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Original Research

Assessment of cutaneous manifestations in diabetic children

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ABSTRACT:
Background: Cutaneous manifestations are frequent in DM, resulting from metabolic disturbances, vascular changes, neuropathy, and immune dysfunction. Children with T1DM are particularly prone to autoimmune-mediated skin disorders, highlighting the need for early recognition and management. **Materials & Methods:** This study included 50 children with T1DM and 50 age- and sex-matched healthy, non-obese controls. All participants underwent thorough dermatological examination by the same dermatologist, with Wood's lamp and mycological tests performed when required.Demographic and clinical details, including HbA1c levels for T1DM patients, were recorded. Data were analyzed using SPSS v18.0, applying descriptive statistics, chi-square, and t-tests, with $p < 0.05$ considered statistically significant. **Results**: Skin infections were more frequent in T1DM, notably folliculitis (24% vs. 6%). Xerosis cutis was the most common diabetes-related skin finding (32% vs. 6%), followed by keratosis pilaris (26% vs. 8%) and rubeosis facieidiabeticorum (10% vs. 2%). Acanthosis nigricans occurred in 8% of T1DM cases compared to 2% of controls. **Conclusion:** It is anticipated that effective management and prevention of skin manifestations in children with T1DM can be achieved by educating patients and their caregivers, along with enhancing physician awareness.
Key words: Cutaneous, Diabetic, Children

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INTRODUCTION

Both type 1 and type 2 diabetes mellitus (DM) can manifest in the paediatric and adolescent population, although their epidemiology, clinical presentation, and pathophysiology vary considerably. Globally, diabetes affects an estimated 230 million individuals, of whom approximately 4.9 million are living with type 1 diabetes mellitus (T1DM). T1DM remains the most prevalent chronic endocrine disorder among children in developed nations, representing a significant public health concern.[1,] [2]Advances in genetic testing have complicated the traditional classification of childhood diabetes by revealing distinct monogenic forms, such as maturity-onset diabetes of the young (MODY), that often mimic the clinical presentation of T1DM. Additionally, the phenotypic overlap between T1DM and type 2 diabetes mellitus (T2DM) in overweight and obese adolescents further blurs the diagnostic boundaries, creating challenges in accurate classification and management.[3,] [4]Epidemiological data indicate that approximately 70,000 children under the age of 15 are newly diagnosed with T1DM each year worldwide, with the paediatric incidence rising at an alarming rate of 3–5% annually. This trend underscores the urgency for targeted prevention strategies, early diagnosis, and optimized disease management. The complexity of paediatric diabetes has been widely acknowledged, prompting the International Diabetes Federation to adopt the theme "Diabetes is different in children" for World Diabetes Day following the United Nations resolution on diabetes in December 2006. This campaign dedicated a three-year global focus to the unique needs of children and adolescents living with diabetes.[5,] [6]Cutaneous manifestations are among the most frequently observed features in individuals with diabetes mellitus (DM). Their development is thought to be influenced by multiple pathophysiological mechanisms, including disturbances in carbohydrate metabolism, the presence of atherosclerotic changes,

microangiopathy, degenerative alterations in peripheral nerves, and compromised host defense mechanisms. Moreover, individuals with type 1 diabetes mellitus (T1DM) have a higher predisposition to autoimmune-mediated skin disorders compared to the general population.[7- 9]Hence; the present study was conducted for assessing cutaneous manifestations in diabetic children.

MATERIALS & METHODS

The present study involved 50 children diagnosed with type 1 diabetes mellitus (T1DM) who were under regular follow-up at, along with a control group of 50 age- and sex-matched healthy, non-obese children. Informed written consent was obtained from all participants prior to enrollment. Comprehensive dermatological examinations were carried out for all subjects by the same dermatologist to ensure consistency. When clinically indicated, additional diagnostic procedures, including Wood's lamp evaluation and mycological investigations, were performed. Demographic characteristics were recorded for all participants, and for the T1DM group, disease-specific details and glycated hemoglobin (HbA1c) levels obtained during routine assessments were also reviewed. Dermal examination was done for evaluating cutaneous manifestations. Data analysis was conducted using SPSS version 18.0, employing descriptive statistics, chi-square tests, and independent sample t-tests. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The mean age of children with type 1 diabetes mellitus (T1DM) was 10.9 years, while that of healthy controls was 10.2 years, with no statistically significant difference ($p = 0.820$). The male-to-female ratio was comparable between groups, with 12 males and 38 females in the T1DM group, and 15 males and 35 females among healthy controls ($p = 0.3213$). The mean duration of diabetes in the affected group was 46.9 months, with the average age at diagnosis being 8.3 years.Skin infections were more frequent in children with T1DM, with folliculitis observed in 24% compared to 6% in healthy controls. Viral warts were noted in 6% of diabetic patients and 4% of controls, while herpes virus infection occurred exclusively in the T1DM group (4%). Among skin manifestations specifically associated with diabetes, xerosis cutis was the most prevalent, affecting 32% of diabetic children compared to 6% of controls. Rubeosis facieidiabeticorum was identified in 10% of diabetic cases and only 2% of controls. Keratosis pilaris was present in 26% of children with T1DM versus 8% in healthy counterparts. Acanthosis nigricans was also more frequent among diabetic patients (8%) compared to controls (2%). Overall, skin disorders, particularly xerosis cutis and keratosis pilaris, showed a higher prevalence in the diabetic group, suggesting a strong association between T1DM and dermatological manifestations.

