

Cutaneous Manifestations of Diabetes Mellitus in a Tertiary Care Hospital in Bengaluru – A Cross Sectional Study

Kavana K.¹, Sharath Kumar B.C.²

^{1, 2} Department of Dermatology, Venereology and Leprosy, Kempegowda Institute of Medical Sciences Hospital and Research Centre, Bengaluru, Karnataka, India.

ABSTRACT

BACKGROUND

"Skin is a mirror of internal diseases". Diabetes mellitus (DM) is a metabolic disorder that needs considerations of many different specialities but the importance of dermatologist's knowledge has not drawn much attention. As a result, we intend to study various cutaneous manifestation of diabetes mellitus. Prior to diagnosis of diabetes mellitus, patient may present with cutaneous manifestation. Thus, it can help in early diagnosis, management and prevention of complication and help in improvement of quality of life.

METHODS

This is a descriptive cross-sectional study. A total of 500 diabetic patients with cutaneous manifestations, who attended skin outpatient department (OPD) at Kempegowda Institute of Medical Sciences Hospital and Research Centre, Bengaluru, Karnataka, India, were evaluated. Detailed history was taken along with physical and mucocutaneous examination. Cutaneous manifestations, general description of diabetes mellitus like duration, type, and drug history as well as the demographic data were collected and analysed using descriptive statistics.

RESULTS

Among a total of 500 diabetes mellitus subjects, the most common cutaneous manifestations were infections (35 %) followed by pruritus (11 %). Among infections, tinea infections (48.29 %) were the most common followed by intertrigo (21 %).

CONCLUSIONS

The ignorance of skin manifestations in diabetes or improper treatment may worsen the condition. Early detection and treatment of common skin manifestations in diabetes will prevent further complications especially in cases of extensive tinea corporis, pruritus, psoriasis, lichen planus, macro and micro angiopathies, trophic ulcers etc.

KEYWORDS

Cutaneous manifestations, Diabetes mellitus

Corresponding Author:

*Dr. Kavana K.,
Resident,
Department of Dermatology,
Venereology and Leprosy,
Kempegowda Institute of Medical
Sciences Hospital and Research Centre,
Bengaluru - 560004, Karnataka, India.
E-mail: kavanaknaikmedico@gmail.com*

DOI: 10.18410/jebmh/2021/258

How to Cite This Article:

*Kavana K, Kumar BCS. Cutaneous
manifestations of diabetes mellitus in a
tertiary care hospital in Bengaluru – a
cross sectional study. J Evid Based Med
Healthc 2021;8(19):1352-1356. DOI:
10.18410/jebmh/2021/258*

*Submission 04-10-2020,
Peer Review 25-10-2020,
Acceptance 24-03-2021,
Published 10-05-2021.*

*Copyright © 2021 Kavana K. et al. This
is an open access article distributed
under Creative Commons Attribution
License [Attribution 4.0 International
(CC BY 4.0)]*

BACKGROUND

Diabetes mellitus is the most common metabolic disorder affecting people all over the world. Arateus of cappadocia in 130 - 201 AD coined the term "Diabetes", meaning siphon; to explain the liquefaction of the flesh and bone into urine.¹ "Sushruta as early as 400 BC described diabetic syndrome as honeyed urine (Madhumeha).² Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs.³ Diabetes mellitus is a fairly common medical disorder that involves almost every specialty in its spectrum of clinical manifestation and up to 1/3rd of patients with diabetes mellitus are estimated to have different types of cutaneous changes during the chronic course of their disease.⁴ There are three major types of diabetes: type 1 diabetes (insulin dependent diabetes mellitus), type 2 diabetes (non-insulin dependent diabetes mellitus), and gestational diabetes.⁵ Criteria for the diagnosis of diabetes mellitus include symptoms of diabetes plus random blood glucose * concentration ≥ 200 mg / dl or fasting plasma glucose * ≥ 126 mg/dl or wo-hour plasma glucose ≥ 200 mg/dl during an oral glucose tolerance test or HbA_{1c} level $\geq 6.5\%$ (*random blood glucose is defined as without regard to time since the last meal and * Fasting plasma glucose is defined as no caloric intake for at least 8 hours).⁶ There are four categories of cutaneous manifestations in diabetes mellitus: (1) cutaneous diseases with weak to strong association with diabetes mellitus; (2) cutaneous infections; (3) cutaneous manifestations of diabetes mellitus complications; and (4) cutaneous reactions to diabetes mellitus treatments.^{7,8} The cutaneous manifestations of diabetes mellitus are those that accompany acute, gross metabolic disturbances along with infections and xanthomatosis. Those that occur due to chronic degenerative changes are diabetic microangiopathy, erysipelas-like erythema, wet gangrene of the foot, diabetic rubeosis, large vessel disease, diabetic dermopathy, diabetic neuropathy (diabetic foot), diabetic bullae (bullous diabeticorum), scleredema of DM. Those that occur more frequently in diabetics but do not correlate with metabolic or degenerative changes - necrobiosis lipoidica diabeticorum (NLD), acanthosis nigricans, granuloma annulare, pruritis, vitiligo, lichen planus, psoriasis, perforating dermatosis, skin tags (acrochordons), diabetic digital sclerosis (diabetic thick skin), ear lobe crease, yellow skin of diabetes mellitus and cutaneous complications of therapy due to insulin, oral hypoglycemic drugs.⁹ The exact pathogenesis of most skin findings associated with diabetes mellitus are generally unknown. Recently, attention focused on one factor that is common to all from of diabetes is hyperglycemia. But the probable pathogenetic factors causing skin manifestation are mainly hyperglycemia, macro and microangiopathy, and neuropathy.¹⁰ Long duration of diabetes mellitus leads to permanent and irreversible functional changes and damages cells, thus resulting in structural, biochemical and functional abnormalities. Controlling the metabolism of the body may help in preventing some of these diabetes manifestations.

