

An epidemiological study of cutaneous manifestations of diabetes mellitus at Tertiary Care Centre of North West Rajasthan (India)

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ABSTRACT

Background: Diabetes mellitus is a metabolic disorder characterized by elevated fasting and postprandial blood glucose levels and disturbances in the carbohydrate and lipid metabolism. Diabetes is the most common endocrine disorder, affecting 8.3% of the population. **Objectives:** To study the prevalence of various dermatoses in the diabetic population. **Materials and methods:** This was an Hospital based cross sectional study. All the patients of Diabetes mellitus with cutaneous manifestations of both sexes and all ages, irrespective of their presenting symptoms, attending our dermatology outpatient department over one year period were included in this study. A detailed clinical history regarding onset and duration was taken and any associated symptoms were asked. After obtaining consent, a thorough systemic and dermatological examination was conducted and all details were entered in a structured proforma. **Results:** The common skin disorders observed were: fungal infections (29.5%), acrochordons (11.25%), bacterial infections (10.5%), diabetic pruritus (8.25%), ichthyosis (5.5%), and acanthosis nigricans (5%). Higher prevalence was noted in type 2 diabetes mellitus than type 1 diabetes mellitus. There was a significant correlation between cutaneous manifestations and duration of diabetes mellitus. **Conclusion:** Cutaneous involvement in diabetes mellitus is quite prevalent which affects the quality of life of patients. It is found more frequently among type 2 diabetes mellitus and increasing duration of diabetes mellitus increases the possibility of cutaneous involvement. Thus, in early-stage disorders such as callus and xerosis, detection and management appeared to be important in reducing complication related to diabetes mellitus.

Key words: Diabetes mellitus; Cutaneous manifestations; Cross sectional study

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by elevated fasting and postprandial blood glucose levels and disturbances in the carbohydrate and lipid metabolism. Its prevalence is increasing in the present scenario of a stressful life style in general population. Abnormalities of insulin and elevated blood glucose level lead to metabolic, vascular, neurological and immunological abnormalities. Affected organs include cardiovascular, renal and nervous systems, eyes and the skin. The skin is affected by both, the acute metabolic derangements and the chronic degenerative

complications of diabetes. Skin, the largest organ of the body is capable of reflecting these changes in a striking manner and some of the cutaneous markers have been labelled as cutaneous manifestations for this metabolic disorder. The symptom-sign complex may help the clinician to assess the glycemic status which may guide a prediabetic person to manage the diabetes by lifestyle management only. Similarly in a diabetic individual the therapy can be monitored by cutaneous markers. Several studies have been conducted to assess the Skin-Diabetes relationship. This is one such study not only to know the Skin-Diabetes relationship but also to explore the newer manifestations with advancing knowledge of the disease.

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The prevalence of diabetes is 8.5% of adult population [1]. Diabetes mellitus is classified broadly into four types, namely, Type 1 Diabetes Mellitus, type 2 Diabetes Mellitus, secondary Diabetes, and gestational Diabetes.

The following criteria is used for diagnosis of diabetes:

The following biochemical parameters define a case of diabetic when [2]

1. HbA_{1c} \geq 6.5% OR
2. Fasting plasma glucose level \geq 126 mg/dl (fasting defined as no caloric intake for at least 8 hours) OR
3. Two hours plasma glucose level \geq 200 mg/dl during OGTT (using glucose load of 75 gm anhydrous glucose dissolved in water) OR
4. Random plasma glucose score \geq 200 mg/dl

IMPORTANCE OF CUTANEOUS MANIFESTATIONS IN DIABETES MELLITUS

The clinical domain enlarges when the clinician has wider vision, while assessing the cutaneous marker of diabetes mellitus. It helps her/him to diagnose or manage diabetes mellitus in a better way.

1. Many cutaneous diseases precede or signal the onset of diabetes mellitus.
2. Some of the cutaneous lesions are diagnostic markers for the diagnosis of diabetes mellitus.
3. Serious life threatening presentations can occur in association with diabetes so as to prompt the physician for vigorous management.
4. Minor skin infections potentiate major complications and serve as a key to the prevention and treatment of complications.
5. Some skin manifestations reflect duration of diabetes.

