

**CUTANEOUS MANIFESTATIONS ASSOCIATED WITH DIABETES MELLITUS**Satish K. S<sup>1</sup>, Ramya N<sup>2</sup>, Soumya V<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system. **AIM:** of the study was to evaluate presence and prevalence of common dermatoses in patients. 250 cases of D.M. with various cutaneous manifestations attending in and outpatient department of Dr. D. Y. Patil medical hospital were evaluated. Detailed history was taken as per proforma and patient investigated. Maximum incidence was seen between 40-70 yrs. of age and in middle class. Fungal infection constituted highest number which included dermatophytosis, candidiasis and pityriasis versicolor. No cutaneous reactions to therapy for diabetes were encountered in the present study.

**KEYWORDS:** Diabetes mellitus, cutaneous manifestations.

**INTRODUCTION:** Diabetes mellitus is a most common endocrine disorder characterized by the abnormalities of insulin and elevated blood glucose level to metabolic, vascular, neurological and immunological abnormalities. Affected organs include the cardiovascular, renal and nervous system, eyes and the skin.

Diabetes mellitus is a chronic disease that affects 11 million individuals in the United States, of these 90% have type II, non-insulin dependent where as 10% have insulin dependent type I.

An estimated 30% of patients with diabetes mellitus develop cutaneous manifestation.

The clinical manifestations and complications of skin disease are frequently more severe in the setting of diabetes. The literature abounds with studies that attempt to identify and understand the pathophysiology of cutaneous disorder in the diabetic patients. Some are caused by the both acute metabolic derangements and the chronic degenerative complication of diabetes.

Others are linked to abnormal carbohydrate metabolism, whereas others are a consequence of the three major diabetic complications such as microangiopathy and neuropathy, still other cutaneous signs are linked to an impaired ability to handle infection, altered collagen, insulin resistance, a pancreatic neoplasm and complication of diabetic treatment.

Many of the pathological process of diabetes mellitus apparently are identical to changes that occur in the normal process of ageing except that some skin conditions appear with greater than expected frequencies. Whereas others are found so often in association with diabetes that they are considered to be marker of that disease.

Cutaneous manifestations vary from trivial to life threatening of the dozen of skin signs and symptoms described for diabetes. However none is pathognomonic of the disease.

Research efforts around the globe are continually improving our understanding of the cause of and optimal strategies to minimize considerable morbidity and mortality associated with the cutaneous manifestations of disease, which demands a highly motivated approach to the therapy.

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**MATERIALS AND METHODS:** All patients with Diabetes Mellitus, visiting the Department of Medicine and Department of Dermatology (outpatient and inpatient) of Padmashree Dr. D. Y. Patil hospital during the period of 1 yr. from 01-05-2006 to 01-05-2007 will be included in the study with a minimum of 250 cases.

A detailed history will be taken as per the Proforma with special emphasis on examination of the entire integumentary system, including the skin, hair, oral mucous membrane, genital mucosa, perianal areas and nails.

All patients will be investigated as follows:

1. Complete blood count with erythrocyte sedimentation rate.
2. Fasting blood sugar and post prandial blood sugar.
3. Urine examination (routine and microscopy).

The other investigation will be tailored as per the cutaneous lesions found in the patients. These include but are not limited to the following:

1. Wood's lamp examination.
2. Skin scraping and KOH (potassium hydroxide) mount for fungal study.
3. Gram stain.
4. Fungal culture.
5. Tzanck smear.
6. Skin biopsy (Hematoxylin-Eosin and special stains when required).
7. Lipid profile.
8. VDRL.
9. ELISA for HIV-I and HIV-II (where risk factors of HIV exist).

The data collected will be analyzed to see the prevalence of skin problems vis-à-vis the age and sex of the patient, duration of diabetes, severity of diabetes and glycemic control.

In the present study, we used body mass index (BMI) of  $\geq 30$  as a cut off value to define obesity.

BMI=weight/height (in kg/m<sup>2</sup>)

Glycosylated hemoglobin method not done because of expense.

**OBSERVATIONS AND RESULTS:** The present study was conducted over a period of one year from 01/05/2006 to 1/05/2007. A total of 250 cases were included in this study which comprises of 139 male patients (55.6%) and 111 female patients (44.4%).

