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SKIN LESIONS IN TYPE 2 DIABETES PATIENTS"

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ABSTRACT

OBJECTIVE: *The aim of this study was to determine the frequency of skin lesions in type 2 diabetes patients.*
PATIENTS AND METHODS: *A cross-sectional study was conducted at Muhammad Medical College Hospital Mirpukhas, Sindh from July 2008 to December 2009. The sample size comprised of 1270 type 2 diabetes patients. The patients were examined by a physician to determine the presence of diabetes mellitus-related skin lesions, skin infections and skin lesions caused by treatment. The data were collected on preformed proforma. Age, sex, duration of diabetes, mode of treatment, whether on oral hypoglycemic agents or insulin were noted. A multivariate logistic regression model was used to estimate the adjusted odds ratio (OR) for having diabetes related skin lesions. All data was analyzed by SPSS-10.0 for Windows (Chicago, IL. USA). The chi-square and student t-test were used as test of significance for qualitative and quantitative variables respectively. A p-value of <0.05 was considered statistically significant.*
RESULTS: *The mean age of patients was 52±11 years, 768 (60.47%) were female and 502 (39.62%) were male. The mean duration of the diabetes was 19±7 years and mean HbAlc was 11.8±3g/dl. Oral hypoglycemic agents were used by 913 (81.88%) patients, insulin by 164 (12.91%) and both were used by 193 (15.19%). The skin lesions were observed 851 (67%). The most common lesion was diabetic dermopathy (28.34%), but different types of skin infections were seen in 42.6% of patients and thus forming the most common lesion. The third most common manifestation was pruritis (28.05%) and the least common was the perforating dermatoses (0.78%). The HbA1c was higher in patients suffering from diabetic foot ulcer and fungal infection than those without having these infections (10.34±1.67 and 11.5±1.4 vs.9.7±1.6 and 8.9±1.6, respectively) (p<0.05).*
CONCLUSION: *This study shows that skin lesions are common in patients with type 2 diabetes mellitus. Therefore, frequent skin evaluation of the diabetic patients is warranted.*

KEY WORDS: Diabetes mellitus skin lesions glycemic control skin infections

INTRODUCTION

Diabetes mellitus is characterized by hyperglycemia resulting from impaired secretion or function of insulin[1]. Diabetes mellitus is a worldwide problem and it is estimated that the number of diabetic patients will grow from 135 million to 300 million by the year 2025. In Pakistan, approximately 8 million people have diabetes and the same number is suffering from the impaired glucose tolerance. Unfortunately the major increases would occur in the developing countries and in Pakistan the number of diabetics in the 2025 is estimated to be doubled[2]. Affected organs include the cardiovascular, renal and nervous systems, eyes and the skin[3]. The skin manifestations of diabetes mellitus can be classified in four categories: 1) skin disease with strong to weak association with diabetes (Necrobiosis lipoidica, diabetic dermopathy, yellow skin, eruptive xanthomas, acanthosis nigricans, oral leukoplakia, lichen planus), 2) infections (bacterial, viral, fungal), 3) skin manifestations of diabetic complications (microangiopathy and macroangiopathy), 4) skin reactions to diabetic treatment (sulphonylurea) [4]. The skin manifestations of diabetes are the result of multiple factors. Abnormal carbohydrate metabolism, other altered metabolic pathways, atherosclerosis, microangiopathy, neuron degeneration, and impaired host mechanisms all play a role [5]. Skin of diabetic patients has increased capillary fragility, and blood vessels show decreased circulation. Skin and soft tissue is the most common site for bacterial infections, and has been reported in up to 30% diabetics. Candida albicans can cause angular cheilitis, vulvovaginitis, balanitis, finger web space infection and paronychia in poorly controlled diabetics. Necrobiosis lipoidica is an asymptomatic disease with

TABLE 1.
DEMOGRAPHIC DATA OF THE STUDY GROUP (N=1270)