AIMS AND OBJECTIVE

This study was aimed at studying the prevalence of various dermatoses in the diabetic population. The characteristic of patients including age, sex prevalence of diabetic patients with various dermatoses was assessed. We also aimed at comparing the dermatoses in the Non insulin dependent diabetes mellitus patients with those who are insulin dependent. Additionally, the correlation of mean duration of diabetes mellitus

in years was done with cutaneous manifestations in diabetics. The occurrence of diabetic therapy induced complications was also studied.

MATERIAL AND METHODS

Study design: Hospital based cross sectional study.

Study duration: 12 months.

Study place: Department of Dermatology, Venereology and Leprosy in collaboration with department of Medicine (Diabetes Care and Research Centre, S.P. Medical College, P.B.M Group of Associated Hospital, Bikaner Rajasthan.

Study population and sample size: A Total 400 patient with cutaneous manifestations of diabetes mellitus of both sexes and all ages, irrespective of their presenting symptoms, were included in the study, attending the out patients departments as mentioned above.

Sampling Method: Consecutive sampling

Inclusion Criteria

All the lab diagnosed patients of diabetes mellitus with cutaneous manifestations of both sexes and all ages, irrespective of their presenting symptoms and drug history were included in the study.

Exclusion Criteria

Patients who did not give consent to participate in study.

Pregnant women

Secondary diabetes

Data Collection

A detailed clinical history regarding onset, duration and associated symptoms was asked. A thorough systemic and dermatological examination will be conducted and all details were recorded on a special proforma. Fasting or random blood sugar level and HbA_{1c} were carried out to confirm the diabetes mellitus.

All relevant data was entered into a predesigned proforma. For data analysis Microsoft excel and statistical software SPSS was used and data was analyzed with the help of frequencies, proportions,

measures of central tendency, appropriate statistical test.

OBSERVATION AND RESULTS

In our study out 400 subject, maximum (41.00%) subject were between 61-75 Yrs age group followed by 40.00% subject between 46-60 Yrs age group, 11.25% subject were from 31-45 yrs age group and only 1.25% subject were below 30 Yrs age group. Mean age was 56.75 ± 11.15 Yrs (Table 1).

In our study out 400 subjects, 238 (59.50%) subjects were male and 162(40.50%) subjects were female.

In our study out 400 subjects, 247(61.75%) subjects were from urban area and 38.25% subjects were from rural area.

In our study 85.25% subjects were hindu, 13.50% subjects were muslim and 1.25% subjects belonged to other religions.

In our study 68.25% subjects were from joint family and 31.75% subjects were from nuclear family.

In our study, according to B J Prasad classification maximum subject (59.00%) from socio-economic status class-II, 18.00% subject belonged to socio-economic status class-I, 13.75% subject were from socio-economic status class-III and 9.25% subject belonged to socio-economic status class-IV.

In our study out 400 subject, in 9.00% subject family history of Diabetes were present. In our study, 96.00% subject had Type-II diabetes and 4.00% subject had type-I diabetes.

In our study, skin manifestation in diabetes patients were divided into 4 groups. Maximum (81.00%) patients had dermatoses in the form of cutaneous concurrences of diabetes mellitus followed by 11.50% disease with Cutaneous manifestation of diabetes, 6.00% dermatoses were diabetes associated with dermatological disease and 1.50% skin diseases were diabetic therapy leading to cutaneous complication (Table 2).

In our study out of 46 patients with cutaneous manifestation of diabetes, maximum (43.48%) patients had acanthosis nigricans followed by 19.56% patients with xanthomatosis, 8.70% patients with diabetic

foot & diabetic dermopathy (Figs. 1a and 1b) each, 6.51% patients with scleredema dibeticorum and 6.51% patients with necrobiosis lipoidica dibeticorum (Figs. 2a and 2b). (Table 3).

In our study out of 324 patients with cutaneous concurrences of diabetes mellitus, 36.42% patients had fungal infection, 12.96% patients had bacterial infection, 3.09% patients had viral infection. Out of 118 with fungal infection, most common fungal infection was superficial dermatophytosis(40.68%). Out of 42 bacterial infection patients, maximum patients had carbuncle(23.81%). Out of 10 viral infection patients, maximum patients had herpes zoster (40.00%) (Figs. 3a and 3b) and verruca vulgaris(40.00%), 13.89% patients had acrochordons and 10.19% patients had diabetic pruritus (Table 4).

