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Skin Manifestation of Diabetes Mellitus in El-Beida City

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Abstract: *Diabetes mellitus affects individuals of all ages and socioeconomic status. Skin is influenced by the acute metabolic derangements as well as by chronic degenerative complications of diabetes. This study was designed to evaluate the incidence of skin manifestations and pattern of skin disorders among diabetic patients from Al-Jabal Al-Akhdar in El-Beida City (Libya). Fifty consecutive patients type 2 diabetes mellitus attending to the diabetic center in El-Beida City. Overall 50 patients (50% male and 50% female), mean age was 58.4 ± 9.4 years and mean duration of diabetes 14.6± 6.6 years. Mean HBA1C was 9.7±1.6. Most frequently observed skin disorders were: cutaneous infections (68%), acanthosis nigricans and pruritus (56%), xerosis (52%), skin tags (28%), and hyperpigmentation (26%). Most frequently observed skin disease was fungal infections (in 40% and 64% for male and female respectively). Skin is involved in diabetes quite often and the manifestations are numerous. Females had a higher frequency of association with acanthosis nigricans (p = 0.25). High prevalence of acanthosis nigricans, pruritus and xerosis in our diabetic population is perhaps due to cold and dry climatic conditions in the region for most of the time in the year.*

Keywords: *Diabetes mellitus, skin lesions and Al-Jabal Al-Akhdar*

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I. Introduction

Diabetes mellitus (DM) is an endocrine disorder that affects all ages and socioeconomic groups. It is defined by hyperglycemia secondary to absolute or relative deficiency of insulin. DM is classified into two types, DM type 1 (insulin dependent diabetes-IDDM) and DM type 2 (non-insulin dependent diabetes NIDDM) (1). Diabetes is affecting 8.3% of the population (2). Skin disorders will be present in 79.2% of people with diabetes (2). Individuals with type 2 diabetes are more probable to create skin manifestations than those with type 1 diabetes. Cutaneous disease can appear as the first sign of diabetes or may develop at any time in the course of the disease (3). Dermatologic manifestations of DM have various health implications ranging from those that are aesthetically concerning to those that may be life-threatening. Awareness of cutaneous manifestations of diabetes mellitus can provide insight into the present or prior metabolic status of patients. The recognition of such findings may aid in the diagnosis of diabetes, or may be followed as a marker of glycemic control(4). The skin is affected by the acute metabolic derangements and the chronic degenerative complications of diabetes. Although the mechanism for many diabetes-associated skin conditions remains unknown, the pathogenesis of others is linked to abnormal carbohydrate metabolism, other altered metabolic pathways, atherosclerosis, microangiopathy, neuron degeneration, and impaired host mechanisms (5). Cutaneous manifestations of DM can be broadly classified into four groups; skin lesions strongly associated with DM, skin lesions of infectious etiology (bacterial, fungal or viral), lesions secondary to complications (microangiopathy, macroangiopathy, neuropathy) of DM and skin reaction that related to treatment (sulphonylureas or insulin) of DM (6). In Libya, the type II diabetes affected >70% of the population which is the highest prevalence in North Africa and among Arabic nations. The most possible cause is eating habits (7). The two standard treatments for diabetic include aggressive glycemic (blood glucose, An HbA1c test shows what the average amount of glucose attached to hemoglobin has been over the past three months) control and medications to reduce symptoms (4, 8). Better glycemic control in type II diabetes has been associated with significantly lower rates of heart disease, stroke and peripheral vascular disease (9). Due to the lack of studies on the characteristics of skin manifestation in diabetic patients in the Northeast of Libya. Therefore, the current study targeted to determine the frequency and pattern of skin disorders in patients with type 2 DM. The study was further aimed to see the association of skin manifestations with glycemic control.

II. Materials And Methods

Diabetes Centre is the only outpatient diabetes clinic in El-Beida, and all diabetic patients were on the register in this center. It provides daily care for diabetics, including medications supply, assessment of metabolic

control, and advice about managing hypoglycemia, hyperglycemia, diabetic foot and skin manifestation. Services include testing of blood glucose (fasting and postprandial blood glucose levels). However, there is no regular education programs for patients. This study was carried out during the period between March and August 2017. Fifty consecutive patients (25 males and 25 females) with more than 3 years diagnosed of diabetes mellitus and having skin lesions were enrolled in this study. Diagnosis of diabetes was based on World Health Organization (WHO) criteria. All the patients underwent a detailed Demographic profiles including: name, age, diabetes duration, body mass index, presences of other disease (hypertension and cardiac disease, thyroid disease and renal disease), and dermatological examination. HBA1C was estimated using the Epithod®616 is the first POC system for Glycated Albumin and HBA1C (kit consists of analyzer and test kits, Korea). The rapid test reader allows healthcare professionals to derive quantitative or qualitative results within minutes. HBA1C level test was done to now if blood glucose controlled (< 7%) or un-controlled (>7%) with the treatment modalities and relation to skin manifestation. Data were presented as a percentage of the total. Descriptive variables like presence of various skin changes were presented as frequencies and percentages. Chi-square test was used to determine association of various skin lesions with glycemic control and gender. P value < 0.05 is considered as significant.

