

Original Research Article

A study on the dermatological manifestations in type 2 diabetes mellitus patients in a tertiary care hospital in a rural setting

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ABSTRACT

Background: Diabetes mellitus is very common metabolic disorder seen in our developing world. Skin is affected by both acute metabolic derangements and the chronic degenerative complications of diabetes. It is suggested that these skin changes may eventually be used as a reflection of the patient's current as well as the past metabolic status.

Methods: 200 diabetic patients were examined and their various cutaneous manifestations were analysed with parameters like age, sex, type of infection, HbA1c etc.

Results: A total of 200 diabetic patients with cutaneous manifestations were enrolled in our study. Majority were in 6th decade (34.5%) and 7th decade (30%) respectively. Males constituted 66% of the cases with a male to female ratio was 1.89:1 Among the cutaneous infections, out of the 132 cases with cutaneous infections, fungal infections (46%) were most frequent, followed by bacterial infections (16.5%) and viral infections (3.5%).

Conclusions: This study showed demographic, social factors & prevalence of dermatological manifestations in type 2 DM patients. It is suggested that the various skin changes may eventually be used as a reflection of the patient's current as well as the past metabolic status.

Keywords: Diabetes mellitus, Cutaneous manifestations, Infections, RBS levels, HbA1c

INTRODUCTION

Diabetes is a major lifestyle disorder, which is fast gaining the status of a potential epidemic in India with more than 62 million individuals currently diagnosed with the disease.¹ The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030.² The WHO estimates the global burden of diabetes to be 299 million cases by the year 2025.³ Diabetes is clinically and genetically a heterogeneous group of disorders characterized by abnormally high levels of glucose in the blood⁴ often accompanied by abnormalities in carbohydrate, fat and protein metabolism. Involvement of skin is a key component in diabetes mellitus.

Skin is particularly important in diabetics because it does get involved in one way or the other. The prevalence of cutaneous infections is more in DM Type 2 whereas autoimmune conditions are commonly associated with DM type 1.⁵ There are many skin manifestations in DM, which vary from trivial to life threatening but none of them are pathognomonic of the disease.⁵ Proper treatment of skin manifestation is important for control of diabetes mellitus and while treating the skin manifestations, control of diabetes is very important. This study was done to assess the cutaneous associations of diabetes mellitus in patients attending MediCiti Institute of Medical Sciences and their importance. This work is an attempt to analyze the pattern of cutaneous manifestations of diabetes in view of its increasing prevalence in the

present scenario of sedentary lifestyle in the general population.

METHODS

This study, a cross sectional observational hospital based study was performed in MediCiti Institute of Medical Sciences, Ghanpur for one & half year, from January 2014 to June 2015. All the type 2 DM patients presenting with cutaneous manifestations who presented to the OP or admitted in IP wards in MediCiti Institute of Medical Sciences in the specified time period, were taken up for the study.

Institutional ethical clearance was obtained from the institutional Review board, MIMS, Ghanpur, before the start of the study. In the selected patients a detailed history with particular reference to demographic details, family history of similar complaints, and duration of DM treatment details, duration of various symptoms and

evolution of lesions was taken. Routine haematological & urine investigations, RBS, HbA1c, lipid profile (selected cases) were done. Special investigations like culture and sensitivity of pus, skin scrapings for fungal elements and biopsy of skin lesions were done in selected cases to support the clinical findings.

RESULTS

This study comprised of 200 patients with type 2 DM and having cutaneous manifestations, who attended MediCiti Institute of Medical Sciences.

In the present study out of 200 patients of DM with dermatological manifestations, majority were in 6th and 7th decade i.e., 34.5% and 30% respectively. Similar 6th decade predominance was also noted in studies by Talat Naheed et al, Ahmed et al, Hussain, et al, Ahmed et al, Kataria et al, Goyal et al, Abhishek et al, Farshchian et al.^{6,8,9,12,16,18}

Table 1: Age and sex distribution.

Age (in years)	No of cases (n=200)	Total %	Males	Male % (n = 131)	Females	Female% (n = 69)
10-20	0	0	0	0	0	0
21-30	2	1	2	1.5	0	0
31-40	11	6.5	7	5.3	4	5.7
41-50	44	22	31	23.6	13	18.8
51-60	68	34.5	45	34.3	23	33.3
61-70	63	30	39	29.7	24	34.7
71-80	12	8	7	5.3	5	7.2
>80	0	0	0	0	0	0
Total	200	100	131	66	69	34

Majority of cases i.e. 88 cases in this study have RBS levels in the range of 151-200 (i.e. 44%) followed by 84 cases having RBS level of >200 (i.e. 42%). Study done by Avula et al in 2014 at Kurnool – Andhra Pradesh reported that the majority of patients (49%) had an RBS value of 140-200 mg/dl.¹⁴

Table 2: Random blood sugar levels.