Variable	With skin lesion	Without skin lesion	Total Patients
Age (years)	51±10	40±5	51±9
Sex (male/female)	252/560	250/108	502/768
Diabetes duration (years)	18±6	14±2	19±7
Age at onset (years)	38±3	39±2	39±7
BMI (kg/m^2)	28±9	28±5	29±5
HbA1c	11.2±3.2	8.1±2.1	11.8±371
Diabetic complications			
▪ Neuropathy	860	118	978
▪ Nephropathy	360	166	526
▪ Retinopathy	36	12	48
▪ Hypertension	630	110	740
Type of treatment			
▪ Oral hypoglycemic agents	790	123	913
▪ Insulin	74	90	164
▪ Both	113	180	193
Total	**977**	**293**	**1270**

oval sharply demarcated reddish brown plaques occurring mostly over anterior legs. It may also manifest as solitary nodule on the hands, fingers, forearms, face and scalp[6]. In most studies, skin lesions have been observed in both types of diabetes. Skin manifestations are common in diabetes and could be expressed in various forms; if we considered metabolic effects on microcirculation and changes in skin collagen, the prevalence of such manifestations would be 100 percent[7]. While skin disorders are often observed in diabetics, there are only a few epidemiologic studies that have mentioned the prevalence of skin diseases in patients with type 2 diabetes mellitus [8-10]. Such information and statistics can form an important basis for population-based health policies. There is no sufficient epidemiological data available related to skin disorders in Sindh. Thus we designed the study to analyze the frequency and patterns of skin lesions among type 2 diabetic subjects.

PATIENTS AND METHODS

A cross-sectional study was conducted at the Muhammad Medical College Hospital Mirpukhas, Sindh from July 2008 to December 2009. The sample size comprised of 1270 type 2 diabetes patients. The diabetes mellitus was defined according to American Association of Diabetes criteria of FBS =126 for 2 times[1]. The patients were over 40 years of age, did not show any obvious signs and symptoms of insulin deficiency and had a positive family history of type 2 diabetes. The patients were examined by a physician and adermatologist to determine the presence of diabetes mellitus-related skin lesions, skin infections and skin lesions caused by treatment. The skin lesions of less than 3 months duration were evaluated to find out their association with the HbA1c. A general physical and systemic examination was performed. The data were collected on preformed proforma. Age, sex, duration of diabetes, mode of treatment, whether on oral hypoglycemic agents or insulin were noted. All the patients were weighed in Kg and height measured in centimeters (cm). With both these measures, body mass index (BMI) was calculated by the formula: BMI = weight in Kg / height in cm. The random blood sugar (RBS), fasting blood sugar (FBS), HbA1c and urinalysis were ordered. The patients of diabetic foot were admitted for proper management, surgical wound care and pus culture sensitivity testing. The diagnosis of fungal infections was confirmed by the KOH preparation. All tests were done in a single laboratory. The study was approved by the ethics committee of institute's research board and an informed written consent was obtained from all subjects. A multivariate logistic regression model was used to estimate the adjusted odds ratio (OR) for having diabetes related skin lesions. All data was analyzed by SPSS-10.0 for windows (Chicago, IL. USA). The chi-square and student t-test were used as test of significance for qualitative and quantitative variables respectively. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of 1270 patients was 52±11 years, 768 (60.47%) were female and 502 (39.62%) were male. The mean duration of the diabetes was 19±7 years and mean HbAlc level was 11.8±3.7 g/dl. Oral hypoglycemic agents were used by 913 (81.88%) patients, insulin by 164 (12.91%) and both were used by 193 (15.19%). The demographic data of the study group is shown in table (Table 1). The frequency of diabetes related skin lesions, skin infections and skin lesions due to treatment were observed in 67% (CI 74.0-76.6), 42.6% (CI 52.2-66.8) and 7.82% (CI 0.2- 0.7) respectively. Most of these lesions (70%) appeared after the diagnosis of diabetes mellitus was made. Thirty percent of the patients had skin lesions before the diagnosis of diabetes. The total number of skin lesions was 1783 and 70% had more than one lesion (Table 2). Only about 9% of lesions appeared within one year of diabetes diagnosis. In 49% of patients with diabetic dermopathy, the lesions appeared during the first year of diabetes diagnosis in contrast to diabetic foot ulcer with an incidence of 7% appearing in the first year of diabetes diagnosis. The most common lesion was diabetic dermopathy (28.34%),

