



FREQUENCY OF CELIAC DISEASE AMONG CHILDREN WITH CHRONIC DIARRHEA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: To evaluate the prevalence of celiac disease in children with chronic diarrhea.

Methodology: This study was conducted from July 2024 to January 2025. One hundred twenty children aged 5 to 14 years presented with chronic diarrhea lasting for more than four weeks were enrolled. All the patients were examined for celiac disease, CD was diagnosed by serological testing which included immunoglobulin A (IgA) against tissue transglutaminase (tTG) and anti-endomysial antibodies (EMA).

Results: Mean age was 9.31 ± 2.85 years. There were 64 (53.3%) male and 56 (46.7%) female patients. We observed the 20 (16.7%) patients were diagnosed with celiac disease. CD was notably associated with socioeconomic status ($P < 0.05$), residence ($P < 0.05$), weight loss ($P < 0.05$), anemia ($P < 0.05$), short stature ($P < 0.05$) and family history of CD ($P < 0.05$).

Conclusion: Celiac disease is a common condition among children with chronic diarrhea, affecting 16.7% children in our study.

Keywords: Celiac disease, chronic diarrhea, pediatric gastroenterology, clinical symptoms, serological testing,

INTRODUCTION

Diarrhoea continues to be a global concern due to its potential outcome in considerable mortality as well as morbidity rates in children around the globe particularly in developing nations. The prevalence of diarrhoea fluctuates according to age demographics. Children below age of 5 demonstrate a greater susceptibility to diarrhoea which accounts for 18% of related fatality rate. The frequency of diarrhoea in paediatric groups decreases with age ¹⁻³.

Acute diarrhoea usually passes within a timeframe of fewer than 7 days. In instances in which diarrhoea persists beyond 7 days known as prolonged diarrhoea, there is a greater likelihood of advancement to persistent diarrhoea ^{4, 5}. Multiple risk factors, including antibiotic usage, and malnutrition have been recognised as contributing to an increased likelihood of persistent diarrhoea within children. Nevertheless, research concerning such risk factors associated with extended diarrhoea remains limited ⁶.

Celiac disease has been defined as an autoimmune disorder marked by an immune-mediated responses occurring in small intestine upon exposure to dietary gluten, barley, as well as rye. Traditionally regarded as a gastrointestinal circumstance mainly linked to malabsorption, it is currently more precisely categorised as an autoimmune condition displaying systemic manifestations⁷⁻¹⁰. Alongside genetic susceptibility as well as gluten exposure factors including decline in intestinal barrier function, as well as an unbalanced gut microbiome may be contributing to autoimmunity related to celiac disease¹¹. Over 99% of individuals in celiac disease possess either HLA-DQ2 as well as HLA-DQ8, in contrast to 40% of overall population¹². Research demonstrates that factors including breast milk, method of delivery, as well as timing of gluten introduction in infants may contribute to risk of developing celiac disease as well as could influence its incidence. However, there is limited data from retrospective studies indicating these variables affect risk for getting celiac disease¹³⁻¹⁵. Chronic diarrhoea frequently appears as primary indication of celiac disease within paediatric patients¹⁶. The condition demonstrates malabsorption as well as if not discussed, can lead to deficiencies in nutrition particularly iron deficiency anaemia, as well as delayed growth in paediatric populations¹⁷.

Celiac disease is an immune-mediated enteropathy triggered by gluten ingestion in genetically predisposed individuals with a wide spectrum of clinical manifestations predominantly in children. Chronic diarrhea is one of the most common gastrointestinal symptoms in pediatric populations and may be an early indicator of underlying celiac disease particularly when accompanied by failure to thrive and malabsorption. Determining the frequency of celiac disease among children presenting with chronic diarrhea is essential for raising clinical suspicion guiding timely diagnostic testing as well as improving management strategies.

METHODOLOGY

The study was designed as a cross-sectional investigation conducted at the department of Pediatric from July 2024 to January 2025. Prior to commencing the study we had obtained ethical certificate from our hospital. Our study consisted of 120 children between the ages of 5 and 14 years who had chronic diarrhea, which was defined as the passage of three or more liquid stools per day lasting for more than four weeks. Children with blood-stained diarrhea, prior diagnoses of celiac disease or other gastrointestinal disorders such as inflammatory bowel disease or infections were not enrolled.

After consent was obtained from the parents/guardian, a thorough clinical evaluation was done by a pediatric gastroenterologist. Demographic variables were recorded for each patients. Clinical variables such as weight loss, presence of anemia and short stature were recorded for all participants. Short stature was defined as a height below the third percentile for age and sex and weight loss was determined based on a clinical assessment of growth patterns and weight-for-age measurements.

