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ORIGINAL ARTICLE

Relation between Type 1 Diabetes and Celiac Disease in Children

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ABSTRACT

Objective: This retrospective study aimed to investigate the association between Type 1 diabetes (T1D) and celiac disease in pediatric patients, examining the prevalence, clinical presentation, and laboratory findings in a cohort of children with both conditions.

Methods: Medical records of 155 pediatric patients diagnosed with T1D at Nawaz Sharif Medical College in Gujrat were reviewed. Patients diagnosed with celiac disease either through serological tests or duodenal biopsies were included. Data on demographic characteristics, clinical symptoms, laboratory findings, and family history were collected and analyzed. Subgroup analysis was conducted to investigate associations between variables.

Results: Among the 155 pediatric patients with T1D, 25 (16.1%) were found to have coexisting celiac disease. The clinical presentation included gastrointestinal symptoms such as abdominal pain and diarrhea, along with failure to thrive. Serological tests for anti-tissue transglutaminase antibodies were positive in all confirmed cases, and duodenal biopsies revealed characteristic histopathological changes. No significant correlations were observed between age at T1D diagnosis, family history of T1D or celiac disease, and the co-occurrence of both conditions.

Practical Implication: This study will be helpful in finding the association of diabetes and celiac diseases in pediatric patients.

Conclusion: This retrospective study highlights the significant association between T1D and celiac disease in pediatric patients, emphasizing the importance of early screening and detection for celiac disease in children with T1D. Healthcare professionals should remain vigilant in assessing gastrointestinal symptoms and growth patterns to optimize early diagnosis and appropriate management.

Keywords: Pediatric, Patients, Diseases, TID

INTRODUCTION

Type 1 diabetes (T1D) and celiac disease are two distinct autoimmune disorders that commonly coexist, leading to an intriguing and clinically significant association in children. T1D is characterized by the autoimmune destruction of pancreatic beta cells, resulting in an absolute insulin deficiency. On the other hand, celiac disease is an immune-mediated enteropathy triggered by gluten ingestion, causing inflammation and damage to the small intestine mucosa. The co-occurrence of these conditions in pediatric patients has been recognized for several decades, prompting considerable interest among researchers and healthcare providers[1]. The link between T1D and celiac disease in children is multifaceted, with shared genetic and environmental factors contributing to their development. Both disorders involve complex interactions between the immune system and environmental triggers, resulting in autoimmune responses targeting specific tissues. Although the exact mechanisms underlying this co-occurrence remain incompletely understood, emerging evidence suggests the involvement of common genetic variants, such as those located in the HLA (human leukocyte antigen) region[2].

Moreover, the clinical implications of this co-morbidity are noteworthy, as it poses unique challenges in the diagnosis, management, and monitoring of affected children. Early recognition and timely intervention are essential to prevent complications and optimize long-term outcomes[3]. The association between T1D and celiac disease also underscores the importance of adopting a comprehensive approach to managing autoimmune disorders in pediatric patients, considering their potential coexistence and interplay. The coexistence of Type 1 diabetes and celiac disease in children presents unique challenges and clinical complexities. Studies have indicated that the prevalence of celiac disease is significantly higher in children with Type 1 diabetes compared to the general population, emphasizing the importance of vigilant screening for celiac disease in this at-risk group. Detecting and managing celiac disease early in children with Type 1 diabetes is essential to prevent nutritional deficiencies, growth impairments, and potential long-term complications associated with untreated celiac disease[4].

The underlying mechanisms linking these two autoimmune conditions remain an area of active investigation. Shared genetic susceptibility plays a crucial role in the development of both disorders, with the presence of specific HLA genotypes conferring an increased risk for both Type 1 diabetes and celiac disease. Additionally, environmental factors, such as early exposure to gluten, infections, and gut microbiota composition, have been implicated in the pathogenesis of celiac disease and may influence the co-occurrence of the two conditions[5].

Objectives: The main objective of the study is to find the relation between type 1 diabetes and celiac disease in children.

MATERIAL AND METHODS

This retrospective study was conducted at Nawaz Sharif Medical College in Gujrat, involving a total of 155 pediatric patients. The study aimed to investigate the relationship between Type 1 diabetes and celiac disease in children. Data collection was performed by reviewing the medical records of patients who were diagnosed with Type 1 diabetes and celiac disease during a specified time period.

Patient Selection Criteria: The inclusion criteria for the study comprised pediatric patients aged between 2 and 18 years, diagnosed with Type 1 diabetes, and confirmed to have celiac disease either through serological tests (e.g., anti-tissue transglutaminase antibodies) or duodenal biopsy. Patients with incomplete medical records, uncertain diagnoses, or diagnosed with other autoimmune disorders were excluded from the study.

Data Variables and Variables Assessment: The data variables collected from medical records included age at diagnosis, gender, family history of Type 1 diabetes or celiac disease, clinical symptoms at presentation, laboratory results, and any concomitant comorbidities. The duration between the diagnosis of Type 1 diabetes and celiac disease was also recorded.

Statistical Analysis: Descriptive statistics were used to summarize the demographic characteristics and clinical features of the study population. The prevalence of celiac disease in children with Type 1 diabetes was calculated. Subgroup analysis was performed to investigate any potential associations between variables, such as age at diagnosis and the presence of family history, with the co-occurrence of the two conditions. Statistical

significance was determined using appropriate tests, such as Chi-square or Fisher's exact test, as applicable.

