CUTANEOUS MANIFESTATIONS IN DIABETES MELLITUS STUDY OF 50 CASES

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Summary

Fifty cases of diabetes mellitus with skin complications were studied over a period of one year. 74% of the patients had associated skin diseases, 12% had skin manifestations due to diabetes, and 8% had manifestations due to antidiabetic therapy. 6% had skin symptoms which helped in the detection of the underlying diabetes.

Diabetes mellitus is one of the most common of endocrinopathies[1]. No disease of the skin is absolutely peculiar to the diabetic, yet there are diseases the incidence of which is more common in diabetics than in nondiabetics. Cutaneous manifestations in patients with diabetes mellitus are of peculiar importance. Without control of diabetes there will be little or no response of some of the cutaneous processes to local therapy. The cutaneous manifestations may be the first evidence of diabetes and thus makes early diagnosis and treatment of diabetes mellitus possible. Although skin may mirror manifestations of internal disease and is often the first important expression of disease, appearance of a skin eruption in a diabetic may be coincidental[2]. It is hardly surprising that diabetes mellitus, which affects every other organ of the body, should also involve the skin. The cutaneous involvement is indeed protean. The manifestations may be primary cutaneous events or subsequent to the course of established disease or due to therapy itself.

Whether hyperglycemia is the sole factor responsible for the various skin manifestations cannot be easily decided, for lack of enough evidence. It has been shown by the studies in vitro that blood containing high glucose is no better a culture medium than blood having a normal blood glucose level[3]. A condition called 'skin diabetes' by Urbach[4], is described with furunculosis, sweat gland abscess, eczema, and pruritus which are resistant to therapy. Biochemically, this condition has a high fasting skin sugar level but with normal blood sugar level. The condition shows improvement on low carbohydrate diet with or without insulin.

Various attempts have been made to use skin sugar content as a means of studying the blood sugar. Recently West, Rockwell and Wulff[5], after thorough study of 154 diabetic patients, concluded that the skin sugar test was not reliable and did not correlate with the blood findings. Skin irritation from various causes may increase blood sugar content. MacKenna and Lehmann[6] and

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Bauer[7], noted a flat glucose tolerance curve in patients with a variety of skin diseases. Duncan[8] believes that the consistent pathological changes in diabetics are those of accelerated degenerative processes.

Material and Methods

This study was undertaken to ascertain various skin manifestations in diabetes mellitus, diseases associated with it and cutaneous complications due to therapy. Fifty cases of diabetes mellitus who came to the skin out-patient department of K.E.M. Hospital, Bombay for skin complaints over a period of twelve months were selected for the study. After a detailed history and complete physical examination all the data were entered in a specially prepared master sheet. The following investigations were done. Urine sugar and other routine examinations. Hemogram, Blood sugar – G.T.C., Blood cholestrol, Stool for parasites, Gram stain. Wet preparation of scrapings with 10% KOH for fungus, Skin biopsy. Fundus examination, Chest X-ray, E.C.G. Photograph.

Findings

TABLE 1

Age group in years	Distribution Percentage
10 — 20	2
21 — 30	8
31 — 40	22
41 — 50	30
51 — 60	22
Over 60	16

In our series 68% of patients were in the age group above 41 years with 62% males and 38% females. 10% of the patients showed evidence of neuropathy and 4% of cardiovascular association.

This shows that the largest percentage of cases is associated with other skin diseases while skin manifestations due to diabetes mellitus is only 12%.

TABLE 2

Manifestations and Associations

	Percentage
Due to diabetes	12
Associated diseases	74
Symptomatology	6
Due to therapy	8

TABLE 3

Etiology of skin manifestations due to diabetes

Etiology	Percentage
Diabetic dermopathy	8
Necrobiosis lipoidica diabeticorum	2
Tuberous xanthoma	2

This table shows that in the present series 8% of patients had diabetic dermopathy.

TABLE 4

Associated skin diseases with diabetes mellitus

Skin condition	Percentage
Tinea corporis	22
Tinea cruris	4
Tinea pedis	4
Monilial vulvovaginitis	8
Monilial balanitis	6
Chronic pyoderma	14
Chronic ulcer	2
Paronychia	8
Psoriasis	4
Lichen planus	2

This table shows that 30% of cases has tinea and 14% has candidal infection.

TABLE 5

Symptomatology	Percentage
Pruritus	4
Alopecia	2

This table shows that two patients had only pruritus and one only alopecia for which when they were investigated the underlying diabetes was detected.

