

## A Cross Sectional Study to Evaluate Cutaneous Manifestations in Diabetic Patients and their Correlation with Sugar Control at Tertiary Care Center in Western Maharashtra

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### Abstract:

**Introduction:** Diabetes is a leading chronic disease in world and number of cases are significantly increasing each year in India also. Out of many associated conditions, skin involvement in diabetes also needs to be evaluated. We conducted this study to study relation between the sugar control and skin manifestations in diabetic patients. **Methodology:** We studied total 100 diabetic patients visiting our dermatology OPD over a period of 1 year from January to December 2020. All skin diseases in diabetic patients were studied. We studied association of these diseases with sugar control in our study participants. **Results:** Mean age of our study participants was  $63.48 \pm 18.12$  years, Majority of the males were from the age group of 61 and above, 34 (62.96%) while majority of the females were from the age group of 41-60 years 25 (54.35%). Majority of the patients had diabetes for 5-10 years (52%) followed by more than 10 years (36%) and less than 5 years in 24% cases. Out of 100 participants, 44% had controlled diabetes while rest 56% had uncontrolled diabetes with HbA1c > 6. We observed a significant difference in skin manifestations of controlled and uncontrolled sugars in diabetic patients. ( $p = 0.007$ ). **Conclusion:** From this study, we conclude that the skin is involved in diabetes quite often. Early diagnosis and treatment of skin manifestations in diabetic patients is important to reduce unwanted morbidity and further complications in the diabetic patients.

**Key Words:** Diabetes, Cutaneous Manifestations, Sugar Control, HbA1c

### Introduction:

Diabetes mellitus (DM) is the most common endocrine problem worldwide and affects individuals of all ages and in all socio-economic segments of the population. Global presence of type 2 diabetics in the year 2000 was 171 million which is likely to be 366 million in the year 2030.<sup>[1]</sup> The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025 and to 80 million by the year 2030.<sup>[1,2]</sup> Diabetes is characterized by hyperglycemia and leads to long term systemic complications because of abnormalities in carbohydrate, lipid and protein metabolism. The skin is affected by the acute

metabolic derangements and the chronic degenerative complications of diabetes and about 11.4-71% diabetic patients have cutaneous disorders<sup>[3]</sup>, the pathogenesis of which is linked to abnormal or altered metabolic pathways, atherosclerosis, microangiopathy, neuron degeneration, and impaired host mechanisms etc.<sup>[4]</sup>

Although the mechanism for many other diabetes-associated skin conditions remains unknown, cutaneous signs of diabetes mellitus are extremely valuable to the clinician. They generally appear after the primary disease has developed but may signal or appear coincidentally with its onset, or even precede diabetes by many years.<sup>[5]</sup>

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Despite increasing prevalence of diabetes mellitus in the general population due to the present scenario of sedentary life style only a few epidemiologic studies have been done on the prevalence of skin disorders in patients with diabetes mellitus. Thus, this study was designed to analyze the cutaneous manifestations in diabetic patients visiting a tertiary care centre in India.

### Methodology:

#### Objectives:

To study the cutaneous manifestations in diabetic patients visiting our dermatology OPD.

To study association between the different skin diseases in controlled and uncontrolled diabetic patients.

We studied total 100 diabetic patients visiting dermatology OPD at DVVPF's Medical College & Hospital, Ahmednagar and satisfy inclusion and exclusion criteria. Study period was one year from January to December 2020.

We included all diabetic patients willing to participate in the study and excluded Type 1 diabetic patients, gestational diabetic patients and patients of other chronic diseases or on steroids. Sugar control was decided by HbA1c levels, where levels less than 6 were considered good sugar control and levels more than 6 were considered poor sugar control. All skin diseases in diabetic patients were studied. We studied association of these diseases with sugar control in our study participants.

