

A STUDY OF THE CUTANEOUS MANIFESTATIONS IN PATIENTS OF DIABETES MELLITUS

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Abstract

Introduction: The incidence of cutaneous manifestations in diabetes mellitus (DM) varies from 11.3% to 70.6%. The cutaneous manifestations seen in DM appear once the primary disease has developed, but it may also occur with its onset or may even precede DM in some of the cases. Our study is an attempt to analyse the pattern of various types of cutaneous manifestations seen in DM.

Aims & Objectives: To study and analyze the cutaneous manifestations in patients of diabetes mellitus.

Materials and methods: 100 patients with Diabetes Mellitus (type 1 and type 2) were enrolled. Detailed history was taken. Investigations like preprandial & postprandial capillary plasma glucose and HbA1C estimation was done. Diabetes was considered controlled when preprandial capillary plasma glucose was 3.9-7.2mmol/L (70-130 mg/dl), postprandial capillary plasma glucose < 180 mg/dl and HbA1C < 7.0%.

Results: Cutaneous infections were the commonest manifestations present in 71% of patients. Out of 100 patients 50 had a superficial fungal infection, 19 had bacterial infections and 6 had viral infections. Amongst cutaneous conditions associated with DM which were present in 67% of patient, skin tags were the commonest (33%). Miscellaneous cutaneous findings were present in 45% patients, nail discoloration was the commonest (11%).

Conclusion: Infections may appear early and remain undetected till DM is finally diagnosed. Majority of patients do not take regular treatment and follow dietary restrictions in early diabetes leading to persistent hyperglycaemic state which predisposes them to infections and other cutaneous manifestations. Presence of cutaneous manifestations must heighten the suspicion of a dermatologist in early diagnosis of DM.

Keywords: Diabetes Mellitus, cutaneous manifestations, cutaneous infections, skin tags, nail discoloration

Introduction

The World Health Organisation (WHO) describes diabetes mellitus (DM) as a chronic multisystem disorder with chronic hyperglycaemia, disturbances of fat, protein and carbohydrate metabolism because of a disturbance in insulin action, secretion or both.

Common symptoms in DM are polyuria, weight loss and blurring of vision, even coma and death can occur due to non-ketotic hyperosmolar state¹. India has the world's largest diabetic population which is approximately 51.8 million.^{2,3}

Classification of Diabetes Mellitus⁴

1. Diabetes Mellitus Type-1
2. Diabetes Mellitus Type-2
3. Other Specific Types of diabetes
4. Gestational Diabetes Mellitus (GDM)

Cutaneous Manifestations

Acute metabolic disturbances and chronic degenerative complications of diabetes mellitus may also affect the skin. The incidence of cutaneous manifestations associated with diabetes mellitus varies from 11.3% to 70.6%.⁵ The cutaneous manifestations seen in DM mostly appear once the primary disease has already developed, but it may also occur coincidentally

with its onset or may even precede DM by many years in some of the cases.

Cutaneous manifestations of diabetes mellitus may be classified as:⁶

1. Cutaneous infections in DM.
2. Cutaneous associations of DM.
3. Cutaneous manifestations of diabetic complications.
4. Cutaneous adverse reactions to the pharmacological treatment of DM.

At times the cutaneous manifestations can be the first presenting sign of diabetes mellitus, hence our study is an attempt to analyse the pattern of various types of cutaneous manifestations seen in DM.

Aims and Objectives

To study and analyze the cutaneous manifestations in patients of diabetes mellitus.

Materials and Methods

The present study was carried out in the Department of Dermatology, Venereology and Leprosy at a tertiary care hospital in Jaipur. A total of 100 consecutive patients of Diabetes Mellitus (type 1 & 2) attending the Department of Medicine and Dermatology were enrolled.

Ethics

Patient's confidentiality was maintained and informed consent was taken for the study. The study was carried out after taking approval from the Institutional Review Board.

Inclusion Criteria:

- Diagnosed cases of Diabetes mellitus willing to participate in the study.

Exclusion Criteria:

- Patients less than 15 years of age.
- Patients with Gestational Diabetes Mellitus.
- Unwilling patients.

Detailed history with special reference to age, sex, rural/urban background, BP, smoking, alcohol intake, duration of diabetes, type of diabetes, type of treatment being taken, complications and family history was taken. A complete general, physical, systemic and dermatological examination was carried in each patient.