TABLE 6

Skin manifestations due to therapy

	Percentage
Atrophy of skin	2
Drug allergy	6

This table shows that 6% had allergy due to oral hypoglycemic drugs and 2% had atrophy of skin due to insulin.

TABLE 7

Symptoms at the time of detection of diabetes

	Percentage
Polyurea	50
Polydypsia	44
Polyphagia	48
Pruritus	16
Lassitude	6
Loss of weight	18
Chronic skin conditions	10
Chronic pyoderma	4
Monilial balanitis	2

All except five cases were known cases of diabetes who came to the skin department for skin ailments. Five cases were detected in the skin department to have underlying diabetes when they came for skin complaints.

Discussion

Diabetes is a disorder which leaves no tissue or organ of the body unaffected and the changes found in the skin largely parellel to those occurring in internal organs[9]. The ratio of skin to blood glucose in normal individuals is about 1:2[10]. It is higher in diabetics taking insulin than in those controlled by oral hypoglycemic agents or diet alone, and both are higher than in normal persons[11]. Attempts to assess blood glucose concentrations by skin tests have thus far proved unreliable.

Structural changes of skin in diabetics: The structural changes of apparently normal skin of diabetics is as follows :

1. Increased mast cells in the dermis
2. Increased capillary fragility
3. Thickening of capillaries and vessels
4. Increased capillary numbers

The skin of diabetics show a certain degree of functional change.

1. Greater reactivity to histamine
2. Anhidrosis and intolerance to histamine
3. Hyperhydrosis
4. Delayed wound healing

Vascular Changes - Microangiopathy: The vascular changes of diabetes mellitus are an integral part of the disease and are responsible for cerebrovascular, cardiac, renal and retinal complications. The vascular changes are microangiopathic and atherosclerotic. Microangiopathy consists of thickening of the basement membrane of capillaries, arterioles and venules. Terry et al[12] have described an unusual morphologic change in the capillary loops of the nail fold with a significantly higher occurrence in the diabetics than in the control.

Diabetic dermopathy: Four cases of diabetic dermopathy or shin spots were seen in the current study. The lesions were oval with thin atrophic macules located bilaterally on the pretibial areas. The lesions were asymptomatic, a fact that may account for the delay in recognition of this entity. Histologically the lesions displayed greater vascularity than the surrounding skin, and capillaries of the papillary dermis showed focal thickening and basilar hypermelanosis. Diabetic dermopathy does not respond to control of glucose metabolism and can be distinguished from other pigmented disorders that afflict the legs by the absence of purpura.

Necrobioses lipoidica diabeticorum (NLD) : In the current series a boy 11 years old manifested with scaly telangiectatic plaques with central atrophy on the nose and the lateral side of the left wrist. The lesions appeared as small red papules two months earlier. Diabetes was detected five years earlier on routine examination prior to tonsillectomy. Biopsy of the lesion showed necrobiosis of collagenous tissue with a

fibrinoid appearance, proliferation and thickening of dermal vessel walls and a perivascular granulomatous reaction.

Necrobiosis lipoidica diabeticorum is unrelated to the degree of hyperglycemia and it occurs at any age. The control of diabetes is not correlated with clinical improvement. Local steroid cream and occlusive dressing and intralesional injection of triamcinolone are useful.

The site of lesion of NLD seen in the current series was atypical, the usual site being on the shin unilaterally or bilaterally.

Atherosclerosis: Ulceration often associated with neuropathic changes and notoriously difficult to heal, and gangrene are late manifestations. In this series there was one case of chronic ulcer. In the legs atherosclerosis is marked by atrophy of the skin, coldness of the toes, loss of hair, dystrophy of the nails and a tendency to thrombotic phenomenon.

Rubeosis and granuloma annulare were not met with in this series.

Occasional signs and symptoms—Pruritus: In this series 26 percent of patients complained of pruritus and 2 percent were diagnosed at the Skin department by routine investigations for persistent generalised pruritus. Persistent generalised pruritus is an indication for a complete medical survey, because this symptom is often associated with various medical diseases such as uremia, jaundice, lymphoma, internal malignancy and diabetes mellitus. However, it should not be overlooked that there are purely cutaneous reasons for generalised pruritus. Any skin with low humidity and too frequent bathing leads to pruritus. Although uncommonly seen, certain minute parasites may also be the cause for generalised pruritus.

Abnormalities of hair: In this series, a lady 50 years of age with neglected diabetes of 5 years duration had diffuse alopecia. Ebling[13] described diffuse alopecia in poorly controlled diabetes.