Sampling method: Convenience sampling,

Sample Size calculation: The prevalence of diabetic skin diseases in is 8%<sup>[4]</sup>

$p = 8\% = 0.08$ ,  $q = 1 - p = 0.92$ ,

taking absolute error,  $e$  of 7%,  $e = 0.07$

Sample size,  $n = 4pq/e^2 = 60$

#### Results:

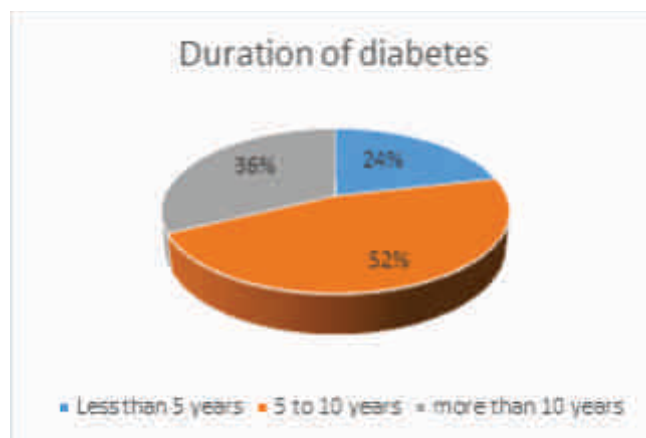
There was a total of 100 diabetic patients in our study, 54 males and 46 females.

**Table 1:** Age and gender wise distribution of the patients

Age Group	Males	Females	Total
21-40	04 (7.41%)	02 (4.35%)	06 (06%)
41-60	16 (29.63%)	25 (54.35%)	41 (41%)
More than 61	34 (62.96%)	19 (41.305)	53 (53%)
Total	54 (100%)	46 (100%)	100 (100%)
Mean $\pm$ SD	65.42 $\pm$ 21.52	59.24 $\pm$ 19.27	63.48 $\pm$ 18.12

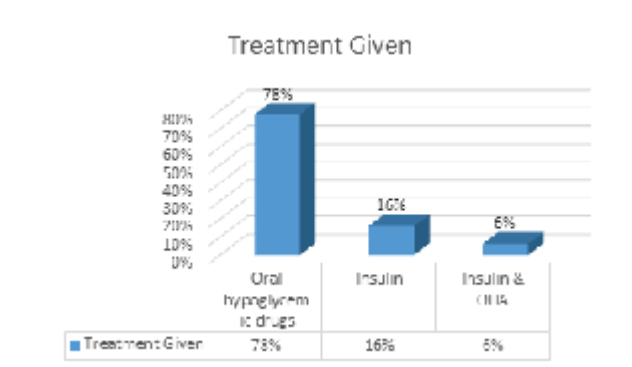
Mean age of our study participants was 63.48  $\pm$  18.12 years, mean age of males, 65.42  $\pm$  21.52 was higher than females 59.24  $\pm$  19.27. Majority of the males were from the age group of 61 and above, 34 (62.96%) while majority of the females were from the age group of 41-60 years 25 (54.35%).

**Chart 1:** Duration of Diabetes



Majority of the patients had diabetes for 5-10 years (52%) followed by more than 10 years (36%) and less than 5 years in 24% cases.

Out of 100 participants, 44% had controlled diabetes while rest 56% had uncontrolled diabetes with HbA1c > 6. All 100 patients were on regular antidiabetic treatment, 78% were on oral hypoglycemic drugs, 16% were on Insulin while rest 6% were on both Insulin and oral hypoglycemic drugs.

**Chart 2:** Treatment given to patients for Diabetes**Table 2:** Details of Cutaneous manifestations in Diabetic patients

Cutaneous Manifestations	Controlled Diabetes	Uncontrolled Diabetes	Total
Skin Infections	11 (25.0%)	31 (55.36%)	42 (42%)
Diabetic Foot Ulcer	09 (20.45%)	14 (25.0%)	23 (23%)
Pruritus	08 (18.18%)	04 (7.14%)	12 (12%)
Skin Tags	06 (13.64%)	02 (3.57%)	8 (8%)
Acanthosis Nigricans	04 (9.09%)	02 (3.57%)	6 (6%)
Diabetic Bullae	02 (4.55%)	03 (5.36%)	5 (5%)
Others	04 (9.09%)	0 (0%)	4 (4%)
	44 (100%)	56 (100%)	100 (100%)
$X^2 = 17.62$ , $df = 6$ , $p = 0.007$ , Significant			

We observed a significant difference in skin manifestations of controlled and uncontrolled sugars in diabetic patients. ( $p = 0.007$ )

There was a total of 42 patients with skin infections, including 21 bacterial infections (21%), 18 fungal infections (18%) and 3 viral infections (3%). We observed 23 cases of diabetic foot ulcers (23%), 12 cases of pruritus (12%), 8 cases of skin tags (8%), 6 cases of Acanthosis Nigricans (6%), 5 cases of Diabetic Bullae (5%) and 4 other cases of Eruptive Xanthomas (2 cases 2%) and one case each (1%) of pigmented purpura and scabies.