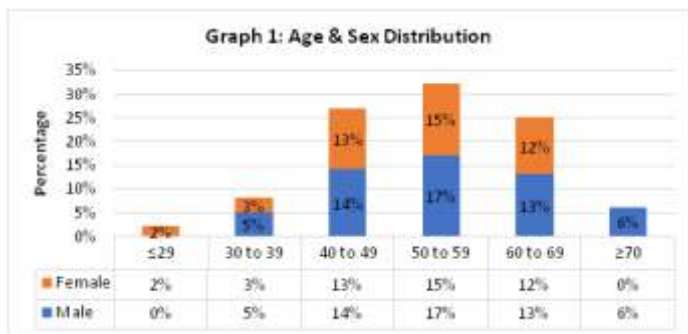
Investigations like haemoglobin, total leukocyte count, differential cell count, preprandial capillary plasma glucose, postprandial capillary plasma glucose, complete urine examination and HbA1C were done in each patient. Assessment of glycaemic control was also done by measuring preprandial capillary plasma glucose, peak postprandial capillary plasma glucose.

Diabetes was considered to be controlled when preprandial capillary plasma glucose 3.9-7.2mmol/L (70-130 mg/dl), peak postprandial capillary plasma glucose < 180 mg/dl and HbA1C < 7.0%

Results

The study group included 100 patients of DM with cutaneous manifestations.

The age group varied from 20-79 years with a mean age of 52 years and SD of 10.52 years. Minimum age was 25 years and maximum 75 years. Maximum number of patients were in 50-59 years (32%) of age group, followed by age group 40-49 years (27%). Majority of the patients were male (55%) and females (45%) with male to female ratio 1.2:1 (Graph 1)



Out of 100 patients 73% of the patients belonged to rural background while 27% were from urban background.

Majority of the patients (48%) were from lower socioeconomic status, followed by 38% from middle socioeconomic and 14% were from upper socioeconomic status.

Majority of the patients were housewives (41%), followed by retired persons (19%) and businesspersons (16%). The miscellaneous group (10%) consisted of priests, tailors,

policemen, astrologers, Anganwadi workers, and so on.

Majority of patients (50%) were overweight, 26% were of normal weight, 21% patients were obese and remaining 3% were underweight. (Table 1)

Table 1. BMI (Kg/m²)

S.No.	BMI	Number of Patients (n=100)			Percentage (%)
		Male	Female	Total	
1	≤18.50 (underweight)	1	2	3	3
2	18.50 to 24.99 (normal)	13	13	26	26
3	25 to 29.99 (overweight)	31	19	50	50
4	≥30 (obese)	14	7	21	21

70% of the patients had type 2 Diabetes Mellitus while only 30% patient was that of type 1 Diabetes Mellitus.

21% of the patients were smoker, 13% were alcoholic and 30% were hypertensive.

Majority of the patients (50%) had duration of diabetes between 1 to 5 years, 21% between 6 to 10 years duration, while 19% had duration less than 1 year, and only 2% patients were having diabetes ≥16 years of duration.

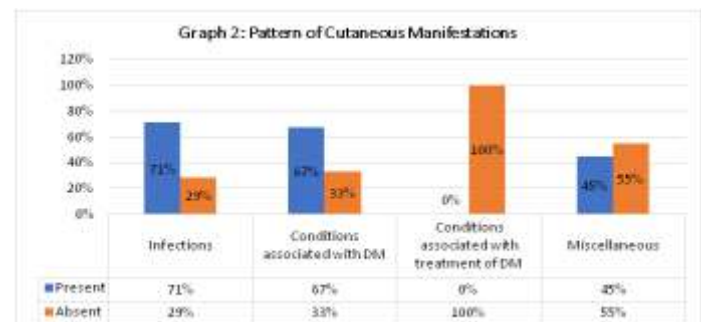
Majority of the patients (60%) were on oral hypoglycaemic drugs, while 33% of the patients were on combination therapy i.e. insulin and oral hypoglycaemic. 7% of the patients were not on any treatment for DM.

53% of the patients were on regular treatment, while 40% were on irregular treatment and 7% were on no treatment. Out of 53% patients on regular treatment, 52.8% patients had controlled diabetes (HbA1C <7) whereas among patients on irregular treatment (40%), 17.5% patients had controlled diabetes. 7% patients who did not take any treatment had uncontrolled diabetes (HbA1c ≥8). (Table 2)

Table 2. Control & Compliance of treatment of Diabetes Mellitus

		Diabetic Control		Total
		Controlled	Uncontrolled	
Compliance of treatment of DM	Regular	28 (52.8%)	25 (47.2%)	53
	Irregular	7 (17.5%)	33 (82.5%)	40
	No treatment	0	7 (100%)	7
Total		36 (36%)	64 (64%)	100

Cutaneous infections were the commonest manifestations present in 71% of patients, followed by the conditions associated with DM, which were present in 67% of patients, miscellaneous cutaneous findings were present in 45% of patients and none of the patient had complications due to treatment of diabetes.