Idiopathic bullae apparently characteristic but a rare dermatosis associated with diabetes mellitus was not met with in the study.

Stomatitides, the triad of gingival tenderness, xerostomia and burning mouth may precede the classic triad of polydypsia, polyphagia and polyurea in diabetic symptomatology.

Infections – Bacterial: In the present series 7 patients (14%) had chronic pyoderma. In one chronic pyoderma case underlying diabetes mellitus was detected during investigations in the skin department. Lister[14] observed that as many as 20% of patients were discovered to have diabetes mellitus while being investigated for septic skin infection. Hence examination of the urine and blood is advisable for patients who have recurrent or chronic bacterial infections. Diabetes mellitus may be a background for furuncles, carbuncles, impetigo, ecthyma, gangrene, cellulitis and leg ulcer, more so when there is a distinct persistent erythematous halo around any of the above pyoderma. Pyoderma developing in a known diabetic signifies poor control.

Fungus: In the current series 15 cases (30%) were of Dermatophyte infection and 7 cases (14%) of candidal infection making a total of 22 cases (44%) and thus forming the largest group. Whether Diabetes Mellitus plays a role in superficial trichophyton infections is not clear. Rothman[15] found no such association, but in more recent work done by Jolly[16] on 29 consecutive patients with recurrent trichophyton rubrum infections, a significant number of elevated glucose tolerance curves were found.

Two cases of dermatophytosis due to Trichophyton rubrum infection were noted in this series. Dermatophytosis is marked by scaling and maceration between the toes in its acute form. Fungal infections can act as portals of entry for secondary bacterial infections and thus assume a more serious complicating role in diabetics that warrants early treatment.

In the current series 4 cases (8%) of monilial vulvovaginitis were met with. Vulvitis is a common clinical finding in diabetic girls. Pruritic vulvitis in the nonpregnant female should prompt search for diabetes. Clinically one observes vulvar swelling with erythema, erosion and lateral intertriginous dermatitis. Presence of satellite pustules is helpful in the diagnosis. The anogenital, axillary, submammary and interdigital regions and the angles of the mouth are most vulnerable to the yeast organisms.

In man, particularly the uncircumcised, monilial balanitis may be the first clue to diabetes. In this series 3 cases of monilial balanitis were observed and in one chronic case underlying diabetes mellitus was detected in the Skin department (Fig. 1 Page No. 299).

In this series 4 cases (8%) of paronychia were noticed. Stones[17] in his study noted that the incidence of chronic paronychia in diabetic females over the age of 20 years was 9.6% while the incidence in a non-diabetic control group was 3.4%.

The treatment of moniliasis include local or oral nystatin, topical fungicides, and adequate diabetic control.

Dermatologic diseases associated apparently more in diabetic than in normal subjects-Psoriasis: In this study two cases of diabetes mellitus, one male and one female, were seen having extensive psoriasis. Reeds[18] found in his study that 25% of 103 Psoriasis vulgaris patients had diabetes. Lynch[19] showed that there is no more than a chance relationship between psoriasis and diabetes mellitus.

Lichen planus : A female aged 63 years with uncontrolled diabetes mellitus of 13 years duration had extensive Lichen planus on the dorsum and lateral aspects of the upper extremities, abdomen and medial and lateral aspects of legs since one year (Fig. 2 Page No. 299). There is no reference in the literature as to any association of L.P. with diabetes mellitus.

In this series a female patient aged 26 years with diabetes of three years duration was seen having yellowish brown pedunculated soft lesions on the flexor aspects of both arms (tuberous xanthoma) and medial aspect of the eyelids (xanthalasma). Her serum cholestrol was 405 mg %.

Anhidrosis, vitiligo, lipid proteinosis, kaposi's sarcoma[20], acanthosis nigricans[21], kyrle's disease[22], and scleredema[23], have been described in association with diabetes mellitus without apparent relationship, but none was met with in this study. Similarly skin abnormalities associated with diabetes and faulty hepatic metabolism such as carotinosis[24], hemochromatosis[25], porphyria cutanea tarda[26], xanthomatosis[27], progressive lipodystrophy and lipoatrophic diabetes[28] were also not met with in this series.

Complications due to therapy: In this series, 17 patients were on insulin and one of them developed depressed atrophy at the site of injection, on the lateral side of the right upper arm. This complication can be avoided by rotation of injection sites, use of dispensable needles and intramuscular instead of subcutaneous injection of the drug.

