Cutaneous Manifestations of Diabetes Mellitus: A Case Series

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Diabetes mellitus (DM) is a common disorder with a broad spectrum of cutaneous manifestations. Our purpose was to evaluate the prevalence and main clinical presentation of skin disorders in patients with DM. For a period of 6 months, all of the patients with DM attending the outpatient dermatology and diabetes clinics of the Hamedan University of Medical Sciences, Iran, were clinically examined for cutaneous manifestations of DM. Patients also were evaluated for glycemic control and evidence of other diabetes-related complications. Diabetic skin manifestations were detected in 110 of 155 (71%) patients with DM. The most common skin lesions in both patients with type 1 and type 2 DM were infectious in origin (72%). No statistically significant differences in cutaneous manifestations were observed between the 2 types of DM. In the outpatient population with DM there is a high prevalence of skin lesions mainly represented by cutaneous infections.

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Diabetes mellitus (DM) is a common disorder with an estimated 23.6 million diagnosed or undiagnosed individuals (7.8% of the population) living in the United States.[1] It is a heterogeneous group of metabolic disorders with multiple etiologies characterized by disturbances in carbohydrate and lipid metabolism as well as continually elevated levels of serum glucose (hyperglycemia). The World Health Organization classification distinguishes 4 types of diabetes based on etiology: type 1 DM, type 2 DM, gestational DM, and impaired glucose tolerance.[2,3] Skin lesions are common in patients with DM, and approximately 30% of these patients develop cutaneous manifestations during the course of their illness.[4-6]

A broad spectrum of cutaneous disorders may be encountered in both patients with type 1 and type 2 DM. On occasion, these dermatologic findings may even precede any clinical or biological evidence of DM. Cutaneous manifestations of DM can be classified as skin lesions strongly associated with DM; skin lesions of infectious etiology; dermatologic disorders related to complications of DM; and skin conditions related to the treatment of DM.[7,8]

In this study, we evaluated the prevalence and main clinical characteristics of skin disorders in a large population of patients attending the outpatient dermatology and diabetes clinics of the Hamedan University of Medical Sciences, Iran.

Materials and Methods

In 2006 for a period of 6 months, all of the patients with DM attending the outpatient dermatology and diabetes clinics of the Hamedan University of Medical Sciences underwent a complete dermatologic examination. Only patients with type 1 insulin-dependent DM (IDDM) and type 2 non–insulin-dependent DM (NIDDM), according to World Health Organization criteria, were included in the study.[9] Medical records were reviewed for information regarding age and sex of the patients, duration of diabetes, and medications taken by each patient. Weight and height were recorded, with patients wearing light clothes and not wearing shoes. Body mass index (BMI) was calculated as follows: weight (kg)/height (m^2). Glycemic control was assessed by the individual mean of glycated hemoglobin (HbA_{1c}).

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Table 1.

Characteristics of Patients With IDDM and NIDDM With Cutaneous Manifestations

	IDDM (n=23)	NIDDM (n=87)	*P* Value
Patient Characteristics			
Mean age (SD), y	21.8 (4.9)	57.2 (9.7)	NS
Sex, n			
Male	12	31	
Female	11	56	
Family history, n	13	30	
Mean duration of diabetes (SD), y	5.47 (5.00)	6.64 (5.26)	NS
BMI (kg/m^2) ≥30, n	1	36	
Mean HbA_{1c} (SD), mmol/L	8.5 (1.2)	9.2 (2)	NS
Complications of Diabetes Mellitus			
Retinopathy, n	2	9	NS
Nephropathy, n	0	4	NS
Neuropathy, n	1	6	NS
Large vessel disease, n	0	4	NS

Abbreviations: IDDM, insulin-dependent diabetes mellitus (type 1); NIDDM, non–insulin-dependent diabetes mellitus (type 2); SD, standard deviation; NS, not significant; BMI, body mass index; HbA_{1c}, glycated hemoglobin.