RBS (mg/dl)	No of cases	Percentages % (n=200)
70-150	28	14
151-200	88	44
>200	84	42
Total	200	

Majority of cases in this study had uncontrolled diabetes i.e., an HbA1C level of >8 (80 cases i.e. 40%) followed by HbA1C levels of 7.1–7.9 in 66 cases i.e. 33%. Studies conducted by Naheed et al showed 53% of patients had uncontrolled diabetes.⁶ Bhat et al who conducted a study in 2006 at Jammu- India also showed a similar value of 56% patients with HbA1c \geq 7.⁷ Farshchian et al, Verma et al noted 60% and Chatterjee et al reported that majority

of patients have an uncontrolled diabetes with HbA1c levels greater than 7.⁹⁻¹¹

An exception to this was found in the study by Ahmed et al with majority of patients (70%) having HbA1c level of less than 7 mg/dl.¹⁸

Table 3: HbA1C levels.

HbA1C levels	No of cases	Percentages % (n=200)
4.7-6.4	24	12
6.5-7	30	15
7.1- 7.9	66	33
\geq 8	80	40
Total	200	

Among the 132 cases with infections, fungal infections (92 cases) were the common infection followed by Bacterial infections (33 cases) and viral infections (7 cases). Majority of the studies that were reviewed reported that cutaneous infections as the most common cutaneous manifestations in diabetic patients.

Avula et al noted a prevalence of 62% cutaneous infections.¹⁴ Netha et al reported a prevalence of 55%.²⁰ Yasso et al reported cutaneous infections prevalence of 44% in diabetic patients, significant relation between cutaneous infections and control of diabetes was noted by them.¹³ This is in accordance with other studies where fungal infections were found to be more common, as observed by Goyal et al, Mutairi et al, Hussain et al and Wani et al in 2010 at Shimla reported a prevalence of 16%.¹⁶⁻¹⁹ Kataria et al and Avula et al observed a prevalence of fungal infections of 26% and 37% respectively.^{12,14}

Table 4: Cutaneous infections.

Type	No of cases	Percentage (n =200)
Fungal	92	46%
Bacterial	33	16.5%
Viral	7	3.5%
Total	132	

In comparison, bacterial cutaneous infections were more common in studies done by Bhat et al, Ahmed et al, Farshchian et al, Verma et al, Puri et al.^{7-9,11,15}

In this study out of 200 cases 33 patients had bacterial infections and furunculosis (14 cases) was the most commonly seen bacterial infection followed by folliculitis (6 cases). Studies by Naheed et al, Kataria et al, Avula et al and Goyal et al also showed that furunculosis was the most common presentation of bacterial infection.^{6,12,14,16} Yasso et al and Mutairi et al reported folliculitis as the most common bacterial manifestation.^{13,17}

Table 5: Bacterial infections.

Type	No of cases
Furuncle	14
Folliculitis	6
Cellulitis	5
Nail infections	3
Impetigo	2
Erythrasma	2
Carbuncle	1
Total	33

Out of the 92 cases with fungal infections, dermatophytosis (62 cases) was the most common fungal infection in the study followed by candida infection (22 cases). Intertrigo was the most commonly seen candidal infection (9 cases) followed by 8 cases of balanoposthitis. *Tinea cruris* (34 cases) was the most commonly seen dermatophyte infection in this study, followed by *Tinea corporis* (18 cases). Similar findings were found in the studies by Naheed et al, Kataria et al, Avula et al, Puri et al, Mutairi et al, which reported that Dermatophytosis as the most common fungal manifestation.^{6,12,14,15,17}

Naheed et al found *Tinea corporis* to be the most common while Avula et al noted *Tinea cruris* as commonest dermatophytosis.^{6,14} Mutairi et al and Hussain et al reported that *Tinea pedis* and *Tinea unguium* were the most common dermatophytosis respectively.^{17,19}

Table 6: Fungal infections.

Type	No of Cases
Dermatophytosis	62
Candidiasis	22
Pityriasis versicolor	8
Total	92

Table 7: Viral infections.

Type	No of cases
Verruca Vulgaris	4
Herpes Zoster	3
Total	7

Table 8: Dermatoses caused due to microangiopathy.

Type	No of cases
Bullous diabeticorum	6
Diabetic dermopathy	4
Diabetic rubeosis	2
Necrobiosis lipoidica diabeticorum (NLD)	1
Total	13

Out of the 200 patients studied, 13 patients (6.5%) presented with dermatoses due to microangiopathy, of which 6 patients had diabetic bullae & 4 patients had diabetic dermopathy & 2 patients had diabetic rubeosis & 1 patient had NLD. Diabetic dermopathy was seen in 3.6% of the patients in a study by Yasso et al.¹³ A study by Farshchian et al reported diabetic bullae 6.9%, diabetic dermopathy 11.5%, diabetic rubeosis 3.4%.⁹

Table 9: Neuropathic and ischaemic diabetic skin disease.

Type	No of cases
Diabetic foot ulcer	18
Diabetic neuropathy	14
Peripheral vascular disease	2
Total	34

Diabetic foot ulcer (18 cases i.e. 9%) was the most commonly seen neuropathic and ischaemic diabetic skin disease in this study.

In the present study, 4 patients had changes attributed to metabolic changes of which were 3 cases of xanthelasma

palpebrarum and 1 case of eruptive xanthomas. In the present study, 2 cases with diabetic thick skin were seen.