- 1) AGE AND SEX DISTRIBUTION (Table 1):** The study reveals that peak incidence of diabetes mellitus with cutaneous manifestation was between 40-70 years of age (72.8%).
- 2) SOCIO-ECONOMIC STATUS (Figure 1):** Majority of patients (86 patients, 34.4%) belonged to middle class. This was followed by lower class (74 patients, 29.6%), poor class (51 patients, 20.4%) and high class (39 patients, 15.6%).
- 3) FAMILY HISTORY OF DIABETES (Figure 2):** A positive family history of diabetes was elicited in 25% of cases (36 male and 34 female patients)

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**4) DETECTION OF DM IN OBESE/NONOBESE INDIVIDUALS (Figure 3):** In the present study 73.6% of diabetes were found to be non-obese whereas remaining 26.4% were obese comprising of 29 male and 37 female patients. This present study failed to demonstrate obesity as significant for developing diabetes mellitus.

**5) VARIOUS SKIN DISEASES ASSOCIATED WITH DIABETES (Table 3):** In the present study fungal infections were detected in 67 cases (26.8%), bacterial infections in 38 cases (15.2%), viral infections in 9 cases (3.6%) and scabies in 4 cases (1.6%)

Psoriasis was detected in 16 cases (6.4%). Granuloma annulare was observed in 1 case (0.4%)

In metabolic disorders, only xanthelasma palpebrum was detected in 4 cases (1.6%).

Vitiligo was observed in 8 cases (3.2%) and acanthosis nigricans in 6 cases (2.4%), lichen planus in 11 (4.4%) patients

**6) BACTERIAL INFECTIONS (Table 5):** Out of 38 patients (15.2%) with bacterial infections, septic skin conditions were present in 29 patients (11.6%) and erythrasma in 2 patients (0.8%) followed by ENL in 1 patient (0.4%) and leprosy in 6 patients (2.4%)

**7) FUNGAL INFECTIONS (Table 4):** Tinea cruris, T corporis were the commonest forms, accounting for 34 cases (13.6%) followed by T. pedis in 4 cases (1.6%) while T. Faciei was present in 2 cases (0.8%) only. Pityriasis versicolor was seen in 5 cases (2%).

**8) VIRAL INFECTIONS (Figure 4):** Out of 9 patients (3.6%) constituting viral infections, there were 4 cases of Herpes labialis (1.6%), 2 cases of Herpes Zoster and warts (0.8%) and 1 case Herpes genitalis (0.4%)

**9) PSORIASIS:** Psoriasis vulgaris was seen in 16 patients lesions were present all over the body more so over the extensor aspects of elbows, knees and ankles. 3 patients had palmo plantar psoriasis.

**10) LICHEN AMYLOIDOSIS:** In this study, 2 cases of Lichen Amyloidosis having lesions over the anterior aspect of both lower legs were observed.

**11) DIABETIC ULCER OF THE FOOT:** 13 cases of diabetic ulcer of foot included in this study. There was ulcer over dorsum of feet and decreased sensation below the lower one third of lower leg.

**12) URTICARIA:** 6 cases of urticaria was found in a non-obese NIDDM patient. Lesions consisted

Of multiple transient, erythematous papules and edematous plaques and wheals distributed all over the body, etiology of the same could not be established by detailed history, clinical examination and relevant investigation.

**13) ACQUIRED ICTHYOSIS:** 7 cases of acquired ichthyosis were detected in this study. The lesions were scaly fissured lines and centrally hyper pigmented keratotic papules.

**14) DIABETIC HAND SYNDROME:** 1 case of diabetic hand syndrome was included in this study. They were unable to bring finger together because of contracture of proximal and distal interphalangeal joints.

**DISCUSSION:** Skin lesions in Diabetes mellitus are sometimes mirror to an underlying disease process and they may be the first expression of the disease.

In the present study, out of 250 cases of DM associated with cutaneous manifestation, 230 cases were known diabetic, remaining 20 patients detected during the course of investigation, outpatient and inpatient department of Dr. D. Y. Patil hospital, Nerul.

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**Age and sex distribution:** During the present study, incidence of DM was more common in 40-70 years of age (72.8%). Majority of patients (53.2%) were over 50 years of age. Males outnumbered females by a ratio of 139:111. This is well comparable with study of Thomas George et al.<sup>1</sup>

**Socio-Economic Status:** In the present study majority of patients come from middle class (34%). Diabetes is commonly observed in middle & high class. This may be due to life style and lack of exercise.

**Family History:** A positive family history of diabetes mellitus was obtained in 28% of cases. Joslin et al<sup>2</sup> in his study observed 41% of diabetes patients had positive family history.

**Bacterial Infections:** 29 cases of septic bacterial infections (11.6%) were found in this study.

Thomas George et al<sup>1</sup> and L. C. Anand<sup>3</sup> observed bacterial infections in 14% and 15.38% of patients respectively in their study, whereas Lister et al observed that as many as 20% of patients had D.M. while being investigated for septic skin conditions.

