral vascular disease and 5 patients had fissure feet. Dermatological manifestations due to metabolic condition were xanthelasma palpebrarum seen in 7 patients (2.33%). Various dermatoses more commonly associated with diabetes were generalized pruritus (15.3%), acrochordons (11%), acanthosis nigricans (6%), psoriasis (4.33%), lichen planus (3.66%) vitiligo (2.66%), perforating folliculitis (1.33%), granuloma annulare (1%), macular amyloidosis (1%), alopecia universalis (0.66%), progressive pigmented purpura (0.33%) and cherry angioma (0.33%) (Table 4). Various non-specific manifestations like eczema (10%), seborrheic keratosis (5%), urticaria (2.33%), pemphigus and seborrheic dermatitis (2%), lichen planus chronicus hypertrophicus (1.66%), 4 cases (1.33%) each of DPN, contact dermatitis, scabies and polymorphous light eruption, 2 cases (0.66%) each of drug reaction, erythema multiforme, keloid and parapsoriasis were observed. Cutaneous infections, dermatoses associated with microangiopathy, dermatoses associated more commonly, metabolic disorder and non-specific manifestations were more common in the uncontrolled diabetic patients (Table 5).

Table 5: Comparison between controlled and uncontrolled DM.

Dermatoses	Controlled DM (<7%)		Uncontrolled DM (>7%)		P-Value	Interpretation
	n	%	n	%		
Cutaneous infections	67	35.45	122	64.55	0.000	Significant Diff.
Dermatoses associated with microangiopathy	3	13.04	20	86.96	0.000	Significant Diff.
Neuropathic and ischemic diabetic skin disease	6	27.27	16	72.73	0.033	Significant Diff.
Metabolic conditions	1	14.29	6	85.71	0.059	No Significant Diff.
Dermatoses commonly associated with DM	42	30	98	70	0.000	Significant Diff.
Non-specific manifestations	35	33.98	68	66.02	0.001	Significant Diff.

DISCUSSION

In the present study of 300 patients of DM with cutaneous manifestations, maximum patient was seen in age range 40-50years with 99 (33%) out of 300. The frequencies of patients with cutaneous manifestations in the first, second, third, fifth, sixth and seventh decade was 0.7%, 5.7%, 27.7%, 20.3%, 10% and 2.7% respectively. Similar frequencies were reported by various studies carried out Mahajan S et al, Nigam PK et al, and Sawhney MP et al, which are well in accordance

with the above frequencies.⁴⁻⁶ The relative increase in the incidence of cutaneous involvement with age in diabetic patients may be attributed merely to the decreased resistance of body as well as long duration of diabetes in these patients. In the current study, male diabetics were more prone for cutaneous manifestations than females, with male to female ratio of 1.85:1. Rao GS et al, Goyal A et al, and Chatterjee N et al, also observed male predominance in diabetic patients.^{7,12,13} However, this was in contrast with the study of Mahajan S et al, and Nigam PK et al, who reported that female diabetic patients had significantly higher incidence of cutaneous

manifestations.^{4,5} In the present study, 51.3% of the patients had diabetes for duration of 1-5years and 22% patients for 6-10years.

Similar results were seen in Rao GS et al study.⁷ Non-insulin dependent diabetes mellitus (Type 2 DM) was most commonly observed (96%) as compared to Insulin dependent diabetes mellitus (type 1 DM) (4%). Similar observations of type 2 diabetes being more common was observed in studies conducted by Mahajan S et al, Nigam PK et al, and Chatterjee N et al.^{4,5,13}

A positive family history of diabetes mellitus was obtained in 108 patients (34%) while 198 patients (66%) gave a negative family history. Majority of the patients had random blood sugar levels in the range of 140-200mg/dl (42.7%), while 68 patients (20.7%) had blood sugar levels of >200mg/dl.

Among the 300 diabetic patients with cutaneous manifestations, 86 patients (28.7%) had good control of DM with HbA1c levels in the range of 6.5%-7%, while 132 patients (44%) had a poor control of DM with HbA1c levels >8%. Uncontrolled diabetes increases the risk of development of microangiopathy, related complications and predisposes skin for various infections.

Of the 300 patients, 166 patients (55.3%) had associated systemic co-morbidity, such as hypertension in 113 patients (37.6%), ischemic heart disease in 46 patients (15.3%) and hypothyroidism in patients (5.33%). Similar frequencies were reported by Mahajan S et al, and Bhat et al.^{4,8} Hypertension has been hypothesized to accelerate the process of microangiopathy in diabetics.

