Original Article

Prevalence of Diabetic Dermopathy in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Objective: To assess the prevalence of diabetic dermopathy (DD) in type 2 diabetes mellitus (T2DM) patients. **Materials and Methods:** In a case control study, seventy-six T2DM subjects underwent dermatological examination after written consent. Biochemical measurements included nonfasting plasma glucose (enzymatic kinetic colorimetry) and glycated hemoglobin (glycohemoglobin spectrophotometry). **Results:** Only four diabetic patients (5.3%) had hyperpigmented and retracted atrophic scars of DD on the shins. Patients with diabetic dermopathy had longer diabetes duration (8.0 ± 4.2 years vs.6.73 ± 5.71years), elevated plasma glucose (13.88 ± 2.86 mmol./L vs. 12.30 ± 2.39 mmol./L) and worse glycemic control (HbA_1c 12± 2 % vs. 11 ± 1.83%) than that of diabetics without DD. However, step-wise regression analysis illustrated that development of diabetic dermopathy in T2DM patients is not related statistically to duration of diabetes and glycemic control. **Conclusion:** Even though the prevalence of diabetic dermopathy in present small diabetic population is low, it is mostly presented by poorly controlled T2DM patients. Frequent dermatological analyses and better glycemic control in large populations are needed to improve prognosis and quality of life in these patients. **Key Words:** Dermopathy, Hyperglycemia, Diabetes mellitus, Prevalence

INTRODUCTION

Diabetes mellitus induces various forms of skin diseases. All of these skin conditions are derived from an impaired skin homeostasis, thought to be caused by diabetes-induced abnormalities of the metabolism or by diabetic complications. The etiologies of skin conditions associated with diabetes have not been fully explained. One possible causative factor is diabetic microangiopathy, which is known to affect the eyes, kidneys, nerves and skin in patients with diabetes. Underlying pathology include excess sorbitol formation, increased glycation end products, oxidative damage and protein kinase C over-activity.

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As the skin plays a thermoregulatory role, there is significant capillary redundancy in normal skin. In diabetic patients, loss of capillaries is associated with a decrease in perfusion reserve. This lost reserve is demonstrable under stressed conditions, such as thermal stimulation. The associated failure of microvascular perfusion to meet the requirements of skin metabolism may result in diverse skin lesions in patients with diabetes[1-4]. Diabetic dermopathy (DD) or Shin spots, most common cutaneous manifestation of diabetes mellitus is a condition characterized by the presence of multiple hyperpigmented atrophic macules on the legs. Dermopathy appears as a shiny round or oval lesion of thin skin over the front lower parts of the lower legs. These lesions have been classified with vascular disorders because histology sections may demonstrate red blood cell extravasation, capillary basement membrane thickening, ateration of the collagen and small blood vessels. One or two hyperpigmented atrophic macules are occasionally encountered on the legs of non-diabetic patients, but

these lesions are much more common in diabetics. The occurrence of 4 or more such lesions is almost always limited to persons with diabetes[5-8].

Patients susceptible to diabetic dermopathy have a functional abnormality in skin blood flow[9]. Diabetic dermopathy have an unfavorable association with retinopathy, neuropathy, and nephropathy. Thus, the presence of DD should prompt aggressive intervention to detect diabetes mellitus and prevent the development of ensuing complications. Better understanding of the disease and improvement in the therapeutic modalities have reduced the life threatening metabolic complications of diabetes[4, 10].

Present study was undertaken to assess the prevalence of diabetic dermopathy (DD) in type 2 diabetes mellitus (T2DM) patients in Faisalabad, Pakistan.

MATERIALS AND METHODS

Sampling and Subjects

Study participants were selected through a multistage systematic sampling design from Out-Patient Department (OPD) of DHQ hospital, Faisalabad. Multi-stage sampling involved selecting the sample in at least two stages. At the first stage, large groups with type 2 diabetes mellitus (T2DM) were selected. At the second stage, those who gave consent were included in the study. Following informed consent, seventy six (T2DM) participants were enrolled. All case participants had established T2DM according to WHO criteria.