TABLE 2.
DISTRIBUTION OF SKIN LESIONS (N=1270)

	Patients (n=1270)		CI (95%)
Lesion	**N (%)**	**Male/female**	
Skin lesions associated with diabetes			
Diabetic dermopathy	360(28.34%)	210/150	26.60-36.0
Acanthosis nigricans	40(1.88%)	13/27	23.7-28.0
Diabetic foot ulcer	160(12.59%)	145/15	5.3-8.3
Diabetic hand ulcer	13(1.02%)	8/6	6.3 – 9.3
Granuloma annulare	26(2.04%)	19/7	7.6 - 8.1
Diabetic rubeosis	127(10%)	87/40	12 - 14.5
Diabetic bullae	101(7.95%)	58/43	10.1 - 12.6
Perforating dermatoses	10(0.78%)	3/7	12.8 - 13.9
Scleroedema	115(9.05%)	25/90	13.8 - 13.9
Necrobiosis lipoidica	27(2/12%)	13/14	0.0 - 0.9
Xanthomata	15(1.18%)	7/8	0.1 - 0.7
Scleroderma changes (hands)	17(1.33%)	3/14	74.0 - 76.6
Lichen planus	23(1.81%)	12/11	10.2 - 12.9
Pruritis	356(28.05%)	66/290	26.51-35.45
Trophic ulcers	17(1.33%)	3/14	71.0 - 62.6
Skin tags	23(1.81%)	12/11	10.2 - 12.9
Erysipelas-like erythema	47(3.70%)	10/37	12.0 - 17.9
Oral leukoplakia	47(3.70%)	17/30	12.0 - 17.9
Skin infections			
Impetigo	267(21.02%)	116/151	6.5 – 9.7
Folliculits	240(18.89%)	130/110	9.6 - 8.4
Furunculosis	170(13.38%)	150/20	13.0 - 14.9
Carbuncles	60(4.72%)	12/48	10.9 - 12.8
Viral warts	39(3.07%)	19/20	5.3-8.3
Tinea capitis	117(9.21%)	87/30	6.3 – 9.3
Tinea pedis	185(14.56%)	86/99	7.6 - 8.1
Tinea versicolor	188(14.80%)	98/90	5.3-8.3
Candida paronychia	125 (9.84%)	00/125	7.6 - 8.1
Onychomycosis	17(1.33%)	0/17	10.9 - 12.8
Skin reactions to insulin therapy			
Lipohyertrophy	80(6.25%)	39/41	0.0 - 0.7
Lipohypotrophy	20(1.57%)	7/13	0.2 - 0.5
Other skin lesions			
Acne	27(2.12%)	2/15	5.0-8.3
Keratosis pillaris	86(6.77%)	36/50	6. 8 – 9.3
Cafe-au-lait macules	31(2.44%)	29/2	7.6 - 8.1
Halo naevi	23(1.81%)	11/12	5.6-8.3
Eczema	110(8.66%)	13/97	5.3-8.3
Atopic dermatitis	100 (7.87%)	13/87	6. 3 – 9.0
Psoriasis	70(5.51%)	11/59	0.3 - 0.7
Vitiligo	59(4.64%)	11/40	0.2 - 0.5
Alopecia areata	41(3.22%)	23/18	0.0 - 0.7
Seborrheic dermatitis	17(1.33%)	16/1	0.2 - 0.5
Keloid	27(2.12%)	13/14	6.3 – 9.7
de Morgan spots	107(8.42%)	150/20	7.3 - 8.1
Palmar erythema	18(1.41%)	16/02	5.0-8.9