Gram staining was done in 15 cases. 10 of them showed gram positive organisms, in which Staph. Aureus was detected in 6 cases. Greenwood et al<sup>4</sup> also reported high incidence of staphylococcal skin infections among diabetes.

**Fungal Infections:** Fungal infections constituted 67 patients (26.8%). There were 47 cases of dermatophytosis (18.8%), 14 cases of candidiasis (5.6%) and 5 cases of pityriasis versicolor (2%). Thomas George et al<sup>1</sup> found an incidence of 30% of dermatophytosis while D. M. Greenwood<sup>4</sup> et al had reported its incidence to be 40%. The present study coincides almost with study of Mahajan et al<sup>5</sup> (30%).

Examination of scraping with 10%KOH and direct microscopic examination were done and found to be positive in 10 cases of candidial infection. In case of dermatophytosis KOH was done in 20 cases and all were positive. H. S. Shah et al<sup>6</sup> in their study of 2000 cases of dermatophytosis could get the test positive in only 707 cases (35.35%).

**Lichen planus:** Present study showed 11 cases (4.4%) of LP. 4 patients had recent onset of LP (duration of 4 months), 2 cases of ulcerative LP was seen involving buccal mucosa, 5 patients had extensive LP.

Thomas George et al<sup>1</sup> found 2% of extensive LP in their study. This study coincides with George et al, 7 cases of LP were confirmed by HPE.

**Psoriasis:** In the present study 16 cases (6.4%) of psoriasis vulgaris were found. Aschner et al<sup>7</sup> found DM in 5.7% of psoriasis patients which is similar to present study.

**Vitiligo:** In this study 8 cases of (3.2%) of vitiligo in NIDDM patient were encountered. Dawber et al<sup>8</sup> found 4.8% of maturity onset of diabetes mellitus to have concomitant vitiligo.

**Diabetic ulcer of Foot:** In the present study 13 cases (5.2%) of diabetic ulcer of foot was encountered in longstanding NIDDM patients. Vanessa et al in his study observed it in 15%.

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**Viral Infections:** Viral infections constituted 9 patients (3.6%), in which there were 4 cases of herpes labialis (1.6%), two cases of herpes zoster and warts (0.8%) and 1 case of herpes genitalis (0.4%).

Calandra and Lissi et al<sup>9</sup> reported 52.9% of patients with Zoster had DM while Sezai & Sasmaz et al<sup>10</sup> found 3.9% which is similar to present study.

**Urticaria:** In the present study total 6 cases (2.4%) of urticaria were detected. Sezai et al<sup>10</sup> found 1.3% of urticaria with diabetes

### CONCLUSION:

- Cutaneous manifestation of diabetes mellitus is commonest in the age group 40-70 yrs (72.8%) with a slight male predominance.
- Infections and infestations were the commonest associations detected in 45.6% of cases out of which fungal infections were observed in majority of the cases (26.8%) followed by bacterial infection (15.2%) and viral infections (3.6%).
- Psoriasis was the next disorder detected in 6.4 % of cases.
- Skin disease strongly associated with diabetes mellitus like vitiligo were observed in 3.2 % of cases. Acanthosis nigricans and LP was observed in 2.4% and 4.4% of cases respectively.
- Cutaneous manifestation due to disorder of collagen and metabolic derangements were infrequent as only 4 cases (1.6%) of xanthelasma palpebrum and 1 case (0.4%) of Granuloma annulare was detected.
- No cutaneous reactions to therapy for diabetes were encountered in present study.

