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TYPE II DIABETES MELLITUS;
FREQUENCY OF CUTANEOUS BACTERIAL INFECTIONS IN PATIENTS WITH TYPE II DIABETES MELLITUS

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ABSTRACT… Introduction: Diabetes Mellitus is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either deficiency of insulin secretion or combination of insulin resistance and inadequate insulin. Infections constitute the main bulk of cutaneous manifestations of diabetes mellitus with incidence ranging between 20–50%. Bacteria and fungi can cause infective complications involving skin and nails of the diabetic patients. The major share of infections in Diabetes Mellitus is contributed by bacteria. The most common causative organisms are Staphylococcus aurous and beta-hemolytic Streptococci. **Objective:** to determine the frequency of cutaneousbacterial Infections in patients with type II Diabetes Mellitis, attending outpatient clinic in a tertiary care hospital. **Study Design:** Cross sectional study. **Setting:** Department of Dermatology and Medicine, Dr. Ziauddin University Hospital, KDLB Campus, Karachi. **Period:** 1st January 2017 till 31st March 2017 over a period of three months. **Material and methods:** Adult patients already diagnosed to be suffering from type 2 Diabetes Mellitis presenting with cutaneous manifestations were included in the study. Patients fulfilling the selection criteria were enrolled after an informed consent. Relevant laboratory investigations were advised where required. Current study targeted bacterial infections only and Chi-square test was used to determine P value. Data obtained was compiled, tabulated and analyzed by SPSS. **Result:** Total of 302 cases of Type 2 Diabetes Mellitis having some cutaneous manifestations were enrolled. There were 124 (41%) males and 178 (59%) females. Mean age of presentation was 50 ± 11 years, the age range being 30-80 years. The mean duration of diabetes was 8.5 ± 7 years (range being 1-30 years). Unsatisfactory glycemic control was present in 205 (68%) patients. Among the enrolled subjects bacterial infections were the most frequently seen skin disease accounting for 79 patients (26%). Among the patients with these bacterial infections uncontrolled Diabetes was a feature in 61 (77%). The breakup of bacterial infections (59) in the descending order of frequency stood as follows: cellulitis 22 (28%), carbuncle 17 (21%), furuncle 14 (18%), ecthyma 13 (16%), folliculitis 09 (12%), and impetigo 04 (5%). **Conclusion:** Cutaneous infections are a common feature in patients with Type II Diabetes Mellitis, bacterial infections being the most common.

Key words: Bacterial Infections, Cutaneous Manifestations, Diabetes Mellitis, HbA_1C, Hyperglycemia, Insulin.

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INTRODUCTION

Diabetes Mellitus (DM) is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either deficiency of insulin secretion or combination of insulin resistance and inadequate insulin.[1] It is a major endocrine cause of morbidity and mortality all over the world and the incidence is increasing globally. The worldwide prevalence ofdiabetes for all age groups was estimated to be 2.8% in 2000 and 4.4% by2030.[2] In Pakistan, prevalence approaches 10% among adults and even greater number with glucose intolerance.[3]

Diabetes mellitus affects all systems of the body. Skin is also frequently involved. According to a study, 30% of diabetics have some type of skin manifestation during the course of their disease[4] whereas in some studies figures as high as 96% have been reported[5], indicating how common is skin involvement in patients with diabetes mellitus. Skin findings may be used as an indicator of patient's present as well as past metabolic status or it can be the presenting symptom in some

patients not diagnosed to have diabetes as yet.

Infections constitute the main bulk of cutaneous manifestations of diabetes mellitus with incidence ranging between 20–50%.[6] Bacteria and fungi can cause infective complications involving skin and nails of the diabetic patients. The major share of infections in diabetes mellitus is contributed by bacteria. The most common causative organisms here are Staphylococcus aurous and beta-hemolytic Streptococci.[6] Different studies have been conducted in our country from time to time to determine the frequency of cutaneous changes in Diabetes Mellitis. However, with regard to bacterial infections, there is a conflicting data regarding its prevalence in diabetic patients.[7,8] Therefore, the current study was aimed to determine the frequency of cutaneousbacterial Infections in patients with type II Diabetes Mellitis, attending outpatient clinic in a tertiary care hospital.

