REVIEWS

SOME ASPECTS OF SKIN DISEASES AND DIABETES MELLITUS

(A review of literature)

By

VIRENDRA N. SEHGAL, M. D.*

and

P. SANKER, M. B. B. S.**

No diseases of the skin are absolutely peculiar to the diabetes, yet there are diseases the incidence of which is more common in diabetics than in non-diabetics. Among those are the infections viz. furuncles, and carbuncles, which were more common before the insulin era. Pruritus of external genitalia is more common in glycosuric diabetics female than in non-glycosuric diabetics and much less in persons with no diabetes at all. Xanthosis, xanthomatosis and necrobiosis lipoidica and epidermophytosis have been found to be more common in diabetics than in non-diabetics. Then there are diabetics in whom allergic reactions to insulin are reported to occur and so is the case with lipodystrophy.

Whether hyperglycaemia per se is the sole factor responsible for the various skin conditions cannot be authentically accounted, for the lack of enough evidence. It has been shown by the studiesi n vitro that blood containing high glucose is no better culture medium than blood having normal blood glucose level.[1] A condition called 'skin diabetes', by Urbach[1,2] is described to be having characterised by furunculosis, sweat gland abscess, eczema and pruritus which is resistant to therapy. Biochemically, it 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.

PRURITUS

Pruritus pundendi occurs most frequently in female diabetics on poor or no control. One possible explanation of this condition occuring in diabetics as postulated by Rudy and Hoffmann[3] is the dificiency of Vitamin i. e. nicotinic acid but Joslin et al have failed to observe this fact.[4] Mehnert and Mehnert[5] working at the Joslin clinic examined the urine of 200 patients of diabetes and 100 non-diabetics for the incidence of yeast potentially pathogenic for man. Their observation reveals that the urine of 34.7% of 150 diabetics who were glycosuric contained yeast as contrast with 8% of 50 diabetics who were aglycourics. The latter figure comes to be the same as that (10%) for 100 non-diabetics without sugar in the urine. Therefore it appears that it is the sugar in the urine which accounts for the presence of yeast in urine than diabetic condition itself does so. The yeasts isolated were of all species of candida

(From the department of Medicine, College of Medical Sciences, Banaras Hindu University, Varanasi-5)

* Lecturer—(Dermato-venereology) and Physician. S. S. Hospital, B. H. U., Varanasi-5.

** Clinical Registrar, Medicine.

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(monilia) and chiefly of albicans variety. Some workers however, are of the opinion that pruritus may be secondary to the elaboration of an enzyme of the endopeptidase group.[6] Koenigstein[7] injected various metabolites of diabetes into the cisternae of rabbits and cats and could not elicit a scratch response. In addition to the above possible explanations for pruritus one has to take into consideration such factors as drugs, uraemia, erosis, liver diseases, as well as alternative primary skin conditions in diabetes. Females predominate than the males in this, whether diabetics or non–diabetics.

DERMATOPHYTOSIS

It is the most common skin disease to which diabetics are prone to suffer[8] and the incidence in diabetes is far more than in non–diabetics. Green–wood[9] has reported its incidence to be 40% and occurs mostly in intertriginous zones of feet. Though it occurs also in non–diabetics, but the condition is more serious in diabetics and is characterised by macerated lesions in the intertriginous areas of the toes which at times are open fissures in the depth of interdigital spaces or on the planter snrface of the toes at their junction with the sole. This condition is associated with itching and at times with blister formation and exudation.

INFECTIONS OF SKIN

They were very frequently met with in pre–insulin era and with the advent of antibiotics the incidence has further gone down. In a few cases still this may be an associated clinical observation, and it is deemed with the predisposition of patients going into complications like diabetic coma.