III. Results

Of the 50 Libyan patients, 50% (n=25), 50% (n=25) were female and male respectively. The mean level of HBA1C was found 9.6 ± 1.7% (ranged from 7 to 13.3%) for male and 9.7 ± 1.7% (ranged from 7-12.2 %) for female. Their ages were ranging from 35 to 75 years old. Mean age of patients was 58.5 years (males 60.7 and females 56.4 respectively). Age distribution relating to 50 established patients by age groups as each group consist of 5 years intervals was shown in **Table 1**. The most of diabetes patients age group was 51- 65 years old followed by 66- 70 years old for male, while the most of diabetes patients age group ranged from 41-70 years old for female. Percentage of patients with duration of diabetic as each group consist of 5 years intervals was illustrated in **Table 2**. The highest percentage prevalence of the duration of diabetic was found since >10- 20 years ago for both gender. Percentage of body mass index relating to 50 established patients was shown in **Table 3**. Most male and female patients were found to have body mass index ranging from 25.0- 29.5 (over weight) with percentage 52% for male and 60% for female. Relation between gender with presence and absence of hypertension and cardiac disease, Thyroid disease, renal disease and negative was shown in **Table 4**. Female patients (52%) was found to have hypertension and cardiac disease more than male patients (44%). Overall patients, percentage of presence of skin manifestation that including (acanthosis nigricans, xerosis, pruritus, psoriasis, blister, lichen planus, vitiligo, skin tags, infection and hyperpigmentation for each gender was illustrated in **Table 5**. Similar pattern of results of diagnosis for different skin manifestation in male and female patients. Most of them they were found to have two type of skin manifestation at same time. The highest percentage was found with acanthosis nigricans and pruritus 56%, xerosis 52%, infection 68%, skin tags 28% and hyperpigmentation 26%. Hyperpigmentation was classified into couple category melasma and generalized hyperpigmentation that shown in **Table 6**. Generalized hyperpigmentation was found as highest percentage 20% with male patients (most of them associated with xerosis and pruritus). Infection also was classified upon main causes of infection that include viral, bacterial and fungal causes as shown in **Table 7.** Fungal infection was found as highest prevalence in both gender with 40% and 64% for male and female respectively compared to bacterial and viral infections. All results for different skin manifestation upon Pearson Chi-Square (P- Value) that related to both male and female ranged from 0.14 to1.

Table 1. Age distribution of diabetic patients at diabetes center in El-Beida city who including this study

Age group (Years)	No of Male (%)	No of Female (%)
35-40	0	1 (4%)
41-45	1 (4%)	3 (12%)
46-50	2 (8%)	5 (20%)
51-55	5 (20%)	2 (8%)
56-60	4 (16%)	5 (20%)
61-65	7 (28%)	2 (8%)
66-70	3 (12%)	7 (28%)
71-75	2 (8%)	0
Total	25	25

Table 2: Duration of diabetes among diabetic patients

Years	No of Male (%)	No of Female (%)
<10	5 (20%)	6 (24%)
11-15	12 (48%)	10 (40%)
16-20	5 (20%)	6 (24%)
21-25	1 (4%)	2 (8%)
26-30	1 (4%)	1 (4%)

>30	1 (4%)	0
Total	25	25

Table 3: Percentage of body mass index among diabetic patients

Body mass index	No of Male (%)	No of Female (%)
≤18.5 underweight	0	1 (4%)
18.5- 24.9 normal weight	7 (28%)	1 (4%)
25.0- 29.5 over weight	13 (52%)	15 (60%)
30 -34.9 obese	4 (16%)	7 (28%)
35-39.9 severely obese	1 (4%)	1 (4%)
≥ 40 morbidity obese	0	0
Total	25	25

Table 4: Relation between gender with presence and absence of hypertension/ cardiac disease, Thyroid disease, renal disease and negative for each gender.

Parameters	Frequency in Male (%)	Frequency in Female (%)
Hypertension and cardiac disease	11 (44%)	13 (52%)
Thyroid disease	0	1 (4%)
Renal disease	1 (4%)	0
Negative	13 (52%)	11 (44%)
Total	25	25

Table 5: Percentage of presence of skin manifestation that including (acanthosis nigricans, xerosis, pruritus, psoriasis, blister, lichen planus, vitiligo, skin tags, infection and hyperpigmentation for each gender.