Clinical Evaluation

Medical history included all medical conditions that had been and are presently being treated. Demographic parameters included gender, mean age and duration of diabetes. From each of the case participants, blood sample was collected in EDTA-coated tubes. Biochemical assays were performed at Clinico-Medical Laboratory, Department of Chemistry and Biochemistry, Faculty of Sciences, University of Agriculture, Faisalabad, Pakistan. Blood plasma was stored in vials at -20 ^{o}C till further analysis.

Routine laboratory investigation included non-fasting plasma glucose (Biocon kit) and glycosylated hemoglobin HbA_1c (A_1c Kit Biosystem). The dermatological examination included visual inspection of the skin, particularly on dorsal, plantar, medial, lateral and posterior surfaces. History, duration and nature of skin lesions were documented[11].

Statistical Analysis

Data were expressed as mean ± SD, n or % of triplicate measurement. The degree of association between different variables was assessed by using Pearson's correlation coefficient (r). Student's t-test was performed by Statistical Package for the Social Sciences (SPSS Inc. Chicago, IL, USA) software (version 15.0) with level of significance set at $p < 0.05$.

RESULTS

The demographical characteristics of the participants are presented in table I. The study sample included T2DM patients without DD (group-1) and with DD (group-2). Hyperpigmented and retracted atrophic scars of diabetic dermopathy were prevalent in almost 5% patients. Age of group 1 and 2 subjects ranged between 46.5-62.5 years and 56.83-65.17 years respectively. Group 1 had 54% male and 46% female patients. Contrary to that, all the patients in group 2 were male.

The mean diabetes duration was higher in patients with diabetic dermopathy than in those without it. Elevated levels of HbA_1c, were prominent among those with dermopathy lesions compared to diabetics with no such lesions. T2DM patients with dermopathy had poor metabolic control compared to those without such skin manifestation. However, mean age, gender, diabetes duration and glycemic controls were not associated with the presence of DD.

Figure-1

Brown, scar-like, slightly elevated lesions on the legs

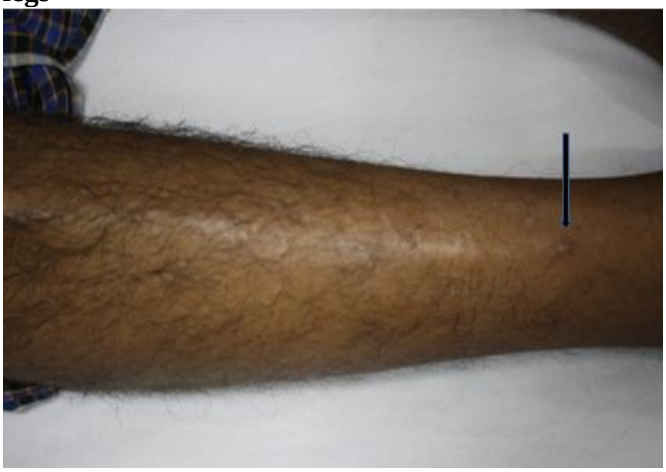
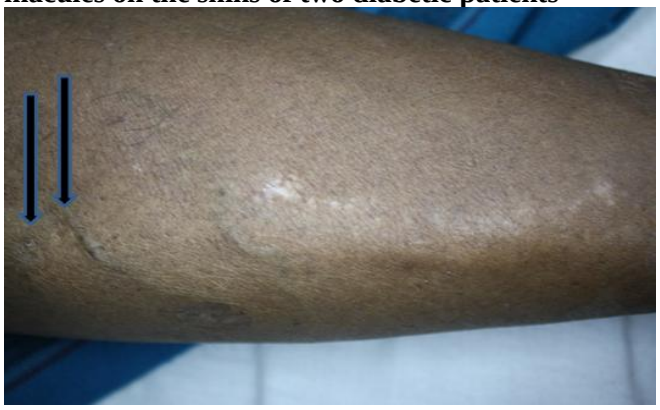