Cutaneous complications of diabetes mellitus provides a clue to the current and past metabolic status of the patient.⁴ Thus, people who have cutaneous manifestation related to diabetes mellitus, even without a history of diabetes, should be investigated for the possibility of the disease.¹¹ Increasing knowledge about cutaneous manifestation of diabetes mellitus leads to overall good prognosis of disease. Diabetes mellitus is a metabolic disorder that needs consideration of many different specialties but the importance of dermatologists' knowledge has not drawn much attention. As a result, we intended to study various cutaneous manifestation of diabetes mellitus. Prior to the diagnosis of diabetes mellitus, patient may present with cutaneous manifestation. Thus, it can help in early diagnosis, management and prevention of complication and help in improvement of quality of life.

METHODS

In this descriptive cross-sectional study, a total of 500 diabetic patients of all age groups and either genders with cutaneous manifestations, who attended skin outpatient department at Kempegowda Institute of Medical Sciences Hospital and Research Centre, Bengaluru, Karnataka, India were included. The study was conducted after approval from institutional ethics committee. Informed consent was taken from the patients. The present study was conducted over a period of 6 months from April 2020 to September 2020. All diabetes mellitus patients 18 years and above who attended skin outpatient department at Kempegowda Institute of Medical Sciences Hospital were included in the study.

Exclusion Criteria

Pregnant women, lactating women and patients not giving consent for study. Patients were selected based on inclusion and exclusion criteria. Detailed history was taken from patients; physical examination and mucocutaneous examination were carried out. Cutaneous manifestations, general description of diabetes mellitus like duration, type and drug history as well as the demographic data were collected. The sample size was calculated using the formula:

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

Where power is 80% and confidence interval is 95%. The data collected was entered into SPSS software version 19 for analysis. Descriptive statistics such as mean, percentages, standard deviation and ranges were found out.

RESULTS

Among a total of 500 diabetes mellitus subjects, the prevalence of cutaneous manifestations was 57 % and 43 % in males and females respectively, male to female ratio is

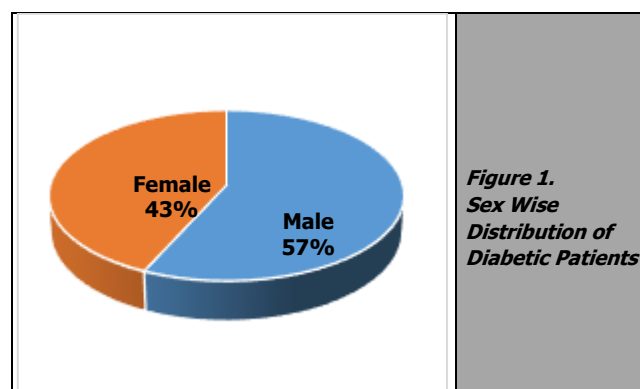
1.32: 1 (Figure 1). Cutaneous manifestations were more common in age group of 41 to 50 years (Figure 2).