MATERIAL AND METHODS

Current study was carried out in the Department of Dermatology and Medicine, Dr. Ziauddin University Hospital, KDLB Campus, Karachifrom 1st January 2017 till 31st March 2017 over a period of three months. Adult patients already diagnosed to be suffering from type 2 Diabetes Mellitis presenting with cutaneous manifestations were included in the study. Patients having skin changes secondary to pregnancy, other systemic illnesses and iatrogenic factors were excluded. An informed consent was obtained from all the enrolled subjects. The demographic details of all the enrolled subjects were also documented.

A detailed history was obtained from the enrolled patients including duration of diabetes and mode of treatment for diabetes (i.e. diet only, oral hypoglycemic, insulin therapy or combination therapy). After a detailed general, systemic and cutaneous examination, the clinical diagnosis of dermatological findings was established. Their fasting blood sugar, random blood sugar and HbA1c were advised to assess the glycemic control. Unsatisfactory glycemic control was defined as HbA1c > 7 as per American Diabetic Association (ADA) criteria.

Other relevant laboratory investigations were advised where required including blood complete picture, renal profile, liver function tests, lipid profile, urine examination and pus for culture and sensitivity. Any special tests like Wood's lamp examination, fungal scrapings, skin biopsy, Tzank smear, nail biopsy and nail clippings were performed in doubtful cases. All the findings were recorded on a specially designed proforma.

Data obtained was compiled, tabulated and analyzed by SPSS (Statistical package for social sciences) version 17. Mean and standard deviation were used to represent quantitative variables like age duration of diabetes, fasting blood sugar, random blood sugar and HbA1c. Descriptive variables like presence of various skin changes were presented as frequencies and percentages. The current study targeted bacterial infections only and Chi-square test was used to determine P value, a value less than or equal to 0.05was considered significant

RESULTS

Total of 302 cases of Type 2 Diabetes Mellitis having some cutaneous manifestations were included in the study. All the patients had at least one skin finding. There were 124 (41%) males and 178 (59%) females. Mean age of presentation was 50 ± 11 years, the age range being 30-80 years. The mean duration of diabetes was 8.5 ± 7 years (range being 1-30 years). The glycemic profile showed mean fasting blood sugar.

(FBS) 156 ± 50 g/dl (range= 69-360 g/dl), random blood sugar (RBS) 213±79 (range = 98-550 g/dl). Mean HbA1c was 8.6 ± 1.5 % (range = 6 - 13%). Unsatisfactory glycemic control was present in 205 (68%) patients (Table-I).

Among the enrolled subjects with Type 2 Diabetes Mellitis, bacterial infections werethe most frequently seen skin disease accounting for 79 patients (26%). There were 31 males (39%) and 48 females (61%) ($P < 0.05$). Among the patients with these bacterial infections uncontrolled Type 2 Diabetes Mellitis was a feature in 61 (77%) while good glycemic control was seen in 18 (23%)($P < 0.05$).

In the current study, breakup of bacterial infections (79) in the descending order of frequency stood as follows: cellulitis 22 (28%), carbuncle 17 (21%), furuncle 14 (18%), ecthyma 13 (16%), folliculitis 9 (12%), and impetigo 4 (5%).

Mean	50 ± 11
Range	(30-80)
Gender	
Male	124 (41%)
Female	178 (59%)
Duration of diabetes Mean ± SD (range) < 5 years 5-9 years >10 years	8.5±7 (1-30) 90 (30%) 100 (33%) 112 (37%)
Mode of treatment for diabetes	
Insulin therapy Oral hypoglycemics Combination therapy Diet control only	69 (23%) 166 (55%) 54(18%) 13 (4%)
Fasting Blood Sugar (mg/dl)	
Mean ± SD (range) <130 >130	156 ± 50 (69-360) 109 (36%) 193 (64%)
Random blood sugars (mg/dl)	
Mean±SD (range) <180 >180	213 ± 79 (98-550) 130 (43%) 172 (57%)
HbA1C (%)	
Mean±SD (range)	8.6 ±1.5 (6-13)
Glycemic control	
Satisfactory Unsatisfactory	97 (33%) 205 (68%)

Table-I. Demographic variables (n=302)

DISCUSSION

Skin, being the largest organ of the body, is almost invariably affected by Diabetes Mellitis. The skin manifestations of Diabetes Mellitis are numerous and different studies have reported a variable frequency ranging from 30-100%.[1,3] Skin involvement may also be the initial presenting sign in such patients. Therefore, skin changes may even be seen sometime before the development of diabetes. Most of the diabetic patients develop skin manifestations eventually. Patients with longstanding diabetes have more severe skin pathologies.[9] These skin changes are in turn the result of different metabolic abnormalities of diabetes like persistent hyperglycemia leading to glycosylation of various tissue components in the skin. Other factors accounting for dermatologic complications are neuropathy, micro- or macroangiopathy, immunosuppression, and dyslipidemia. There are some cutaneous features specific to insulin resistance and hyperinsulinemia.