Figure-2 & 3
Close-up views of the atrophic hyperpigmented macules on the shins of two diabetic patients



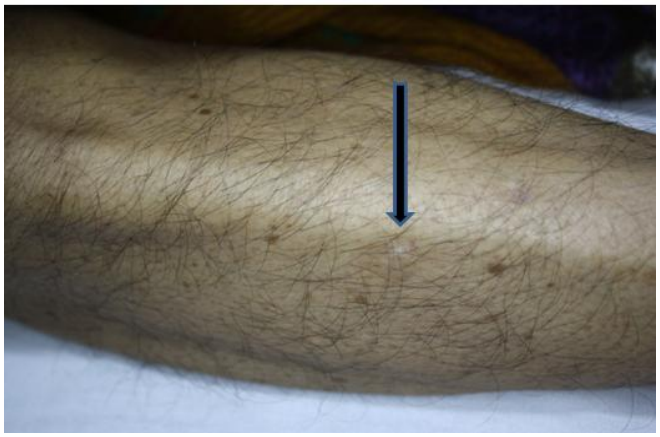


Table-1
Demographical characteristics of case participants (n = 76)

Demographics	Group-1	Group-2
Total Subjects	(n = 72)	(n = 4)
Age (years)	54.5 ± 8	61 ± 4.17
Gender (Male/Female)	41/31	4/0
Duration of diabetes (years)	6.73 ± 5.71	8.0 ± 4.2
HbA_1c (%)	11 ± 1.83	12 ± 2
Plasma glucose (mmol./L)	12.30 ± 2.39	13.88 ± 2.86

Data are means ± SD, n or %

DISCUSSION

Diabetes mellitus (DM) is the main cause of nonaccidental amputation: the risk for patients with diabetes mellitus is about 15 times more than that of any other patient population[12]. Diabetic skin lesions are usually ignored by physicians and patients. With a careful medical history and detailed physical examination, it can be seen that, in addition to other complications of diabetes, diabetic dermopathy appears either prior to, or simultaneously with, neuropathic symptoms. Moreover, it usually starts to appear on the distal portions of the lower extremities, mirroring the onset and the distribution of neuropathic symptoms.[13]

Diabetic patients susceptible to diabetic dermopathy have a functional abnormality in blood flow leading to this scarring process [9]. Frequent dermatological analyses and better glycemic control in large population are needed to improve prognosis and quality of life in these patients.

DD was present in only 5% of the study participants. This prevalence is lower than the reported 9% - 55% DD incidence in the diabetic patients. [6, 14,15] Even though the prevalence of DD in small selected diabetic population is low, T2DM patients with poor glycemic control had DD. Little is known about the relative extend to which cutaneous alterations are involve in diabetes and its secondary complications. This result may be due to variations among the sample sizes and ethnicities of the study groups.

All the patients with DD were above the age of 45 years as reported by others studies[2, 16]. Mean age of the patients with dermopathy was higher but not significant ($p > 0.05$) as compared to the patients without dermopathy, indicating that dermopathy tends to occur in the older age group. The difference in diabetes duration was insignificant ($p > 0.05$) in both groups. As the duration of diabetes increased, the likelihood of the presence of DD also increased as reported by Shahzad *et al*., 2011 [16]. There was no statistical correlation between the diabetic dermopathy and glycemic control, as reported earlier.[17]

Diabetic dermopathy presented well-demarcated, hyperpigmented, atrophic depressions, macules or papules located on the anterior surface of the lower legs of group 2 diabetic patients. The histopathology remained poorly defined which may in part be due to the fact that the few lesions were biopsied. All the patients had markedly increased epidermal melanin. The findings suggest that hemosiderin deposition in conjunction with the deposition of melanin contribute to the clinical features of DD.[18]

CONCLUSION

Diabetes mellitus which affects every organ of the human system, also involves the skin and indeed the cutaneous manifestations are protean in nature. Early referral to the dermatologist may help to detect complications of the skin in diabetes at an early stage and may prevent disability caused by these complications.

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