Table 1: Demographic data

Characteristic	Children with T1DM (n=65)	Healthy Controls (n=78)	p-value
Age (years) (mean)	10.9	10.2	0.820
Sex (male/female)	12 / 38	15 / 35	0.3213
Duration of diabetes (months)	46.9	–	–
Age at T1DM onset (years)	8.3	–	–

Table 2: Skin findings in patients with type 1 diabetes mellitus and healthy controls

Skin Condition	Patients with T1DM (n=50) n (%)	Healthy Controls (n=50) n (%)
Skin infections		
Folliculitis	12 (24%)	3 (6%)
Wart	3 (6%)	2 (4%)
Herpes virus infection	2 (4%)	0 (0%)
Skin manifestations associated with diabetes		
Limited joint mobility	2 (4%)	0 (0%)
Scleroderma-like skin changes	1 (2%)	0 (0%)
Xerosis cutis	16 (32%)	3 (6%)
Rubeosis facieidiabeticorum	5 (10%)	1 (2%)
Keratosis pilaris	13 (26%)	4 (8%)
Acanthosis nigricans	4 (8%)	1 (2%)

DISCUSSION

Skin changes may be related to metabolic alterations associated with diabetes. Others may be manifestations of macro or microvascular disease. Insulin injections, required for management of most diabetes in the pediatric age group, may also cause cutaneous changes. There remain several cutaneous abnormalities which are observed with increased frequency among diabetics, the significance of which is unknown. The skin is a potentially invaluable tool

for understanding certain diabetic complications: however, the value of observations and experimental data relating to cutaneous changes in diabetics depends upon documentation of the type of diabetes mellitus employing the currently accepted classification system.[7- 10]Hence; the present study was conducted for assessing cutaneous manifestations in diabetic children.

In the present study, skin infections were more frequent in children with T1DM, with folliculitis observed in 24% compared to 6% in healthy controls. Viral warts were noted in 6% of diabetic patients and 4% of controls, while herpes virus infection occurred exclusively in the T1DM group (4%). Among skin manifestations specifically associated with diabetes, xerosis cutis was the most prevalent, affecting 32% of diabetic children compared to 6% of controls. Rubeosis facieidiabeticorum was identified in 10% of diabetic cases and only 2% of controls. Keratosis pilaris was present in 26% of children with T1DM versus 8% in healthy counterparts. Acanthosis nigricans was also more frequent among diabetic patients (8%) compared to controls (2%). Overall, skin disorders, particularly xerosis cutis and keratosis pilaris, showed a higher prevalence in the diabetic group, suggesting a strong association between T1DM and dermatological manifestations.Torres et al, in a previous review summarized dermal manifestations in diabetic children. Obesity and diabetes are chronic diseases that affect people all over the world, and their incidence is increasing in both children and adults. Clinically, they affect a number of organs, including the skin. The cutaneous manifestations caused or aggravated by obesity and diabetes are varied and usually bear some relation to the time that has elapsed since the onset of the disease. They include soft fibromas, acanthosis nigricans, striae, xerosis, keratosis pilaris, plantar hyperkeratosis, fungal and bacterial skin infections, granuloma annulare, necrobiosis lipoidica, psoriasis, and atopic dermatitis.[11]Pavlović MD et al assessed the prevalence of cutaneous disorders and their relation to disease duration, metabolic control, and microvascular complications in children and adolescents with type 1 diabetes. The presence and frequency of skin manifestations were examined and compared in 212 unselected type 1 diabetic patients (aged 2-22 years, diabetes duration 1-15 years) and 196 healthy sex- and age-matched control subjects. Logistic regression was used to analyze the relation of cutaneous disorders with diabetes duration, glycemic control, and microvascular complications. One hundred forty-two (68%) type 1 diabetic patients had at least one cutaneous disorder vs. 52 (26.5%) control subjects ($P < 0.01$). Diabetes-associated skin lesions were found in 81 (38%) patients. Acquired ichthyosis, rubeosis faciei, diabetic hand, and necrobiosis lipoidica were seen in 22 vs. 3%, 7.1 vs. 0%, 2.3 vs. 0%, and 2.3 vs. 0% of type 1 diabetic and control subjects, respectively. The frequency of cutaneous reactions to insulin therapy was low (-2.7%). The prevalence of fungal infections in patients and control subjects was 4.7% and 1.5%, respectively. Keratosis pilaris affected 12% of our patients vs. 1.5% of control subjects. Diabetic hand was strongly (odds ratio 1.42 [95% CI 1.11-1.81]; $P < 0.001$), and rubeosis faciei weakly (1.22 [1.04-1.43]; $P = 0.0087$), associated with diabetes duration. Significant association was also found between acquired ichthyosis and keratosis pilaris (1.53 [1.09-1.79]; $P < 0.001$).[12]

CONCLUSION

It is anticipated that effective management and prevention of skin manifestations in children with T1DM can be achieved by educating patients and their caregivers, along with enhancing physician awareness.

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