but different types of skin infections were seen in 42.6% of patients and thus accounting as the most common lesion. The third most common manifestation was pruritis (28.05%) and the least common lesion was perforating dermatoses (0.78%). The diabetic dermopathy and diabetic foot ulcer were most common in male as compared to female (P<0.05), meanwhile the candida paronychia was the most common observed lesion in female. The mean age of patients with skin lesions was significantly higher than those without lesions (P<0.05). The mean age was lower in patients with granuloma annulare (48±14 years vs. 54±11) (p<0.05). The urinalysis showed microalbuminura and macroalbuminuria in 350 (27.55%) and 176 (13.58%) respectively. The HbA1c was higher in patients suffering from diabetic foot ulcer and fungal infection than those without having these infections (10.34±1.67 and 11.5±1.4 vs.9.7±1.6 and 8.9±1.6, respectively) (p<0.05).

DISCUSSION

This study demonstrated the frequency of diabetes related skin lesions, skin infections and skin lesions due to treatment were 67% (CI 74.0-76.6), 42.6% (CI 52.2-66.8) and 7.82% (CI 0.2- 0.7) respectively. The frequency of skin lesions in type 2 diabetic patients has been reported to be in a range of 49-84 % which is compatible with the results of the present study [8,9,10]. The most frequent skin lesion was diabetic dermopathy (28.34%), which is comparable with the previous studies of Wahid Z et al [11] and Borssens B et al [12] but higher than those of by Romano et al[8] (12.5%) and Foss et al[21] (1.2%). And this can be the result of differences in the types of evaluated lesions or differences in the mean age, duration and complications of diabetes mellitus. The prevalence of diabetic dermopathy in this study is comparable to the study of Hosseini et al [13]. The prevalence of infectious lesions was 42.8% and candida paronychia was the most common lesion.

These results are different to the studies of Romano et al [8], Talat et al [13] and Sasmaz et al [14], who reported 61%, 62.2% and 31% respectively. The difference can be explained by differences in blood sugar level, hygiene, socioeconomic and health status in the studied population. Fungal infection was the most prevalent skin lesion (14.80%) in females.

This is comparable to prevalence of 12% and 16.66% reported by Hosseini et al [13] and Khoharo HK et al [15] respectively. Lipohyertrophy and Lipohypotrophy were found in 6.25% and 1.57% of patients respectively. These lesions have been reported in studies of Tariq et al [7] and Hosseini et al [13], who reported prevalence of 2.4% and 7.82% respectively. Cold injuries, alcohol contamination and inappropriate angle of needle at the insulin injection site are responsible for inducing lipohypotrophy; therefore, a possible cause for the occurrence of this complication may be inadequate education on the method of insulin injections. Mean age, HbA1c and the duration of diabetes were significantly higher in patients with dermopathy; also male were more affected by these complications. These findings are compatible with previous studies[12, 13, 16]. Neuropathy induces skin xerosis, trauma, and fissures and increases the risk of infections[17]. Bouguerra et al [18] reported that patients' age and duration of diabetes are the major risk factors for cutaneous mycosis. In a group of patients affected by candidial intertrigo during the previous 3 months, level of HbA1C was significantly higher than the others without intertrigo. These results are similar to the study of Rayfield et al [19]. A strict control of blood glucose and precise education on feet hygiene is necessary in patients with these infections. Meurer et al [20] has reported that the prevalence of accompanying neuropathy and peripheral vessel disease combination in diabetic foot ulcer is about 15-20%, indicating that all diabetic patients with foot ulcer should be evaluated for microvascular complications and blood glucose control and should receive education on diabetic foot ulcer prevention and treatment.

CONCLUSION

This study shows that skin lesions are common in patients with type 2 diabetes mellitus and frequent skin evaluation of the diabetic patients is warranted. Proper skin care and long-term glycemic control may reduce the risk of skin lesions in type 2 diabetic subjects.

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