Table 1: Age wise distribution of study subjects

Age group (yrs)	No of subject	Percentage
19-30	5	1.25
31-45	45	11.25
46-60	164	41.00
61-75	160	40.00
>75	26	6.50
Total	400	100.00

Table 2: Skin manifestation wise distribution of study subjects

Disease	No of cases	Percentage
Cutaneous manifestation of DM	46	11.50
Cutaneous concurrences of DM	324	81.00
DM associated with dermatological disease	24	6.00
Diabetic therapy leading to cutaneous complication	6	1.50
Total	400	100.00



Figure 1: (a) Diabetic dermopathy over lower limb, (b) Bullosa diabeticorum over the extensor aspect of the knee.



Figure 2: (a) Necrobiosis lipoidica diabetorum over the shins, (b) Gangrenous changes in a diabetic.

Table 3: Cutaneous manifestation of study subjects

Cutaneous manifestation of DM	No of cases	Percentage
Xanthomatosis	9	19.56
Acanthosis nigricans	20	43.48
Acquired perforating collagenosis	2	4.35
Bullosa diabetorum	3	6.51
Diabetic dermopathy	4	8.70
Diabetic foot	4	8.70
Necrobiosis lipoidica diabetorum	1	2.17
Scleredema diabetorum	3	6.51
Total	46	100.00

Out of 24 patients of diabetes associated dermatological disease, maximum (33.33%) patients had vitiligo, 25.00% patients had lichen planus & psoriasis and 16.67% patients had granuloma annulare (Figs. 4a and 4b).

Out of 6 patients with therapy related cutaneous complication, maximum (33.33%) had Steven Johnson syndrome & eczematous eruption, 16.67% patients had erythema multiforme & lipodystrophy (Table 5) (Figs. 5 and 6).

DISCUSSION

The increasing prevalence of diabetes and its complications in India would pose a real threat to existing health services. Awareness about cutaneous manifestation of diabetes and its treatment can assist in early prevention of its complication and reduce incidence of diabetes related deformity.

In our study out 400 subject, maximum (41.00%) subject were from 61-75 Yrs age group followed by 40.00% subject between 46-60 Yrs age group, 11.25% subject were from 31-45 yrs age group and only 1.25% subject were below 30 Yrs age group. Mean age was

56.75 ± 11.15 Yrs. In our study 238 (59.50%) subject were male and 162 (40.50%) subject were female.

In a study done by Khandelwal A et al. [3] their observation was similar to our study. They observed that in a total of 300 participants taken under study 45.0% were males and 55.0% were females. Majority of the patients (96.0%) were 30 years or above.

In a study done by Dinesh K Upadhyay et al. [4] their observation was similar to our study. They observed that out of 182 patients enrolled in the study. Males were 103 (56.59%) and females were 79 (43.41%). The greatest number of patients were in the age group of 51-60 years [69 (37.91%)] followed by 61-70 years [40 (21.98%)], 41-50 years [31 (17.03%)] and 31-40 years [13 (7.14%)]. Twenty five patients (13.74%) were above 70 years of age. The mean age of the patients was 56.9 ± 12.55 years.

Similar to our study Singla A et al. [5] observed that most of the patients were from 50-60 Yrs age group. Similar age has been seen in a study by Gupta RK et al. [6].

In a study done by Nagar V et al. [7] their observation was similar to our study. They observed that out of 150 study participants enrolled for the study 58% were male and 42% were female diabetic patients. Most of the patient's (72%) were of age group more than 50 years.

In our study out 400 subject, 247 (61.75%) subject were from urban area and 38.25% subject were from rural area. In a study conducted by Singla A et al. [7] they observed that urban (85.00%) patients were more commonly affected than rural (15.00%) patients.

In their study Nagar V et al. [7] observed that higher proportion of the subject (65%) resided in urban area. Most of them (28.6%) had high school education while 21.3% of them were graduate and post graduate. Next were those with middle school education (20.6%), primary education (19.3%) and those who had never attended school (10%). Occupation wise most of the study subjects were unemployed (32.6%). Only 26% of the participants had family history and 18.6% of patients were smokers. Their results were similar to our study.