Cutaneous Manifestations	Number of Cases	Percentage (%)
Necrobiosis lipoidica diabetorum	2	0.4
Pyoderma gangrenosum	2	0.4
Bullous pemphigoid	3	0.6
Granuloma annulare	4	0.8
Xanthelasma palpebrarum	6	1.2
Diabetic foot ulcer	8	1.6
Pemphigus vulgaris	8	1.6
Diabetic bullae	13	2.6
Psoriasis	16	3.2
Lichen planus	17	3.4
Perforating dermatosis	21	4.2
Acanthosis nigricans	24	4.8
Vitiligo	27	5.4
Stasis dermatitis	37	7.4
Acrochordons	40	8
Xerosis	41	8.2
Generalized pruritus	55	11
Infections	176	35.2

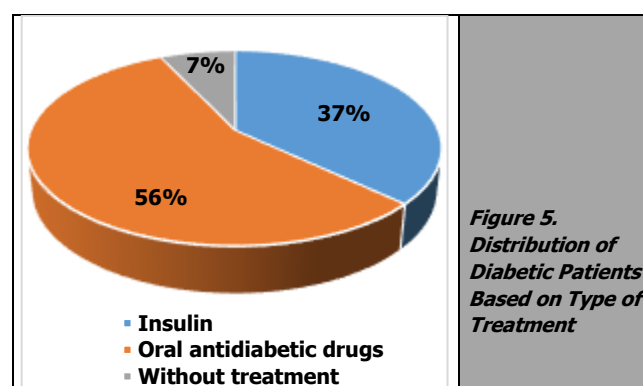
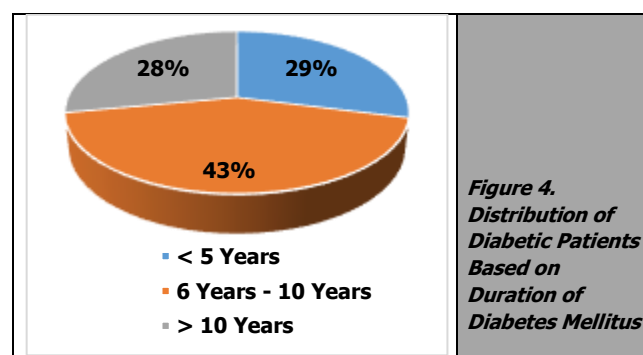
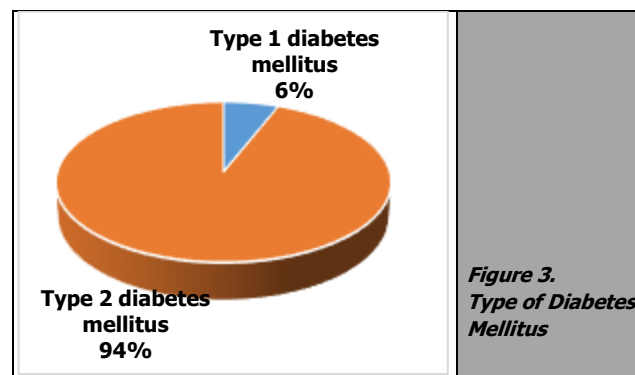
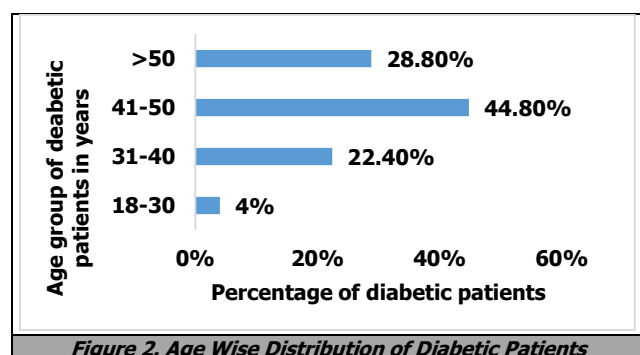
Table 1. Cutaneous Manifestations in Studied Diabetic Patients

Infections	Number of Cases	Percentage (%)
Herpes zoster	4	2.3
Balanoposthitis	6	3.4
Vulvo-vaginal candidiasis	10	5.7
Cellulitis	15	8.5
Folliculitis	19	10.8
Intertrigo	37	21
Tinea	85	48.3

Table 2. Cutaneous Manifestations Related to Infections in Studied Diabetic Patients



In our study, type 2 diabetes mellitus (94 %) was more common than type 1 diabetes mellitus (6 %) (Figure 3). In 43 % of the patients, duration of diabetes was 4 to 10 years (Figure 4). HbA_{1c} level was > 7 in 346 (69.20%) patients. In the present study, 56 % of the patients were on oral antidiabetic drugs, 37 % on insulin and remaining 7 % were not on treatment (Figure 5).