In the present study, among the various dermatological manifestations, infections were the most common dermatoses (63%), followed by dermatoses having a more common association with diabetes (47.66%), followed by non-specific cutaneous manifestations (34.33%), followed by due to microangiopathy (6.66%), neuropathic and ischemic diabetic skin disease (7.33%), metabolic diseases (2.33%) and cutaneous reactions to therapy for diabetes (0.67%) Similar findings were reported by other studies.⁴⁻⁷

Infections were the most common dermatoses (63%), of which fungal infections were most prevalent (35.3%), followed by bacterial infections (20%) and viral infections (7.66%). This was in accordance with other studies where fungal infections were more common, as observed by Mahajan S et al, (54.68%) and Bhat YJ et al, (34.34%).^{4,8} Fungal agents formed largest group of cutaneous lesions and it may be because most of the patients belonged to lower socio economic group residing in hot and humid conditions, overcrowding and decreased resistance of the body predisposes the individuals for such infections. The incidence of cutaneous infections was more in uncontrolled diabetics.

In the present study, 20 patients (6.66%) had dermatoses associated with microangiopathy, wherein 16 patients (5.33%) had diabetic dermopathy and 4 patients (1.3%) had diabetic bullae. Most of the western studies report a high frequency of diabetic dermopathy (50%), as compared to 17.8% in Indian patients. Similarly, Mahajan S et al, in their study of 100 diabetics, found diabetic dermopathy in 6 patients and 2 cases of diabetic bullae.⁴

Of the 22 patients with neuropathic and ischemic diabetic skin disease, 8 patients had peripheral vascular disease, 9 patients had diabetic foot ulcers and 5 patients had fissure feet. According to Mahajan S et al, Rao GS et al, Al-Mutairi N et al, diabetic foot ulcers were reported in frequencies of 8, 1 and 2 cases respectively.^{4,7,10}

Among the various dermatoses studied, generalized pruritus was the most common seen in 46 patients (15.3%) followed by acrochordons in 33 patients (11%), 18 patients (6%) had acanthosis nigricans, 13 patients (4.33%) had psoriasis, 11 patients (3.66%) had lichen planus, 8 patients (2.66%) had vitiligo, 4 patients (1.33%) had perforating folliculitis, 3 patients each (1%) had macular amyloidosis and granuloma annulare, 2 patients (0.66%) had alopecia universalis, 1 patients each (0.33%) had cherry angiomas and progressive pigmented purpura. The above-mentioned dermatoses have been reported previously in studies conducted by and Al-Mutairi N et al, and Paron NG et al.^{10,11}

Acanthosis nigricans and acrochordons are manifestations of insulin resistance, which may be present before the expression of DM. Increased levels of insulin act on insulin like growth factor (IGF) receptors, resulting in development of acanthosis nigricans. In a study by Nigam PK et al, dermatoses associated with an increased incidence of DM, like vitiligo (4), lichen planus (2), acquired perforating dermatoses (3) were detected.⁵

Of the 103 patients who presented with non-specific manifestations, majority of them had eczema 30 (10%), 15 patients (5%) had seborrheic keratoses, 7 patients (2.33%) had urticaria, 6 patients each (2%) had pemphigus and seborrheic dermatitis, 5 patients (1.66%) had lichen simplex chronicus hypertrophicus, 4 patients each (1.33%) had DPN, contact dermatitis, scabies and polymorphous light eruption, 3 patients each (1%) had prurigo nodularis and androgenic alopecia, 2 patients each (66%) had drug reactions, erythema multiforme, keloid and parapsoriasis and one case each (0.33%) of sebaceous cyst, dermatitis herpetiformis, senile comedones and melasma. The occurrence of nonspecific cutaneous disorders also has pathogenetic, prognostic, and therapeutic importance in diabetic patients. These disorders could also increase the likelihood of exposure to contact allergens resulting in eczemas.⁹

Among the 300 diabetic patients with cutaneous manifestations, 154 patients had HbA1c <8% (good to moderate control) while 132 patients had a poor control

of diabetes (HbA1c >8%) the present study, when a comparison of pattern of cutaneous manifestations in the controlled and uncontrolled groups was done, it was found that the cutaneous infections, dermatoses associated with microangiopathy, neuropathic and ischemic diabetic skin disease and dermatoses more commonly associated were more common in the uncontrolled group, which was statistically significant ($P < 0.05$). The increased frequency of non-specific manifestations in the controlled group was meaningfully significant.

CONCLUSION

The present study was undertaken to know the spectrum of cutaneous manifestations in diabetes mellitus. Infections were the most common cutaneous manifestations in diabetics, followed by dermatoses most commonly associated with diabetes.

Cutaneous manifestations are more common in patients who have overall poor glycemic control which in turn is reflected by high HbA1c value. Cutaneous manifestations can heighten the suspicion of a physician regarding the diagnosis of diabetes. This further helps to prevent systemic derangements by early institution of appropriate treatment.

Proper skin care and long-term control of blood glucose levels may reduce the risk of some of the skin lesions in diabetic subjects. Thus, dermatologists can play an important role in reducing dermatologic morbidity, improvement of quality of life and management strategy of diabetic patients.

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