After the clinical assessment blood samples were collected from each participant for laboratory examination for diagnosis of celiac disease. The diagnostic process involved measuring the serum levels of immunoglobulin A (IgA) against tissue transglutaminase (tTG), which is biomarker for the detection of celiac disease. Additionally IgA anti-endomysial antibody (EMA) testing was performed. SPSS 24 was used for analyzing the collected data. Continuous variables were evaluated as mean $\pm$ standard deviation while categorical variables were assessed as frequencies and percentages. The association of CD with various factors were assessed using Chi Square test, keeping P statistically notable at < 0.05 .

RESULTS

The average age of the patients was 9.31 ± 2.85 years. There were 64 (53.3%) male and 56 (46.7%) female patients, the rest of the demographic profile of the patients is presented in table no 1.

Regarding the clinical presentation weight loss was observed in 73 (60.8%) cases. Anemia was present in 37 (30.8%) cases. Short stature was observed in 38 (31.7%) cases. Family history of celiac disease was reported in 33 (27.5%) cases (Table 2).

We observed that 20 (16.7%) children were diagnosed with celiac disease (Figure 1).

Children from lower socioeconomic status, urban residence, having weight loss, anemia, short stature and those having family history of CD were significantly more likely to have celiac disease (Table 3)

Table 1: Demographics

Demographics		n	%
Gender	Male	64	53.3%
	Female	56	46.7%
Socioeconomic status	Low	41	34.2%
	Middle	53	44.2%
	High	26	21.7%
Residence	Urban	55	45.8%
	Rural	65	54.2%
Education of parents	Educated	47	39.2%
	Uneducated	73	60.8%

Table 2: Clinical presentation

Clinical presentation		n	%
Weight loss	Yes	73	60.8%
	No	47	39.2%
Anemia	Yes	37	30.8%
	No	83	69.2%
Short stature	Yes	38	31.7%
	No	82	68.3%
Family history of CD	Yes	33	27.5%
	No	87	72.5%

Figure 1: Frequency of celiac disease

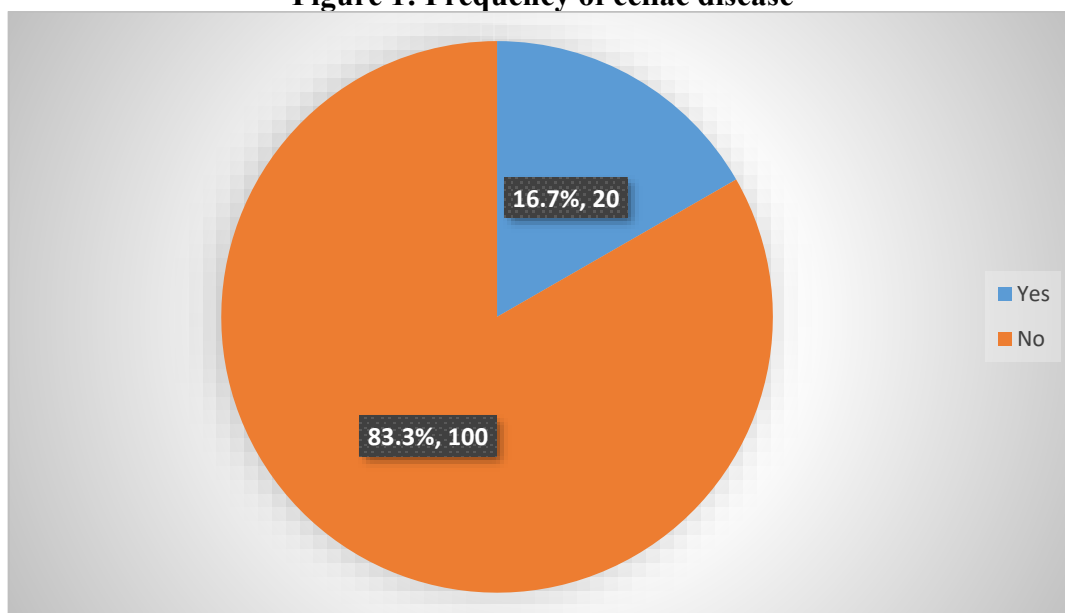


Table 3: Association of celiac disease with demographics and clinical presentation

Demographics and clinical presentation		Celiac disease				P value
		Yes		No		
		n	%	n	%	
Gender	Male	10	50.0%	54	54.0%	P > 0.05