Patients with type II Diabetes Mellitis develop infections frequently while those with type 1Diabetes Mellitis have a frequent association with autoimmune type dermatologic manifestations.[8] Mean age of presentation in our study i.e. 50 ± 11 years is similar to the reports from Ahmed et al.[1] and Basit et al.[10]

Dermatological manifestations were seen more commonly in women in our study as a higher number of females were enrolled, indicating greater disease burden among females. On the contrary, some regional studies have shown a preponderance of males.[1]

The mean duration of diabetes in our patients was 8.5 years; majority of patients (37%) had diabetes for 10 years or more. Poorly controlled diabetes with an HbA_1c mean value of 8.6% featured in 64%, the findings seem to be in agreement with Bhat et al.[11]

Ahmed et al.[1] have reported a higher frequency (93%) of uncontrolled diabetes in a similar series of patients. However, the results can vary from one study to another depending upon the study design and setting. This in turn may be correlated with medical facilities, hygiene, literacy level and lack of awareness about the disease.[1,2]

Infections were the most common group of dermatoses (57%) seen in our study comprising bacterial infections, fungal infections and viral infections. The overall frequency of skin infections in patients with Diabetes Mellitisvaries between in 20-50%.[8] Cutaneous infections are especially seen more frequently in patients with type IIDiabetes Mellitis. Patients with poor glycemic control were found to be more prone to infections especially bacterial. In our study, the frequency of bacterial infections was 26%. Basit et al.[10] have reported a higher frequency of skin infections in a

similar set of patients. This in turn may be due to increased exposure to the infectious organisms and humid climatic conditions.[10] Vahoraet al.[12] have reported a lesser frequency of bacterial infections in such patients.The frequency of bacterial infections in type II Diabetes Mellitis was reported to be higher by Ahmedet al.[1] Few studies have also reported a varied frequency of bacterial infections in association with type II Diabetes Mellitis.[13-15]On the contrary, Galdeano F et al.[16] have reported a lower frequency of bacterial infections in a similar series of patients. Again it can be stated that the frequency of such findings can vary from one study to another depending upon the study design and setting. Moreover, sample size can also influence pattern of diseases. Bacterial infections most commonly seen in diabetics are Staphylococcus aureus and Streptococcus pyogenes leading to the development of impetigo, folliculitis, furunculosis, carbuncle, ecthyma, cellulitis, and erysipelas. Hot and humid weather of the metropolitan city can also account for a relatively higher frequency of cutaneous bacterial infections in our study.

In the current study, the breakup of bacterial infections (79) in the descending order was cellulitis, carbuncle, furuncle, ecthyma, folliculitis, and impetigo. However, the relative frequency of these bacterial infections in diabetes mellitis can vary in different studies.[13-16] Cellulitis, carbuncle and furuncles were more frequent in a study from Sudan.[17] In a study from Sargodha, findings reported seem to be in agreement with our study.[18] The findings reported in different regional studies also correspond to the observations made in our study.[19-21] Khortoum et al.[17] also compared studies by Basheer AHH, with varying results in different studies with frequency of cutaneous bacterial infections to be as low as 4% and as high as 24%.[22]

Radhu et al.[21] claims fungal infections to be more common in such patients as compared to the bacterial infections although he has claimed infections to be more common. The relative high prevalence of skin infections in these subjects could be due to poor hygienic conditions as well as uncontrolled diabetes mellitus which increase the risk of development of micro-angiopathy and related sequelae.

CONCLUSION

It can be concluded that cutaneous infections are a common feature in patients with Type II Diabetes Mellitis, the bacterial infections being the most common. Poor glycemic control, old age and poor hygiene contribute to the higher frequency of bacterial infections in such patients. Prevalence of hot humid environment further increases the risk of cutaneous bacterial infections in these patients.

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4	Fatima Akhund	Data collection.	