Table 10: Metabolic disorders.

Xanthomatosis	
Xanthelasma Palpebrarum	3
Eruptive Xanthomas	1

Table 11: Cutaneous reactions to therapy for diabetes.

Therapy	
Insulin	1
Oral hypoglycemic agents	0

In the present study, among 200 patients with dermatological manifestations, 1 patient with insulin injection site reaction in the form of lipodystrophy was recorded. Bhat et al in observed that out of 150 diabetic patients, 2 patients developed reactions to oral hypoglycemic agents and 3 patients to insulin, 1 patient had pruritic erythema and the other 2 reported injection site pigmentation.²⁰

DISCUSSION

In this study conducted at MediCiti Institute of Medical Sciences, 200 diabetic patients having one or more cutaneous manifestations were included.

Age distribution

Surveys indicate the prevalence of DM rises steeply with age. The relative increase in the incidence of cutaneous involvement with age in diabetic patients may be attributed to the age related skin changes compounded by effects of long duration of diabetes. Chronic hyperglycemia is associated with long term damage of almost all organs, including skin. Patients may be exposed to ill effects of asymptomatic hyperglycemia for many years before DM is detected.

HbA1c level

Diabetes in long run is associated with multiple degenerative changes that affect the all the organ systems like, cardiovascular system, the central and peripheral nervous system, the eyes, and the skin. Long-term effects of DM on the microcirculation and on dermal collagen, sooner or later result in skin disorders in almost all the diabetic patients. Thus, dermatologists play an important role in reducing the dermatologic morbidity, improvement of quality of life, and management of diabetic patients

Cutaneous infections

The greater frequency of infections in diabetic patients is caused by the hyperglycemic conditions, which favours

immune dysfunction (e.g. damage to the neutrophil function, depression of the antioxidant system, and humoral immunity), microangiopathies, macroangiopathies and neuropathy. The impairment of skin barrier function, hypohydrosis and decreased epidermal antimicrobial peptide expression in the skin due to long standing hyperglycemia are other factors of skin infections in DM. This difference may be due to variation in climate and humidity and health/ hygiene practices. High incidence of fungal infections in this study may be explained by demographic predominance of agricultural workers in hot & humid environment in rural setting.

Dermatoses due to microangiopathy

There are many mechanisms by which diabetes can cause microangiopathy. These include excess sorbitol formation, increased glycation end products, oxidative damage, and protein kinase C-over activity. All of these processes occur in the skin, and the existence of a cutaneous diabetic microangiopathy has been well documented. These microangiopathic changes are associated with abnormalities of skin perfusion. In diabetic patients loss of capillaries is associated with a decrease in perfusion reserve. Clinically the consequences of diabetic cutaneous microangiopathy are in the form of ischemia, polyneuritis, sensory loss & cutaneous necrosis ultimately resulting in ischemic/neuropathic ulcers and/or gangrene.

Neuropathic and ischemic skin disease

Foot ulcers were the major consequence of ischemic and neuropathic changes in this study. The patients were mostly from rural areas where, agriculture is the prime occupation wearing open sandals or no foot wear at all, is the norm. This leads to increased exposure to trauma & secondary infection.

Metabolic changes

DM patients often suffer from high lipid levels in the blood. This causes fat to be deposited in the skin and presents as xanthomas or xanthelasma.

CONCLUSION

A total of 200 diabetic patients with cutaneous manifestations were included. Majority were in 6th decade (34.5%) and 7th decade (30%) respectively. Males constituted 66% of the cases with a male to female ratio of 1.89:1. Majority of the patients had RBS levels in the range of 150-200mg/dl (44%), while (42%) had blood sugar levels >200mg/dl. Among the 200 diabetic patients with skin manifestations, 54 (27%) patients had good to moderate control of DM with HbA1c <7 levels while 146 (73%) patients had a poor control of DM with HbA1c levels >7%. Among the cutaneous infections, out of the 132 cases with cutaneous infections, fungal infections (46%) were most frequent, followed by bacterial

infections (16.5%) and viral infections (3.5%). Dermatoses associated with microangiopathy were observed in 13 (6.5%) patients, of whom, 4 had diabetic dermopathy and 6 patients had diabetic bullae, 2 had diabetic rubeosis and 1 had necrobiosis lipoidica diabetorum. Among the 34 patients (17%) with neuropathic and ischemic diabetic skin disease, 18 patients had diabetic foot ulcers and fissured feet and 14 patients had diabetic neuropathy, 2 had peripheral vascular disease. Dermatological manifestations attributed to metabolic changes were xanthelasma palpebrarum (3 cases) and eruptive xanthomas (1 case). Among the 200 patients with skin manifestations, 1 patient developed reaction secondary to insulin therapy in the form of lipodystrophy.

These dermatological manifestations reflect the metabolic status of a patient and have to be given serious thought. Dermatologists should recognize the signs and symptoms of diabetes at an early stage design a suitable skin care treatment and ensure a proper glycemic control, thereby reducing the dermatological morbidity, improving quality of life of diabetic patients.

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