According to HbA_{1c} values, patients were classified as well-controlled (HbA_{1c}, 6.7 to <.3 mmol/L; n=52), fairly well-controlled (HbA_{1c}, 7.3–9.1 mmol/L; n=38), and poorly controlled (HbA_{1c}, >9.1 mmol/L; n=20). Assessment of complications of DM was performed according to standard clinical and instrumental evaluations: retinopathy was diagnosed by a retina specialist using direct and indirect ophthalmoscopy; 24-hour urinary microalbumin excretion (urine albumin excretion ≥30 mg/24 h) was used to detect diabetic nephropathy[10,11]; and peripheral diabetic neuropathy was assessed by means of the diabetic neuropathy index.[12] Large vessel disease and coronary heart disease were diagnosed according to the patient's clinical record, looking for a history of myocardial infarction, angina, heart failure, peripheral vascular disease, and stroke.

Dermatologic examinations were performed by the same 2 attending dermatologists during a routine visit at the clinic. Most of the lesions were clinically evaluated and, when necessary, diagnoses were confirmed by skin biopsies, culture, and/or Wood lamp examination. The statistical analysis was performed using SPSS. The χ^2 test was used to evaluate differences (α=.05).

Results

A total of 110 of 155 (71%) patients with DM had cutaneous manifestations considered to be associated with DM. Characteristics of patients with IDDM and NIDDM with cutaneous manifestations are summarized in Table 1. Skin lesions observed in patients with DM are reported in Tables 2 and 3. In both patients with IDDM and NIDDM, the total number of infectious cutaneous lesions was more than noninfectious lesions. In the IDDM group, the most frequent cutaneous infections were viral warts, while pruritus and vitiligo were the most common noninfectious lesions. Pyodermas were the most frequent cutaneous infections in patients with NIDDM, and pruritus and acrochordon had the highest frequency in noninfectious lesions.

No statistically significant differences were observed between the 2 types of DM regarding age, duration of disease, and diabetic complications (ie, retinopathy, nephropathy, neuropathy, and large vessel disease; *P*>.05 for all). The difference in BMI between the 2 groups was statistically significant, with patients with NIDDM having a significantly higher BMI (*P*=.001).

Table 2.

Cutaneous Infections in Patients With Diabetes Mellitus

	Participant Response, n (%)		
Manifestation	**IDDM (n=23)**	**NIDDM (n=87)**	**Total (N=110)**
Pyodermas	3 (13.0)	14 (16.1)	17 (15.5)
Pityriasis versicolor	1 (4.3)	2 (2.3)	3 (2.7)
Erythrasma	1 (4.3)	2 (2.3)	3 (2.7)
Candidiasis	NA	NA	NA
Balanoposthitis	NA	1 (1.1)	1 (0.9)
Vulvovaginitis	NA	6 (6.9)	6 (5.5)
Intertrigo	2 (8.7)	3 (3.4)	5 (4.5)
Oral infections	2 (8.7)	13 (14.9)	15 (13.6)
Dermatophytosis	2 (8.7)	2 (2.3)	4 (3.6)
Onychomycosis	3 (13.0)	5 (5.7)	8 (7.3)
Herpes zoster	NA	10 (11.5)	10 (9.1)
Cystic acne	3 (13.0)	NA	3 (2.7)
Viral warts	4 (17.4)	NA	4 (3.6)

Abbreviations: IDDM, insulin-dependent diabetes mellitus (type 1); NIDDM, non–insulin-dependent diabetes mellitus (type 2); NA, not available.

Comment

The results of our study demonstrated that approximately 70% of patients with DM in our population had pathologic skin changes. This high prevalence affected both patients with IDDM and NIDDM. Of greatest interest in this study was the fact that pruritus was found to be a frequent skin manifestation, affecting 28% of patients with DM. The etiology of itching cannot be attributed to a single pathophysiologic mechanism. Several cutaneous mediators have been suggested to induce pruritus and a variety may be linked to metabolic changes in diabetic status.