(Graph 2)

Most of the patients in infection group had more than one manifestations. Out of 100 patients 50 had fungal infection, 19 had bacterial infections and 6 had viral infections. None of patient had parasitic infestation (Table 3). Out of 71 patients, 5 patients had single infection and 66 patients had more than one

Table 3. Cutaneous Infections/ Infestations

	Number of Patients (n=71)			Percentage (%)
	Male	Female	Total	
1) Fungal	29	21	50	50
A) Dermatophytosis	23	13	36	36
T.Corporis	10	7	17	17
T. Cruris	9	5	14	14
Onychomycosis	9	5	14	14
T. Pedis	3	1	4	4
T. unguium	2	1	3	3
B) Candidiasis	11	9	20	20
Candidal Balanoposthitis	6	0	6	6
Vaginal Candidiasis	4	2	6	6
Cutaneous Candidiasis	0	5	5	5
Candidal Paronychia	1	2	3	3
2) Bacterial	8	11	19	19
Folliculitis	4	4	8	8
Furunculosis	3	5	8	8
Carbuncle	1	1	2	2
Cellulitis	0	1	1	1
3) Viral	2	4	6	6
Herpes Simplex	0	3	3	3
Herpes Zoster	2	1	3	3

infection.

The cutaneous conditions associated with DM were present in 67% of the patients. Among the cutaneous conditions skin tags were the most common (33%), followed by cherry angioma in

Table 4. Cutaneous conditions associated with Diabetes Mellitus

S.No.		Number of Patients			Percentage (%)
		Male	Female	Total	
1	Skin Tags / Acrochordons	15	18	33	33
2	Cherry Angioma	13	8	21	21
3	Xerosis	8	11	19	19
4	Acanthosis Nigricans	7	11	18	18
5	Generalised Pruritus	7	5	12	12
6	Xanthelasma Palpebrarum	5	3	8	8
7	Diabetic Dermopathy	5	2	7	7
8	Yellow Discolouration of skin	3	2	5	5
9	Diabetic Thick Skin	2	0	2	2
10	Rubeosis Faciei	1	1	2	2
11	Granuloma Annulare	0	1	1	1

21%, xerosis in 19% etc. (Table 4)

Miscellaneous cutaneous findings were present in 45% of total cases, discolouration of nail was the commonest (11%), followed by decreased hair over lower legs in 10%, eczemas in 10%, psoriasis in 5% etc. (Table 5)

Table 5. Miscellaneous Cutaneous Findings

S.No.		Number of Patients			Percentage (%)
		Male	Female	Total	
1	Discolouration of Nail	11	0	11	11
2	Decreased hair on lower leg	7	3	10	10
3	Eczemas	6	4	10	10
4	Psoriasis	3	2	5	5
5	Pigmented Purpuric Dermatoses	3	2	5	5
6	Lichen Planus	1	3	4	4
7	Seborrheic Keratosis	2	2	4	4
8	Alopecia	2	1	3	3
9	Nevus	1	2	3	3
10	Macular Amyloidosis	0	2	2	2
11	Vitiligo	1	1	2	2
12	Prurigo nodularis	0	2	2	2
13	Perforating dermatosis	0	1	1	1
14	Syringoma	0	1	1	1
15	Urticaria	1	0	1	1
16	Acne keloidalis nuchae	1	0	1	1

Cutaneous infections were the commonest complications (46%) in inadequate and poorly controlled diabetes (i.e. HbA1c ≥ 7). Fungal Infections were the commonest (50%) among infections followed by bacterial (19%) and viral (6%) in all these groups. Diabetes associated complications and miscellaneous cutaneous findings were also more frequent among inadequate and poorly controlled diabetes i.e. 72.4% and 51.7% respectively.

Majority of patients had 3 (26%), 4 (25%) and 2 (21%) cutaneous manifestations followed by 1 (12%), 5 (9%), ≥ 6 (7%) cutaneous manifestations per patients.