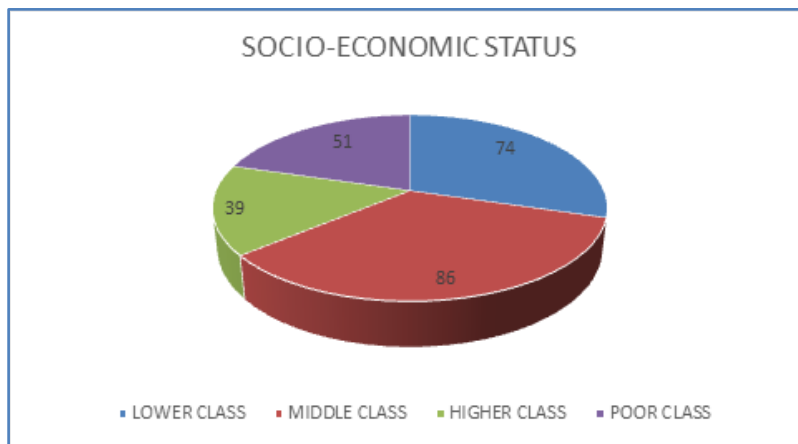
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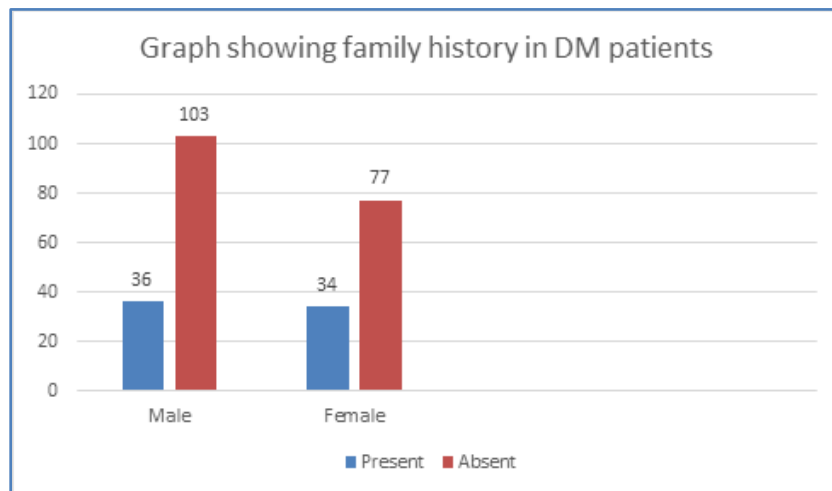
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AGE GROUP	MALE	FEMALE	TOTAL	PERCENTAGE
18-20	2	1	3	1.2
21-30	3	7	10	4
31-40	15	16	31	12.4
41-50	39	29	68	27.2
51-60	31	34	65	26
61-70	34	15	49	19.6
71-80	13	8	21	8.4
81-90	2	1	3	1.2
<b>TOTAL</b>	<b>139</b>	<b>111</b>	<b>250</b>	<b>100</b>

**TABLE 1: AGE & SEX DISTRIBUTION**



**Figure 1**

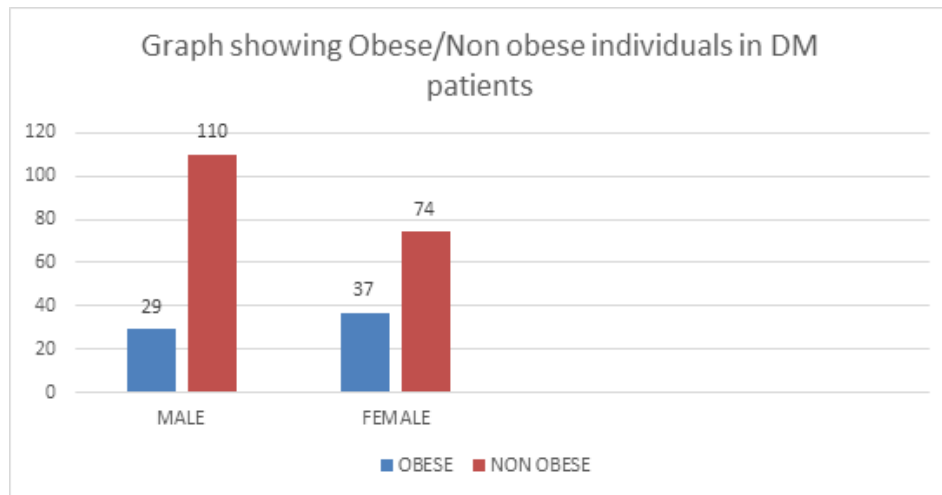


**Figure 2**

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Blood Sugar Levels	FBS	PPBS	FBS Percentage	PPBS Percentage
126-200	142	20	56.8	8
201-300	80	144	32	57.6
301-400	24	80	9.6	32
401-500	4	6	1.6	2.4
501-600	0	0	0	0

**TABLE 2: DISTRIBUTION OF DATA BY BLOOD SUGAR LEVELS - FBS & PPBS**



**Figure 3**

SKIN DISEASE	NUMBER OF CASES	PERCENTAGE
FUNGAL INFECTION	67	26.8
BACTERIAL INFECTION	38	15.2
VIRAL INFECTION	9	3.6
CONTACT DERMATITIS	10	4
VITILIGO	8	3.2
KELOIDAL ACNE	1	0.4
PSORIASIS	16	6.4
LP	11	4.4
PRURIGO NODULARIS	1	0.4
SCABIES	4	1.6
ALOPECIA AREATA	9	3.6
ACROCHORDAN	6	2.4
SHAMBURG PURPURA	5	2.0
AQ ICTHYOSIS	7	2.8
ANGULAR GLOSSITIS	1	0.4