Similar to other study in our study showed that most of the patients were from higher socio-economic status. Sedentary life style is more common in higher socio-

Table 4: Cutaneous concurrences of DM

Cutaneous concurrences of DM			No of cases	Percentage
Infection	Viral (n=10)	Herpes zoster	4	1.23
		Herpes simplex	2	0.62
		Verruca vulgaris	4	1.23
	Bacterial (n=42)	Furunculosis	8	2.46
		Carbuncle	10	3.08
		Impetigo	1	0.31
		Echthyma	2	0.62
		Folliculitis	5	1.54
		Cellulitis	4	1.23
		Erysipelas	4	1.23
		Erythrasma	4	1.23
		Hydradenitis suppurativa	4	1.23
		Superficial dermatophytosis	48	14.81
	Fungal (n=118)	Tinea versicolor	12	3.70
		Mucor mycosis	8	2.46
		Candidiasis		
		Paronychia	4	1.23
		Intertrigo	4	1.23
		Thrush	2	0.62
		Balanoposthitis	20	6.17
		Vulvovaginitis	18	5.56
		Erosion interdigitalis blastomycetica	2	0.62
		Parasitic (scabies)	8	2.47
Acquired ichthyosis		22	6.79	
Acrochordons		45	13.89	
Diabetic cheiro arthropathy		2	0.62	
Diabetic thick skin		4	1.23	
Diabetic pruritus		33	10.19	
Follicular keratosis		4	1.23	
Palmar erythema		2	0.62	
Periungal telangiectasia		2	0.62	
Pigmented purpuric dermatosis		8	2.46	
Rubeosis faciei		4	1.23	
Erysipelas like erythema		2	0.62	
Corn		8	2.46	
Callosities		10	3.09	
Total		324	100.00	

Table 5: Diabetic therapy leading to cutaneous complication

Diabetic therapy leading to cutaneous complication	No of cases	Percentage
Steven Johnson syndrome	2	33.33
Ecematous eruption	2	33.33
Erythema multiforme	1	16.67
Lipodystrophy	1	16.67
Total	6	100.00

economic status people and in urban area. That is why there are more Type-2 DM patients in our study.

Various studies have found infections, like bacterial, fungal and other associate diseases like necrobiosis lipodica diabetorum, unexplained generalized pruritus or pruritus ani have been found to be more common in diabetics than in non-diabetics. Whether hyperglycemia is sole factor responsible for various skin conditions cannot be authentically accounted, for the lack of enough evidence.

A handful of studies have observed a high prevalence of bacterial infections with diabetes. Hence examination of urine and blood for sugar is advisable in patients who have recurrent chronic bacterial infections. Diabetes mellitus may be background for various bacterial infections. Pyoderma developing in known diabetic signifies poor control.

In our study 118 cases were found to have fungal infections constituting 29.50% which is major group of cutaneous manifestations in diabetes in present study. In present study 5.00% of diabetic patients presented with balanoposthitis 4.50% cases had vulvovaginitis, 10.00 % patients had candidiasis and in 0.50% of cases oral candidiasis was noted. The poorly controlled diabetic patient is particularly at risk for developing severe acute mucocutaneous candidal infection. In present study 2% of cases had oral candidiasis, of which

one was uncontrolled diabetic and other patient was irregular in treatment.

The existence of relationship between diabetes and psoriasis was suggested as early as 1897. There are several Indian studies indicating presence of

relationship between the two diseases. Psoriasis and diabetes mellitus had been variously reported in literature as 2.4% to 5.7%. In the present study there are 1.50% of psoriatic patients with diabetes which is almost consistent with finding of above authors.

Acrochordans are associated with impaired carbohydrate metabolism and may serve for identifying patients at risk of having diabetes mellitus. A handful of studies have also claimed a relationship between multiple, large hyper-pigmented tags and diabetes. In present study skin tags are found to be a sign of diabetes, unproven though. The association is suggested theoretically by fibroblast growth factor in diabetes and potentiation of effect of this factor by insulin.