It has been demonstrated again and again that certain dermatoses are the consequences of a disturbance of carbohydrate metabolism, the nature of pathogenesis involved is still controversial question. The skin infections which are commonly associated with diabetes include certain types of dermatoses, notably those localised in the intertriginous zones and in the area surrounding the excretory orifices such as balanoposthitis, circum–oral and vulvular dermatitis, staphylococcal infections including folliculitis, furunculosis, carbuncles, sweat gland abscesses and so on. The causation or their association with diabetes is far from satisfactory, though various workers have been trying to bring out a plausible postulate to explain this, but unfortunately it still remains a relatively untresspassed territory in dermatology. Kaposi[10] however, postulated during his investigations that the increased concentration of sugar or intermediary and incomplete products of carbo–hydrate metabolism in the skin act in one of the following ways either by direct stimulation of sensory nerves of skin causing pruritus or by creating a disturbance of secretory and vasomotor nerves, resulting in anhydrosis, asteatosis and xerosis of the skin or by exerting direct influence on capillary walls and glands. Jadassohn[11] regarded some of the skin diseases in diabetes as belonging to a group of excretory dermatoses on the theory that the sugar passing through the secretory glands exert a pathogenic influence on the cutaneous bacterial flora. Carrie and Koenig[12] have demonstrated that patients with high blood sugar

levels excrete abnormal amount of sugar on to the skin surface. Block et al[13] and Achard[14] showed that abnormal decomposition of products of sugar bring about an umstimmug (alteration of terrain) as a result of which the skin reacts to endogenous or exogenous stimuli other than those derived from the abnormal metabolism, with cutaneous manifestations. According to Stokes et al[15] ingested carbohydrate may influence skin infection through its action on the bacterial content of intestinal tract, causing vasomotor instability which constitutes a clinicnlly important fact or predispose to a wide variety of inflammatory reactions. Pillsbury and Strenberg[16] pointed out the influence of carbohydrate on skin infection and said that it may be exerted through its effect on the water content of the tissue (hydration). It has been shown that a high carbohydrate intake leads to water retention in the tissues. This point is being investigated abroad and in our country by certain group of workers. Kandhari[17] however, believes it to be due to hydration or water logging of the skin which predisposes thus the diabetic person to infections. Kulcher and Alderson[18] postuiated, however, that carbohydrate restriction results in dehydration followed by decreased susceptibility to experimentally induced infection, thus substantiating the observations of aforesaid workers. Rudy and Hoffmann[3] champion the theory that skin manifestations are not related to the hyperglycaemia but are attibutable to skin increased vulnerability resulting from a deficiency in the component of the vitamin B complex, notably nicotinic acid. These authors as well as Gross,[19] reported that skin lesions including those of monilial infection in diabetics, respond to treatment with vitamin B complex and with nicotinic acid. However, since Neuwahl[20] has demonstrated that nicotinic acid improves the carbohydrate metabolism of diabetic patients and may enchance the action of insulin, the therapeutic effect of nicotinic acid and the explanation based on this effect may not quite conform with Rudy and Hoffmann[3] views on the subject. Milbradt[21] stated that skin disorders involving extensive dermatitis of chemical or mechanical origin may bring on a disturbance in carbohydrate metabolism. This is generally interpreted as evidence of injury to the liver, rather than a sign of disturbed pancreatic function. Lastly, Whitfield[22] alluded to the assumption that in many bacterial infections the thyroid–adrenal apparatus is brought into action as a part of the organism's defence mechanism. The resulting rise in blood sugar is therefore an effect and not the cause of skin diseases in these cases.

Xanthosis or Xanthoderma is a yellowish discoloration of the skin encountered at times in diabetics, being found chiefly on palms and soles and nasolabial folds. It is considered to be due to high carotene and the cholestrol content of the blood, probably carotene being not fully metabolised. Boeck and Yater[23] observed it in 9% of 100 patients with diabetes, in 9% of 22 patients in renal diseases and in 3% of 23 other hospital patients selected at random.