	Female	10	50.0%	46	46.0%	
Socioeconomic status	Low	12	60.0%	29	29.0%	P < 0.05
	Middle	5	25.0%	48	48.0%	
	High	3	15.0%	23	23.0%	
Residence	Urban	4	20.0%	51	51.0%	P < 0.5
	Rural	16	80.0%	49	49.0%	
Education of parents	Educated	8	40.0%	39	39.0%	P > 0.05
	Uneducated	12	60.0%	61	61.0%	
Weight loss	Yes	18	90.0%	55	55.0%	P < 0.05
	No	2	10.0%	45	45.0%	
Anemia	Yes	12	60.0%	25	25.0%	P < 0.05
	No	8	40.0%	75	75.0%	
Short stature	Yes	12	60.0%	26	26.0%	P < 0.05
	No	8	40.0%	74	74.0%	
Family history of CD	Yes	12	60.0%	21	21.0%	P < 0.05
	No	8	40.0%	79	79.0%	

DISCUSSION

The results from our study showed that the prevalence of CD among children with chronic diarrhea was 16.7% which is consistent with studies conducted in different regions but with varying prevalence rates. Ahmad et al. reported the prevalence of CD in patients with chronic diarrhea 23.57%, which is higher compared to the results of our study.¹⁸ Kamal et al. reported that the frequency of CD in children presenting with chronic diarrhea was 13.3%.²⁰ Another study by Imanzadeh et al. reported a prevalence of 6.5% which is lower than the findings in our study.¹⁹

Mehraj et al. conducted a study on children who failed to thrive, and found that the frequency of CD in those patients was 24.2% and among the children who failed to thrive, around 37.5% had diarrhea.²¹ Aziz et al. conducted a study on CD patients and found that among the total CD patients, 40.91% were having CD due to diarrhea which they labelled as classical celiac disease (CCD).²² Panezai et al. studied the frequency of CD in patients presenting with chronic diarrhea and they found that the prevalence of CD in those patients was 12.2%.²³ Bhavika et al in their study reported that 16.2% children presenting with the chronic condition of diarrhea had CD.²⁴

These differences in prevalence can be attributed to various factors such as regional genetic predispositions, differences in diagnostic practices and population characteristics. The higher proportion of 16.7% in our study could also reflect the growing awareness and better diagnostic methods being employed in many regions which may result in more cases being identified.

In terms of demographic Characteristics the present study found that 53.3% of the participants were male and 46.7% were female. This gender distribution aligns closely with that observed in the study by Kamal et al. where the gender distribution was found to be similar with a slightly higher proportion of male patients.²⁰ Although we observed a slightly higher prevalence of male patients in our study, but when gender was stratified with CD, we could not observe a notable association, which suggests that CD might not be a gender biased disease.

We also explored the association of socioeconomic status and residence with CD, interestingly there was a notable association of low socioeconomic status and rural residence with higher rates of CD diagnosis ($P < 0.05$). This finding is consistent with the results from Roy et al. they reported that patients who belonged to lower economic class diagnosed with CD were presented with either diarrhea or gastrointestinal diseases. This association might be due to factors such as limited access to clean water and hygienic lifestyle in such settings. Rural populations often face challenges in terms of access to healthcare which might result in a delayed diagnosis of CD or misdiagnosis leading to more severe cases being identified later. Regarding clinical Presentations the most common symptom in the current study was weight loss which was observed in 60.8% of the participants. This aligns with

the findings from Aziz et al. who found that children with CD due to chronic diarrhea had lower weight than children with non-diarrhea CD.²⁰ In our study 31.7% of the children were diagnosed with short stature a clinical feature commonly seen in children with celiac disease.²⁰ Short stature is a potential marker for CD as the disease impairs growth and development in children due to malabsorption. The association between clinical symptoms such as anemia and family history of CD was also statistically notable in this study. Mehraj et al. showed that anemia was a frequent feature in children with CD.²¹ Ahmed et al and Kamal et al. reported in their studies that family history of CD were notably associated with CD.^{18, 20} We assume that a smaller sample and lack of a control group such as patients with no CD or patients with non-diarrhea chronic disease, are the limitations of our study. We recommend studies to be conducted to explore more factors associated with CD on multicenter level specially in the peripheral areas.

CONCLUSION

In conclusion, our study found a moderate frequency of celiac disease 16.7% in children with chronic diarrhea. Weight loss, anemia, short stature and family history of CD was notably associated with celiac disease.

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