Out of 21 bacterial infections, 13 were staph aureus (13%), 7 were streptococcal infections (7%) and one was *Pseudomonas aeruginosa* (1%). Out of 18 Fungal infections, 12 were *Candida* infections (12%) and 6 were *Trichophyton* (6%), there were 3 Herpes simplex viral infections (3%).

Out of the 42 skin infections, 31 were seen in uncontrolled diabetes patients and 11 were seen in

controlled diabetes patients. There were 23 cases of Diabetic Foot Ulcers, out of which 14 were seen in uncontrolled diabetes patients and rest 9 in controlled diabetes patients.

Skin infections and diabetic foot ulcers were seen more common in uncontrolled diabetic patients (55.36% and 25.0%) as compared to those in controlled diabetic patients (25.0% and 20.45%).

### Discussion:

A broad spectrum of cutaneous disorders may be encountered in patients with diabetes mellitus. On occasion, these dermatologic findings may even precede any clinical or biochemical evidence for diabetes. Cutaneous manifestations of diabetes mellitus can be classified as conditions with strong associations with diabetes mellitus; infectious causes of skin lesions; dermatologic disorders related to complications of diabetes mellitus; and skin conditions related to the treatment of diabetes mellitus.<sup>[6]</sup>

Most of the cutaneous disorders are related to complications of diabetes like neuropathy (diabetic foot), microangiopathy (diabetic dermopathy), immunologic dysfunction (infections), insulin resistance (acanthosis nigricans) etc.<sup>[7]</sup>

Most documented studies have shown the incidence of cutaneous disorders associated with diabetes to be between 30 and 71%.<sup>[8,9]</sup> In our study, the most common six skin disorders among uncontrolled diabetics were: Skin infections (55.36%), diabetic foot ulcers (25%), pruritus (7.4%), diabetic bullae (5.36%), and acanthosis nigricans and skin tags - (3.57%) respectively.

The incidence of cutaneous involvement in diabetes varies from 11.4% to 71%.<sup>[10]</sup> In the present study, 55.36% of patients had cutaneous involvement. The most common dermatosis observed was cutaneous infections (55.36%) similar to the observations made in other studies.<sup>[11-14]</sup> In our study, cutaneous bacterial infections were the most common, seen in 21% cases, followed by fungal infections (18%) and then viral infections (3%).

It is widely believed that diabetic patients have an increased risk for infectious diseases, in our study this risk seems to be higher in poorly controlled patients (55.36%), as compared to controlled diabetics (25%). The increased incidence of infections in these patients could be due to peripheral vascular disease, diabetic neuropathy, abnormal microcirculation, decreased leucocyte adherence, delayed chemotaxis, and decreased phagocytosis.<sup>[15]</sup>

DM is not specifically associated with generalized pruritus.<sup>[15]</sup> We observed 7.4% incidence of pruritus as compared to a range of 4.5%-15.2% seen in other studies.<sup>[9-11]</sup>

Acrochordons (skin tags), a cutaneous marker of diabetes, were present in 3.57% of cases in our study. These were seen in 13.3% cases by Vahora *et al.* and in 26.2% cases by Ragnunatha *et al.*<sup>[14,16]</sup> and Acanthosis nigricans (AN), usually seen in insulin resistance, was seen in this study in 3.57% of cases.

Diabetic foot can occur due to multifactorial pathogenetic mechanisms and is a serious complication. The contributing factors for its development include neuropathy and diabetic angiopathy, with neuropathy being the major factor.<sup>[17]</sup> Diabetic foot was seen in 25% of cases in this study and Ragnunatha *et al.*<sup>[16]</sup> reported it in 0.2% of cases. Diabetic foot ulcers were seen more common in uncontrolled diabetic patients 25% as compared to those in controlled diabetic patients 20.45% in our study.

Some of the less common findings observed in this like of Eruptive Xanthomas (2%) and one case each (1%) of pigmented purpura and scabies have also been reported by other similar studies.<sup>[18-20]</sup>

### Conclusion:

From this study, we conclude that the skin is involved in diabetes quite often. The manifestations are numerous and varied and many a times they may be the first presenting sign or may precede the diagnosis of diabetes by many years hence identifying these cutaneous markers at the earliest can aid in diagnosis of diabetes and its prevention and treatment. Early diagnosis and treatment of skin manifestations in

diabetic patients is important to reduce unwanted morbidity and further complications in the diabetic patients.

**Conflict of Interest:** None

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