XANTHOMA DIABETICORUM

Now an uncommon skin condition in diabetics. It is characterised by bright red nodules mottled with deep rose tint of varying sizes with a maximum diameter upto 5 mm., being chiefly distributed on extensors aspects of forearms and especially about

the elbows and knees. They are associated with increased total lipids and cholestrol content of the blood[24,25]. Phospholipids under normal condition act as emulsifiers. In this situation the relative decreases in circulating phospholipids result in an agglomeration of fat droplets to form milky serum[26].

NECROBIOSIS LIPOIDICA DIABETICORUM

In 1928 it was Openheim[27] who observed this condition in a diabetic patient, but it was named by Urbach[28] and Ratjo in 1932. However, the condition occurs (10%) in non-diabetics also. Kannon[29] has reported this condition can occur months and years prior to onset of actual diabetes. Hildebrane, et al[30] reported that 18% of a series of 86 cases in the literature cutaneous lesions appeared 1 to 5 years before symptoms of diabetes. The lesions are papulated 1 to 3 mm. in diameter with sharply outlined borders and may be covered by scales and don't disappear under pressure. In later stages the lesions take up the form of round, oval or irregular shaped plaques with well defined borders having a firm consistency and glistening surface; still later there may occur an area of atrophy and ulceration in the centre. It is most often met with in females below the age of fifty. Urbach[31] in 1932 pointed out to the presence of extra cellular accumulation of lipid as well as necrobiosis and vascular changes. Since then, it has been seen that the presence of lipid is not constant, nor for that matter, is there the invariable existence of blood vessel changes[32]. In the series of Joslin et al[4] a total of 37 cases in patients with onset of diabetes at the age of 15 years or under and with duration of diabetes with 15 years or over, the distribution in the sexes was equal i. e. 19 males and 18 females.

In the case report of Goldberg and Rosenberg[33] this condition was observed in a patient with intercapillary glomerulonephrosis.

DERMATITIS GANGRENOSA

No incidence of dermatitis gangrenosa is available although some case reports have been published from different places. One report deals with the development of gangrene of the skin of the trunk or arm during or after diabetic coma[34]. One such case occured at New England Deaconess Hospital when a patient developed gangrenous slough at the site of hypodermic injection. A lowered resistance perpetuated by acidosis in diabetes is probably responsible for this condition.

DUPUYTREN CONTRACTURES

Joslin et al[4] reported that the contractures of the palmar fascia occur most frequently amongst older diabetics than non-diabetics, This is supported by Wilder[35]. Schneider[36], however, found that 120 of 321 patients in a diabetic clinic had dupuytren contractures,

LANUGO

This is a downy hair condition occuring when diabetic suffers from malnutrition also. Therefore it is mostly seen in neglected cases or diabetic pseudo-dwarfs,

LIPODYSTROPHY

This involves the changes in the deeper layer of subcutaneous fats either atrophy or hypertrophy after repeated injection of insulin at one site[37], Both hypertrophy and atrophy may occur in the same individual either concurrently or in succession.

It is reported that such changes in adipose tissue are not related to any preservative (tricresol) in the insulin, or the presence of lipase in the market insulin, to inflammatory responses, to mechanical trauma of repeated injections at one site or trace of alcohol which might be left in the syringe in the process of cleaning.

In a survey of 1096 consecutive diabetic patients of all ages who had taken insulin for one year or longer, 24.2% showed atrophies to a greater or lesser degree. However, in the 342 patients in the series who were under the age of 20 years, atrophies occurred in 44.4% as contrasted with an incidence of only 14.9% in the 754 patients twenty years of age or older.

In patients under 20, atrophies were only slightly more common in females than males, whereas in those twenty and over the incidence among females was almost 7 times more great. Actually in the adult male group only 3.3% showed atrophies.

This extra-ordinary sex difference appears to be real although it must be admitted the layer of subcutaneous fat available for change is often less in adult males than in adult females.