In both patients with IDDM and NIDDM, the most common category of skin disease was infectious in etiology. It is widely believed that patients with DM have an increased risk for cutaneous infectious diseases, though there is little documented evidence to support this claim. The risk seems to be higher in poorly controlled patients; however, we did not find a significant relationship between the diabetic disease control and the prevalence of cutaneous infections. It has been suspected that poor metabolic control affects host defenses, as functional abnormalities in white blood cells have been observed under conditions of hyperglycemia and ketosis,[13] or even hyperglycemia alone.[14] Clinically, the most notable infectious agents in patients with DM include gram-positive organisms, particularly *Staphylococcus aureus* and the β-hemolytic group A streptococci. Overall, however, we found the prevalence of fungal infections to be much higher than bacterial or viral infections, which was similar to the results reported by Romano et al.[15]

The prevalence of acrochordon was 19% among patients with IDDM or NIDDM. Because acrochordon is common in the general population, a controlled study with nondiabetic, weight-controlled participants would be required to determine if it is truly related to DM. Diabetic dermopathy affected 10% of our patients with DM, similar to Romano et al[15] but clearly lower than the incidence reported in other studies.[16,17]

Patients with NIDDM had a slightly higher incidence and prevalence of diabetic complications (ie, retinopathy, nephropathy, neuropathy, and large vessel disease), though the differences were not statistically significant.

Table 3.

Noninfectious Cutaneous Lesions in Patients With Diabetes Mellitus

	Participant Response, n (%)		
Skin Lesion	**IDDM (n=23)**	**NIDDM (n=87)**	**Total (N=110)**
Acrochordon	1 (4.3)	20 (23.0)	21 (19.1)
Alopecia areata	2 (8.7)	1 (1.1)	3 (2.7)
Acanthosis nigricans	NA	3 (3.4)	3 (2.7)
Bullous pemphigoid	NA	2 (2.3)	2 (1.8)
Hairy tongue	NA	1 (1.1)	1 (0.9)
Cherry angioma	1 (4.3)	13 (14.9)	14 (12.7)
Diabetic bullae	NA	6 (6.9)	6 (5.5)
Diabetic dermopathy	1 (4.3)	10 (11.5)	11 (10.0)
Rubeosis	NA	3 (3.4)	3 (2.7)
Discoid lupus erythematosus	NA	1 (1.1)	1 (0.9)
Xanthelasma	NA	2 (2.3)	2 (1.8)
Erysipelaslike erythema	NA	1 (1.1)	1 (0.9)
Erythema annulare centrifugum	NA	1 (1.1)	1 (0.9)
Fixed drug eruption	1 (4.3)	2 (2.3)	3 (2.7)
Foot gangrene	NA	4 (4.6)	4 (3.6)
Pruritus	4 (17.4)	27 (31.0)	31 (28.2)
Granuloma annulare	NA	1 (1.1)	1 (0.9)
Lichen simplex chronicus	NA	3 (3.4)	3 (2.7)
Lichen planus	NA	2 (2.3)	2 (1.8)
Lymphomatoid papulosis	NA	1 (1.1)	1 (0.9)
Insulin lipoatrophy	2 (8.7)	NA	2 (1.8)
Necrobiosis lipoidica	NA	2 (2.3)	2 (1.8)
Pallor and cooling	1 (4.3)	3 (3.4)	4 (3.6)
Pemphigus vulgaris	NA	1 (1.1)	1 (0.9)
Pyogenic granuloma	NA	1 (1.1)	1 (0.9)
Psoriasis	NA	1 (1.1)	1 (0.9)
Pyoderma gangrenosum	NA	1 (1.1)	1 (0.9)
Pityriasis rubra pilaris	NA	1 (1.1)	1 (0.9)
Seborrheic keratosis	NA	7 (8.0)	7 (6.4)
Schamberg dermatitis	NA	5 (5.7)	5 (4.5)
Sebaceous cyst	NA	1 (1.1)	1 (0.9)
Urticaria	1 (4.3)	4 (4.6)	5 (4.5)
Vitiligo	3 (13.0)	NA	3 (2.7)
Xerosis	1 (4.3)	8 (9.2)	9 (8.2)

Abbreviations: IDDM, insulin-dependent diabetes mellitus (type 1); NIDDM, non–insulin-dependent diabetes mellitus (type 2); NA, not available.

Conclusion

Our study found that in our outpatient population with DM, there is a high prevalence of skin lesions mainly represented by cutaneous infections. Not only can dermatologic symptoms help identify and treat skin disorders associated with DM, they also can be important for the initial diagnosis of the underlying disease, even though no skin diseases are specific to DM.

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