Infections (35 %) were the most common cutaneous manifestation followed by pruritus (11 %), xerosis (8.2%), acrochordons (8%), stasis dermatitis (7.4%), vitiligo (5.4%), acanthosis nigricans (4.8%), perforating dermatosis (4.2%) and others (Table 1). Among infections, tinea infections (48.29 %) were most common followed by intertrigo (21 %), folliculitis (10.8%), cellulitis (8.5%), vulvo-vaginal candidiasis (5.7%), balanoposthitis (3.4%) and herpes zoster (2.3 %) (Table 2).

DISCUSSION

Diabetes mellitus is a common endocrine disorder affecting people all over the world and nearly all specialties in its spectrum of clinical manifestation. No diseases of skin are particular to diabetes, but still there are diseases, whose prevalence is more common in diabetics compared to non-diabetics. The incidence of diabetes mellitus was more common in males (57 %) than females (43 %) in the present study. Male to female ratio is 1.32 : 1 A similar finding was made by Thomas Georges et al. (62 % males and 38 %

females).¹² In present study 73 % of patients were in age group of 41 years and above which constituted the major age group having cutaneous manifestations associated with diabetes, whereas similar observation was made by Anand LC et al.¹³ (74 %) and Kadam MN et al. (81 %).¹⁴ In the present study type 2 diabetes mellitus was more prevalent and this finding is similar to study done by G. U. Sawatkar et al.¹⁵ and Azizian Z et al.¹⁶ In the present study, 43 % of the patients has diabetes mellitus for 6 to 10 years. In our study, 56 % of the patients were on oral anti diabetic drugs, 37 % of patients were on insulin and 7 % of the patients were not on treatment. Similar finding was seen in study done by Azizian Z et al. in which 69.3 % of patients were on oral anti diabetic drugs, 26.2 % of patients were on insulin and 4.4% of patients were not on treatment.¹⁶

In our study, cutaneous manifestation of diabetes were infections (35 %), followed by pruritus (11 %), xerosis (8.2%), acrochordons (8 %), stasis dermatitis (7.4 %), vitiligo (5.4 %), acanthosis nigricans (4.8 %), perforating dermatosis (4.2%) and others. Infections (35 %) was the common cutaneous manifestation of diabetes followed by pruritus (11 %). This is in accordance with a study done by Yadav S et al.¹⁷ Persistence generalized pruritus should not be over looked and it is an indication for complete medical evaluation because this symptom is often associated with various medical diseases such as hypothyroidism, uremia, jaundice, lymphoma, leukemia and internal malignancy. Demis et al. showed 3% incidence of generalized pruritus in diabetes mellitus. In the study done by Kadam MN et al. 17% cases of generalized pruritus along with diabetes mellitus were observed.¹² Anand LC et al. quoted that pruritus of unexplained nature of generalized or localized type may be the earliest pointer to the existence of diabetes and also claimed 40 % of diabetics having pruritus of unexplained origin.¹³ In present series there were 11 % cases of generalized pruritus along with diabetes mellitus, which is comparatively less as compared to the results of Kadam MN et al. and Anand LC et al. In the present study among infections, tinea infections (48.29 %) were most common followed by intertrigo (21 %), folliculitis (10.8 %), cellulitis (8.5 %), vulvo-vaginal candidiasis (5.7 %), balanoposthitis (3.4 %) and herpes zoster (2.3 %). Similar higher incidence of fungal infections (44 %) was observed by George T et al.¹² whereas Anand LC et al. observed fungal infections in 35% of cases¹³ and Kadam MN et al. observed fungal infections in 38 % of cases in their study.¹⁴ The poorly controlled diabetic patient is particularly at risk for developing infections.¹⁸ In the present study acrochordons were observed in 8 %. Acrochordons are associated with impaired carbohydrate metabolism and may serve for identifying patients at risk of having diabetes mellitus. The association is suggested theoretically by potentiation of fibroblast growth factor in diabetes by insulin.¹⁹ Khana M et al. noted 26.3% patients of skin tags with overt diabetes mellitus or impaired GTT.²⁰ Huntley AC et al. also claimed a relationship between multiple, large hyper-pigmented tags and diabetes.²¹