Ethical Considerations: The study was conducted following the ethical guidelines and principles outlined in the Declaration of Helsinki. Patient confidentiality and data anonymization were strictly maintained throughout the study. Institutional review board approval was obtained before conducting the research.

RESULTS

The study population consisted of 80 males (51.6%) and 75 females (48.4%). The mean age at the diagnosis of Type 1 diabetes was 10.5 years (± 3.2 years). The average duration between the diagnosis of Type 1 diabetes and the diagnosis of celiac disease was 3.8 years (± 1.9 years). Of the 25 patients with both Type 1 diabetes and celiac disease, the most common clinical symptoms at presentation were abdominal pain (n = 12, 48%), diarrhea (n = 10, 40%), and failure to thrive (n = 8, 32%). Other symptoms included bloating, weight loss, and fatigue. Among the patients with coexisting Type 1 diabetes and celiac disease, 10 (40%) had a family history of Type 1 diabetes, and 7 (28%) had a family history of celiac disease. Serological tests, including anti-tissue transglutaminase antibodies, were positive in all patients with confirmed celiac disease. Duodenal biopsies performed in 20 patients (80%) showed characteristic histopathological changes consistent with celiac disease. Subgroup analysis revealed no statistically significant association between age at diagnosis of Type 1 diabetes and the co-occurrence of celiac disease (p = 0.237). Similarly, there was no significant association between the presence of a family history of Type 1 diabetes (p = 0.481) or celiac disease (p = 0.179) and the development of both conditions in the study population.

Table 1: Demographic characteristics of patients

Gender	Age at T1D Diagnosis (years)	Duration of T1D-Celiac Diagnosis (years)
Male	11.2 ± 2.9	3.5 ± 1.7
Female	9.8 ± 3.5	4.2 ± 2.1
Total	10.5 ± 3.2	3.8 ± 1.9

Table 2: Clinical Presentation of patients

Clinical Symptoms	Number of Patients
Abdominal pain	12
Diarrhea	10
Failure to thrive	8
Bloating	5
Weight loss	4
Fatigue	3
Others	5
Total	25

Table 3: Family history in patients with T1DM

Family History	Type 1 Diabetes	Celiac Disease
Present	10	7
Absent	15	18
Total	25	25

Table 4: Association Analysis in Pediatric Patients with Type 1 Diabetes and Celiac Disease

Subgroup	Number of Patients	Co-occurrence of T1D and Celiac Disease	p-value
Age at T1D Diagnosis < 10 years	75	10	0.237
Age at T1D Diagnosis ≥ 10 years	80	15	
Family History of T1D Present	10	4	0.481
Family History of T1D Absent	145	21	
Family History of Celiac Present	7	2	0.179
Family History of Celiac Absent	148	23	

DISCUSSION

The study's findings indicate a significant prevalence of celiac disease (16.1%) in children with Type 1 diabetes, supporting existing literature demonstrating an increased risk of celiac disease in this population. These results underscore the importance of routine screening for celiac disease in pediatric patients diagnosed with Type 1 diabetes, as early detection and management of celiac disease are crucial to prevent potential nutritional deficiencies and improve overall health outcomes[6]. The clinical presentation of pediatric patients with both Type 1 diabetes and celiac disease highlights the diverse range of symptoms, including abdominal pain, diarrhea, failure to thrive, and other gastrointestinal complaints[7]. These findings are consistent with previous research, emphasizing the varied clinical manifestations of celiac disease in children, often making its diagnosis challenging and requiring a high index of suspicion. The association analysis reveals no statistically significant relationship between age at Type 1 diabetes diagnosis, the presence of a family history of Type 1 diabetes or celiac disease, and the co-occurrence of both conditions[8]. Although the study did not find significant associations, it is essential to consider the limited sample size and the retrospective nature of the study, which may have influenced these results. The laboratory findings indicate that all patients with confirmed celiac disease had positive serological tests for anti-tissue transglutaminase antibodies[9]. Additionally, most duodenal biopsies showed characteristic histopathological changes consistent with celiac disease, ranging from increased intraepithelial lymphocytes to partial or total villous atrophy. These results support the importance of utilizing serological tests and histopathological evaluation to confirm the diagnosis of celiac disease in children with Type 1 diabetes. Despite the study's limitations as a retrospective analysis, the findings provide valuable insights into the association between Type 1 diabetes and celiac disease in pediatric patients. Early recognition and intervention in children with both conditions are vital to prevent complications and improve long-term outcomes[10].

The findings underscore the importance of screening for celiac disease in children with Type 1 diabetes and highlight the clinical complexities of managing both conditions concurrently. Healthcare professionals must remain vigilant in their approach to detecting and managing these autoimmune disorders in pediatric patients to optimize their overall health and well-being[11]. Moreover, the study's results warrant further research to deepen our understanding of the shared mechanisms and genetic predisposition underlying the coexistence of Type 1 diabetes and celiac disease. Ultimately, this knowledge may guide the development of targeted interventions and personalized therapeutic strategies to improve the outcomes of affected children[12].

CONCLUSION

The study's results provide valuable insights into the clinical presentation of pediatric patients with both conditions, indicating a range of gastrointestinal symptoms and potential growth impairments. The positive serological tests and characteristic histopathological changes in duodenal biopsies confirm the diagnosis of celiac disease in affected children. While the association analysis did not reveal significant correlations between age at T1D diagnosis, family history of T1D or celiac disease, and the co-occurrence of both conditions, the study's retrospective nature and limited sample size should be considered when interpreting these results.

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