Discussion

Diabetes Mellitus is the most common endocrine disorder that involves the skin. Many cutaneous disorders are associated with DM. Dermatological signs of DM mostly appear once the primary disease has developed but may also appear coincidentally in early stages or even precede DM by years.

In the present study, majority of the patients were in the age group of 50-60years (32%). This is in agreement with various studies done by Sawhney et al (1990)¹⁶, Mahajan et al (2003)¹¹, Nigam et al (2006)¹⁰ and Nawaf et al (2006)¹⁸. The cutaneous manifestations increase with age, duration as well as level of blood sugar control and severity of DM.

Males (55%) outnumbered females (45%) in our study, which is in agreement with studies done by Sawhney M et al (1990)¹⁶, Rao GS et al (1997)²⁰. However, Romano G et al (1998)¹⁷, Nigam et al (2003)¹⁰, AI Mutairi N et al (2006)¹³, Mahajan et al (2006)¹¹ and Bhat et al (2006)¹² reported higher incidence of dermatological manifestations in female diabetic patients. This may be due to lesser number of females in our study. It could also be because of lack of awareness, illiteracy and negligence on the part of female patients as well as socioeconomic backwardness.

In the index study, majority of the patients had uncontrolled diabetes (64%) which is comparable with studies by Sawhney et al 1990¹⁶ (97%), Yosipovitch et al 1998⁹ (71%), Nigam et al 2003¹⁰ (52%), Bhat et al 2006¹² (55%) and Ahmed et al 2009¹⁴ (94%). Poorly controlled diabetes mellitus, severity of disease and duration of illness increases the chances of complications.

In the present study, among the various dermatological manifestations, infection were the most frequent dermatological manifestations (71%) followed by other dermatological conditions associated with DM (67%) and miscellaneous cutaneous findings (45%). Similar findings were reported in Studies by Mahajan et al 2003¹¹ (54%), Nigam et al 2003¹⁰ (26%), Bhat et al 2006¹² (34%) and Al Mutairi et al 2006¹³ (68%).

Fungal infections (50%) were the commonest infections followed by bacterial (19%) and viral (6%). However, in similar studies by Yosipovitch et al (1998)⁹ and Bhat et al (2006)¹², incidence of fungal infections reported were 32% and 34.34% respectively.

Among the cutaneous conditions associated with diabetes mellitus, skin tags were the commonest and were present in 33% of patients in our study. Various similar studies by Kahana et al (1987)⁷ and Thappa (1997)⁸ observed that skin tags present in 26.3% and 62.85% of the cases respectively.

Acanthosis nigricans was present in 18% of the patients in our study, whereas Mahajan et al (2003)¹¹, Bhat et al (2006)¹², Mutairi et al (2006)¹³ and Ahmed et al (2009)¹⁴ reported a slightly lower incidence of acanthosis nigricans in their study 3%, 5.3%, 4.7%, 2.8% respectively. Acanthosis nigricans and skin tags are dermatological manifestations of DM which may precede occurrence of DM. High levels of insulin act on insulin like growth factor receptors (IGF) which resulted in development of acanthosis nigricans.

In the present study diabetic foot ulcer was present in 3% of the patients. Almost similar findings were reported by Puri et al 2012¹⁹ in their study in 2% patients of diabetes mellitus.

In the present study 12%, 21%, 26%, 25%, 9%, 7% patient had 1, 2, 3, 4, 5, ≥ 6 cutaneous manifestations respectively. While almost similar observations were made by Goyal et al (2010)¹⁵ in their study 20%, 20%, 12%, 16%, 16%, 14%, 2% patients had 1, 2, 3, 4, 5, 6, 7 cutaneous manifestations respectively.

Number of cutaneous manifestations in our study were comparatively higher because a large percentage (64%) of our patients had uncontrolled diabetes. Poor dietary control, food habits, illiteracy, poor hygiene, climatic conditions, rural background and socioeconomic backwardness may be the additional factors.

Conclusion

Diabetes is a multisystemic disease and skin is also not spared by its complications. Infections may appear early and remain undetected till DM is diagnosed. Majority of patients do not take regular treatment and follow dietary restrictions in early diabetes leading to persistent hyperglycaemic state which predisposes to infections. The advanced end glycosylation may lead to other complications like micro angiopathy, neuropathy etc which appear late. Presence of cutaneous manifestations can heighten the suspicion of a dermatologist in early diagnosis of DM.

Limitations

The sample size of the study is restricted due to time constraints.

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