CONCLUSIONS

Diabetes mellitus is a common endocrine disorder that involves almost every speciality in its spectrum of clinical manifestations. Skin is not an exception and at least one third of the patients with diabetes possess cutaneous changes. The importance of skin manifestations lies in fact, that they are often the first pointers to the diagnosis or deterioration of the disease. Early detection and early treatment of common skin manifestations in diabetes will prevent further complications and reduction of quality of life especially in cases of extensive tinea corporis, pruritus, psoriasis, lichen planus, macro and micro angiopathies, trophic ulcers etc.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

REFERENCES

- [1] Barnett DM, Krall LP. The history of diabetes. Joslins EP, Khan CR, eds. Joslins diabetes mellitus. Philadelphia: Lippincott Williams & Wilkins 2005:1-7.
- [2] Kharbanda C, Alam MS. Evolution of sulfonylureas in the treatment of diabetes mellitus. Chemistry & Biology Interface. Chemistry & Biology 2013;3(4):230-52.
- [3] American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2009;32(Suppl 1):S62-7.
- [4] Karadag AS, Ozlu E, Lavery MJ. Cutaneous manifestations of diabetes mellitus and the metabolic syndrome. Clin Dermatol 2018;36(1):89-93.
- [5] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017, Atlanta, GA, USA, Centers for Disease Control and Prevention, US Dept. of Health and Human Services 2017.
- [6] Mayer-Davis EJ, Kahkoska AR, Jefferies C, et al. ISPAD Clinical Practice Consensus Guidelines 2018: definition, epidemiology, and classification of diabetes in children and adolescents. Pediatr Diabetes 2018;19(Suppl 27):7-19.
- [7] Perez MI, Kohn SR. Cutaneous manifestations of diabetes mellitus. J Am Acad Dermatol 1994;30(4):519-31.
- [8] Paron NG, Lambert PW. Cutaneous manifestations of diabetes mellitus. Primary Care 2000;27(2):371-83.
- [9] Sacchidanand S. Skin in diabetes mellitus. Chap- 49. IADVL textbook of dermatology. Vol. 2. 4th edn. Bhalani Publishing House 2016:1916-7.
- [10] Sehgal VN, Bhattacharya SN, Sharma S, et al. Alopecia areata progressing to totalis / universalis in non-insulin dependent diabetes mellitus (type II): failure of dexamethasone-cyclophosphamide. Pulse therapy. Indian J Dermatol Venereol Leprol 2008;74(2):171-4.
- [11] Levy L, Zeichner JA. Dermatologic manifestation of diabetes. J Diabetes 2012;4(1):68-76.

- [12] George T, Fernandez JC. Cutaneous manifestations in diabetes mellitus study of 50 cases. *Indian J Dermatol Venereol Leprol* 1976;42(6):261-6.
- [13] Anand LC. Assessment of diabetic state in various skin disorder usually associated with Hyperglycemia. *Indian J Dermatol Venereol Leprol* 1978;44(2):95-102.
- [14] Kadam MN, Soni PN, Phatale S. B. Siddramappa. A study of cutaneous manifestations associated with diabetes mellitus. *Int J Adv Med* 2016;3(2):296-303.
- [15] Sawatkar GU, Kanwar AJ, Dogra S, et al. Spectrum of cutaneous manifestations of type 1 diabetes mellitus in 500 south Asian patients. *Br J Dermatol* 2014;171(6):1402-6.
- [16] Azizian Z, Behrangi E, Hasheminasabzavareh R, et al. Prevalence study of dermatologic manifestations among diabetic patients. *Advances in Preventive Medicine* 2019;2019:1-5.
- [17] Yadav S, Goyal A, Verma P. Pattern of cutaneous manifestations of diabetes mellitus. *Paripex-Indian Journal of Research* 2020;9(1):4-6.
- [18] Peleg AY, Weeraratna T, McCarthy JS, et al. Common infections in diabetes: pathogenesis, management and relationship to glycaemic control. *Diabetes Metab Res Rev* 2007;23(1):3-13.
- [19] Bozca BC, Köseoğlu HG, Bassorgun CI, et al. The role of insulin-like growth factor in the Acrochordon etiopathology. *BMC Dermatol* 2020;20(1):14.
- [20] Khana M, Grossman E, Feinstein A, et al. Skin tags: a cutaneous marker for diabetes mellitus. *Acta Derm Venereol* 1987;67(2):175-7.
- [21] Huntley AC. Cutaneous manifestations of diabetes mellitus. *Dermatol Clin* 1989;7(3):531-546.