Persistence generalized pruritus is an indication for complete medical survey because this symptom is often associated with various medical diseases such as uremia, jaundice, lymphoma and internal malignancy. It should not be over looked that there are purely cutaneous reasons for generalized pruritus.

Pruritus of unexplained nature of generalized or localized type may be the earliest pointer to the existence of diabetes and also claimed that 40% of diabetics have pruritus of unexplained origin. In present study there were 8.25 % cases of generalized pruritus along with diabetes mellitus, which is comparatively less than expected. Localized anogenital pruritus appears to be a manifestation of diabetes mellitus.

A close association has been found between vitiligo and diabetes mellitus. Though vitiligo is associated with both insulin dependent and non insulin dependent types of diabetes, in most of patients it is seen after age of 40 years. In present study 2.00% of total patients were having vitiligo.



Figure 3: A patient with multidermatomal herpes zoster.



Figure 4: Trophic ulcer (top), granuloma annulare (bottom).

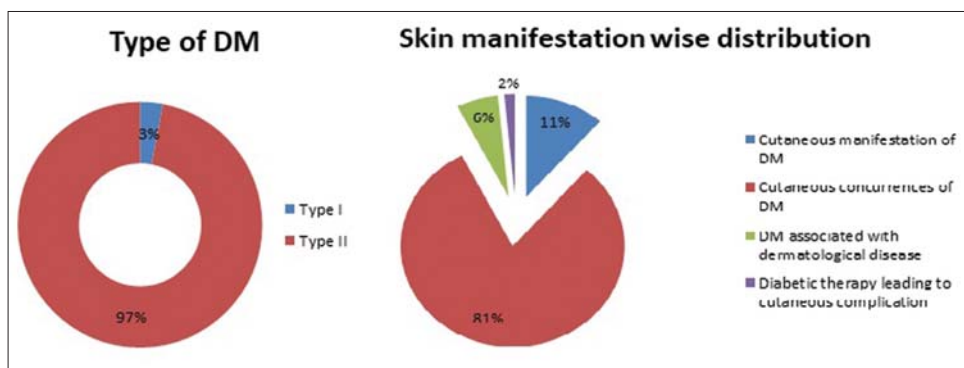


Figure 5: Type of diabetes mellitus and distribution of skin manifestations.

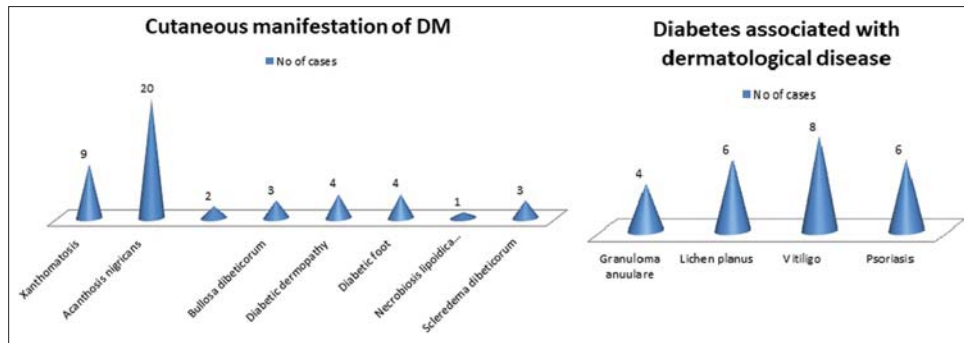


Figure 6: Cutaneous manifestations of diabetes.

CONCLUSION

Cutaneous manifestations are very common with diabetes mellitus. Patients who are already suffering from multiple system involvement with DM are further compromised by skin manifestations. Skin manifestations are not only of cosmetic relevance, but further deteriorate the life quality, add therapeutic cost and also increase the agony of the diabetic patients.

The importance of skin manifestations lies in fact, that they are often the first pointers to the diagnosis or deterioration of the disease. Where as the ignorance of skin manifestations in diabetes or improper treatment may make the condition worse. The early detection and early treatment of common skin manifestations in diabetes will prevent further complications or ineffectiveness due to treatment. A small sample size, short study duration, and lack of detailed investigations like clinico-histopathological correlation were a few limitations of our study.

Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

Statement of Informed Consent

Informed consent for participation in this study was obtained from all patients.

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