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FIXED DRUG ERUPTION	1	0.4
PLE (POLYMORPHOUS LIGHT ERUPTION)	3	1.2
LICHEN SIMPLEX CHRONICUS	5	2.0
URTICARIA	6	2.4
DIABETIC ULCER OF FOOT	13	5.2
PALPABRAL XANTHALESMA	4	1.6
PANGARIA	1	0.4
FRECKLES	1	0.4
BURNINIG FEET SYNDROME	1	0.4
ERYTHEMA NODOSUM	1	0.4
XEROSIS	2	0.8
ID. ERUPTION	1	0.4
MILIARIA	1	0.4
SEBORRHOEIC KEROTOSIS	3	1.2
ACATHOSIS NIGRICANS	6	2.4
STUCCO KEROTOSIS	1	0.4
L AMYLODOSIS	2	0.8
DIABETIC HAND SYNDROME	1	0.4
PRURIGO SIMPLEX	1	0.4
TROPICAL ULCER	1	0.4
ROSACEA	1	0.4
GRANULOMA ANNULARE	1	0.4
<b>TOTAL</b>	<b>250</b>	<b>100</b>

**TABLE 3: VARIOUS SKIN DISEASES ASSOCIATED WITH DIABETES MELLITUS**

<b>FUNGAL INFECTIONS</b>	<b>NUMBER OF CASES</b>	<b>PERCENTAGE</b>
T. CRURIS	18	7.2
T. CORPORIS	16	6.5
T. PEDIS	4	1.6
T. FACIEI	2	0.8
C. BALINITIS	4	1.6
C. INTERTRIGO	4	1.6
ONYCOMYCOSIS	7	2.8
PITYRIASIS VERSICOLOR	5	2
VALVO VOGINAL CANDIDIASIS	6	2.4
PARONYCHIA	1	0.4
<b>TOTAL</b>	<b>67</b>	<b>26.8</b>

**TABLE 4: FUNGAL INFECTIONS**



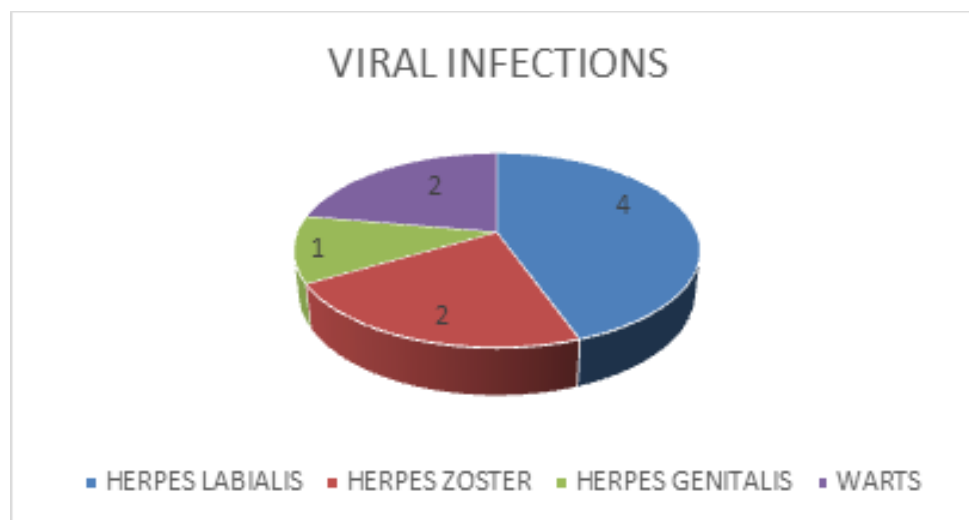
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BACTERIAL INFECTIONS	NUMBER OF CASES	PERCENTAGE
FURUNCULOSIS	16	6.4
FOLLICULITIS	4	1.6
CARBUNCLE	4	1.6
CELLULITIS	3	1.2
ECTHYMA	1	0.4
ERYSERELES	1	0.4
ERYTHRASMA	2	0.8
ENL	1	0.4
LEPROSY	6	2.4
<b>TOTAL</b>	<b>38</b>	<b>15.2</b>

**TABLE 5: BACTERIAL INFECTIONS**

GRAM STAIN	NO. OF CASES	PERCENTAGE
DONE	21	8.4
NOT DONE	229	91.6
<b>TOTAL</b>	<b>250</b>	<b>100</b>

**TABLE 6: DISTRIBUTION OF DATA BY GRAM STAIN**



**Figure 4**

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