Skin manifestation diagnosis	Frequency in Male (%)	Frequency in Female (%)	Total Frequency (%)	Pearson Chi-Square P-Value (for both male and female)
Acanthosis nigricans	12 (48%)	16 (64%)	28 (56%)	0.25
Xerosis/ dryness	13 (52%)	13 (52%)	26 (52%)	1
Pruritus/ Itching	15 (60%)	13 (52%)	28 (56%)	0.57
Blister	2 (8%)	1 (4%)	3 (6%)	0.55
Psoriasis	1 (4%)	1 (4%)	2 (4%)	1
Lichen planus	1 (4%)	1 (4%)	2 (4%)	1
Vitiligo	1 (4%)	1 (4%)	2 (4%)	1
Skin tags/ Acrochordon	5 (20%)	9 (36%)	14 (28%)	0.21
Infection	15 (60%)	19 (76%)	34 (68%)	0.33
Hyperpigmentation	7 (28%)	6 (24%)	13 (26%)	0.7

Table 6: Relation between percentage case of hyperpigmentation (melasma and generalized hyperpigmentation) with gender.

Type of hyperpigmentation	Frequency in Male (%)	Frequency in Female (%)	Pearson Chi-Square P-Value (for both male and female)
Melasma	2 (8%)	3 (12%)	0.14
Generalized hyperpigmentation	5 (20%)	3 (12%)	0.44

Table 7: Relation between percentage cases of main causes of indication for each gender.

Causes of indication	Frequency in Male (%)	Frequency in Female (%)	Pearson Chi-Square P- Value (for both male and female)
Bacterial	2 (8%)	2 (8%)	0.3
Viral	3 (12%)	1 (4%)	0.3
Fungal	10 (40%)	16 (64%)	0.57

IV. Discussion

Cutaneous signs of diabetes mellitus are extremely valuable to the clinician. They generally appear after the primary disease has developed but may signal or appear coincidentally with its onset, or even precede diabetes by many years (*6*). The highest percentage prevalence of the duration of diabetic was found since >10-20 years ago with overweight and mean level of HBA1C (9.6± 1.6). These observations were consisted to a study from Saudi Arabia (*10*), from Iran (*11*) and from turkey (*12*). Upon four categories of cutaneous manifestations previously described, most documented studies have shown the incidence of cutaneous disorders associated with diabetes to be between 30 and 71%. (*6, 13*). In our study, the most common six skin disorders were: cutaneous infections 68%, acanthosis nigricans and pruritus (56%) and xerosis (52%). Meanwhile, skin tags, and hyperpigmentation were found as 28%, and 26% respectively which similar to previous studies (*10-12, 14*)**.** Pruritus and xerosis accounted for the most common skin manifestation in our study and although various

studies on cutaneous lesions in diabetic patients do not comment on the prevalence of xerosis. The reason for high prevalence of xerosis in our diabetic population is perhaps due to cold climatic conditions in the region for most of the time in the year and most of patients drink less than 1.5 L of water per day especially in winter and summer seasons. Skin tags were seen in 28% of patients. Skin tags may serve as a marker for diabetes mellitus as was concluded by Thappa *et al*., (*15*). Cutaneous infections were seen in 68% of patients (HBA1C level >7% in these patients) as in Al-Mutairi, *et al*., (*16*)**.** Fungal infections were seen in 52% of the patients. Bacterial and viral infections were seen in 8% of the patients respectively. Among the skin manifestations observed in our diabetic patients, similar to the finding by Margolis and Margolis (*17*). Thus revealing the importance of evaluation of diabetes in patients with multiple acanthosis nigricans and xerosis with cutaneous infections comprised the most frequent manifestation seen in our patients, similar to previous reports (*16*, *18*). It is widely believed that diabetic patients have an increased risk for infectious diseases, although there is little documented evidence to support it. This risk seems to be higher in poorly controlled patients, but it is often difficult to understand whether poor metabolic control is the cause or the consequence of the concurrent infections (*5*). None of the patients had wet gangrene, scleroderma diabeticorum, trophic ulcer, granuloma annulare, necrobiosis lipiodica, reactive perforating collagenosis, or drug reactions to oral hypoglycemic treatments in this study, although these are usually associated with diabetes mellitus. From the foregoing account, we conclude that the skin is involved in diabetes quite often. The manifestations are numerous and varied and many a times they can serve as diagnostic marker for underlying diabetes. Whenever patients present with multiple skin manifestations, their diabetic status should be checked. In most cases, a careful dermatological examination and a better metabolic control are needed in order to improve quality of life in these patients. All patients needs a regular education programs (to know about diet control, how to take medication, important of water to the body and regularity in checkup blood glucose).

V. Conclusion

The prevalence of skin manifestations was higher in type 2 than in type 1 diabetic patients, and as the duration of diabetes increased, level of HBA1C and BMI the likelihood of developing skin manifestations also increased. Early referral to the dermatologist may help detect skin complications of diabetes at an early stage to prevent disability caused by these complications.

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