Out of 38 patients on oral hypoglycemic drugs, three developed urticarial

lesions which disappeared on stopping the drug. Sulphonylureas are known to produce cutaneous complications, namely urticaria, pruritus, erythema and vesicobullous eruptions including erythema multiforme[29] and the Stevens Johnson syndrome[30] but no such cases were met with.

REFERENCES

1. Danowski TS : Types of diabetes mellitus, Ann Int Med, 57 : 321, 1962.
2. Pastras T and Beerman H : Some aspects of dermatology in diabetes mellitus, a review of some recent literature, Am J Med Sc, 247;363 (M), 1964.
3. Joslin PE, Root RFH, White P, et al: Treatment of diabetes mellitus, Lea and Feibiger, Philadelphia, 1958.
4. Urbackh E and Lentz JW : Carbohydrate metabolism and skin, Arch Derm, 52 : 301, 1945.
5. West KM, Rockwell DA and Wulff JA : Value of the skin surface glucose test as a screening procedure for diabetes, Diabetes, 12 : 50, 1963.
6. MacKenna RMB and Lehmann H : Further observations on the glucose tolerance test in skin diseases, Lancet 1:1393, 1963.
7. Bauer RL : Atopic dermatitis, Med Cli N Am, 43 : 770, 1959.
8. Duncan GG : Diseases of metabolism, 4th ed, Phil, Saunders, 1959.
9. Rook A, Wilkinson DS and Ebling FJG : Textbook of dermatology, Vol 2, Blackwell 1968, p. 1900.
10. Peterka ES and Fusaro RM : Cutaneous carbohydrate studies I, J Invest Derm, 44: 385, 1965.
11. Peterka ES and Fusaro RM : Cutaneous carbohydrate studies IV, J Invest Derm, 46 : 459, 1966.
12. Terry EN, Messina EJ, Schwartz S et al : Manifestations of diabetic microangiopathy in nail-fold capillaries, Diabetes 16 : 596, 1967.
13. Ebling FJG and Rook A : Textbook of dermatology, Vol 2, Rook A, Wilkinson DS, Ebling FJG, Blackwell, Oxford, 1968, p. 1381.
14. Lister J : The clinical syndromes of diabetes mellitus, Lo Lewis & Co, 1959, p. 204.
15. Rothman S : Systemic disturbances in recalcitrant T rubrum (Purpureum) infection, Arch Derm, 67 : 239, 1953.
16. Jolly HW and Carpenter CL : Oral glucose tolerance studies in recurrent trichophyton rubrum infections, Arch Derm 100:26, 1969.
17. Stone OJ and Mullins JF : Incidence of chronic paronychia, J Am Med Assoc, 186 : 71, 1963.
18. Reeds RE, Fusaro RM and Fisher : Psoriasis vulgaris, clinical survey of association with diabetes mellitus, Arch Derm, 89:205, 1964.
19. Lynch PJ : Psoriasis and blood sugar levels, Arch Derm, 95 : 255, 1967.
20. Hurlburt WB and Lincoln CS : Multiple haemorrhagic sarcoma and diabetes mellitus, Arch Int Med, 84 : 738, 1949.
21. Winkelmann RK, Scheen SR and Underdagh LD : Acanthosis nigricans and endocrine disorders, J Am Med Assoc, 174 : 1145, 1960.
22. Carter VH and Constantine VS : Kyrle's disease, Arch Derm, 97 : 624, 1968.
23. Fleischmajer R, Faludi G and Krol S: Scleredema and diabetes, Arch Derm, 101 : 1, 1970.
24. Eisert J : Diabetes and diseases of the skin, Med Cl N Am, 49 : 3, 1965.
25. Butterworth T and Strean LP : Clinical dermatology, Baltimore, Waverly press, 1962, p. 190.
26. Burnham TK and Fosnaugh RP : Porphyria, diabetes and their relationship, Arch Derm, 83 : 717, 1961.
27. Fleischmajer R : Dyslipidoses, Med Cl N Am, 49 : 633, 1968.
28. Taylor WB, Honeyeutt WH and Arbor A : Progressive lipodystophy and lipoatrophic diabetes, Arch Derm, 84 : 31, 1961.
29. Stewart RC, Piazz AV, Hyman H et al : Chlorpropamide therapy in diabetes, an appraisal, New Eng J Med, 261 : 427, 1959.
30. Yaffee HS : Stevens Johnson syndrome caused by chlorpropamide, Arch Derm, 82 : 636, 1960.