The difference in incidence in sexes is present also as regards hypertrophies but this abnormality is more common in males. Thus among 596 diabetic patients of whom 259 were males and 337 were females hypertrophies occured in 39.3% of males under 20 years of age as contrasted with only 17.9% among females, Among patients who were 20 years of age or over, hypertrophies were found in 20.5% of males and in 11.7% of females.

SUMMARY

A review of the incidence of various dermatoses have been dealt with and an effort has been made to unfold the possible mechanism involved in the causation of these conditions. A study of the influence of various factors common to diabetes, which predispose and " trigger " the skin manifestations have been made. This study, has also helped to explain the preventive role of insulin in the various dermatoses, as occuring in diabetes mellitus.

REFERENCES

1. Urbach, E.: JAMA, 129 : 441, 1945,
2. Urbach, E.: Skin diseases, Nutrition and metabolism. William Heinemann, Ltd., 1946.

3. Rudy, A. and Hoffmann, R.: New England J. Med. 227 : 893, 1942.
4. Joslin, P. E., Root, R. F. H., White, P. and Marble, A.: Treatment of diabetes mellitus-Lea and Feibiger (Philadelphia), 1958.
5. Mehnert and Mehnert : Diabetes 7 : 293, 1958.
6. Shelley, W. B. and Arthur, R. P.: Trans. Assoc, Am. Physicians, 68 : 283, 1956.
7. Koenigstein, H.: J. Invest. Dermat. 10 : 265, 1948.
8. Behrman and Levin : J. Mount Sinai Hosp. 13 : 257, 1947.
9. Greenwood : JAMA 89 : 774, 1927.
10. Kaposi, M.: Cited by Urbach[2]
11. Jadassohn, J.: Cited by Urbach[2]
12. Carrie, C. and Koenig, R.: Arch. f Dermat. u. Syph. 173 : 611, 1936.
13. Block, B.: Ergele cited by Urbach[2]
14. Achard, C.: Clinque becons sur le diabetes Paris : Balliare, 1925.
15. Stokes, J. H.: Beerman, H. and Ingrahm, N. R. (Jr.), Am. J. Med. Sc., 195 : 562, 1938.
16. Pillsbury, D. M. and Sternberg, T. H.: Arch. Dermat. and Syph., 35 : 893, 1937.
17. Kandhari, K. C.: Personal Communication, 1965.
18. Kulchar, G. V. and Alderson, H. E.: Brit. J. Dermat., 48 : 447, 1936.
19. Gross, P.: Arch. Dermat, and Syph. 43 : 504, 1941.
20. Neuwahl, F. J.: Lancet 2 : 348, 1943.
21. Milbradt, W.: Arch. Dermat. and Syph. 169, 494, 1934.
22. Whitfield, A Delib, 9th internal. Dermat. Congress 1 : 252, 1935.
23. Boeck and Yater, J. Lab. and Clin. Med. 14; 1129, 1929.
24. Montgomery and Osterberg: Arch. Dermat. and Syph. 37 : 373, 1938.
25. Thannhausher and Magen-dantz.: Ann. Int. Med. 11 : 1662, 1938.
26. Margolin, E. G.: An. Int. Med. 39 : 629, 1953.
27. Openheim. Tentr. Hant, u. Geschl : 32 : 179, 1930.
28. Urbach and Retjo: Arch. f. Dermat. 166 : 273, 1932.
29. Connon: South. Med. J., 38 : 105, 1945.
30. Hildebrane, Montgomery and Pynearson: An. Int. Med., 66 : 851, 1940.
31. Urbach, E.: Arch. Dermat. u. Syph., 168 : 273, 1932.
32. Hare, P. J.: Brit. J. Dermat., 67 : 365, 1955.
33. Goldberg and Rosenberg: A. M. A. Arch. Dermat. 71 : 602, 1955.
34. Revin: Am. J. Med. Sci., 189 : 550, 1935.
35. Wilder: Cited by Urbach.[2]
36. Schneider: Medicine in South Africa, 96, 1957.
37. Marble and Renold: Trans. Assoc. Am. Physician, 62 : 215, 1949.