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PEDIATRIC CELIAC DISEASE IN KARBALA, IRAQ: CLINICAL CHARACTERISTICS, DIETARY ADHERENCE, AND MANAGEMENT CHALLENGES

Kamil K. Atiyah Altameemi ¹, Abdul Sattar A. K. Al-Saeedi ² and Abdullah H Maad ^{1,*}

¹ Department of Pharmaceutics, College of Pharmacy, University of Al-Ameed, Karbala, Iraq.

² Department of Medical Laboratory, College of Applied Medical Science, University of Kerbala, Karbala, Iraq.

* Corresponding Author: E-mail: dr.ph.abdullah.maad@gmail.com

ORCID Details

Kamil K. Atiyah Altameemi: <https://orcid.org/0009-0005-7104-5382>

Abdul Sattar A. K. Al-Saeedi: <https://orcid.org/0000-0002-9191-1269>

Abdullah H Maad: <https://orcid.org/0000-0002-6009-5166>

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ABSTRACT

Celiac disease is a chronic autoimmune disorder that occurs in genetically susceptible individuals following the consumption of gluten which results in damage to the mucosa of the small intestine and a broad clinical picture. The objective of the present study was to assess the clinical features, dietary compliance and difficulties faced by these children in the city of Karbala, Iraq. A cross-sectional study in 30 children ≤ 12 years with confirmed or suspected celiac disease from October 2024 to March 2025. Data were collected through structured, pretested questionnaires administered via face-to-face interviews with patients and/or their caregivers. Information was gathered using a structured and pre-tested questionnaire using face-to-face interviews with patients and/or their caregivers. Descriptive statistical analysis was used for the analysis of data. Thirty children with celiac disease were included in the analysis. Of those that participated, 70% reported strict or near-strict adherence to a gluten-free diet, while 30% demonstrated inconsistent adherence. But the families reported 86.7% frequently had trouble finding acceptable gluten free food products. The participants were provided with nutritional services by health professionals (70.0%) but no structured nutrition counseling was available (30.0%). Coexisting conditions were present in 70% of the patients, with type 1 diabetes mellitus being the most common condition at 36.6%, followed by other conditions at 16.7% (irritable bowel syndrome), 6.7% (rheumatoid arthritis), 6.7% (psoriasis), 3.3% (Crohn's disease), and 30.0% of the children ($n = 9$) reported no additional autoimmune diseases. Also, 40% of participants reported other food allergies, suggesting increased immune sensitivity in this population. In conclusion, pediatric celiac disease in Karbala has a variable clinical presentation, moderate adherence to a gluten-free diet, and a significant challenge in achieving optimal management, especially in terms of gluten-free food accessibility and acceptability.

Keywords: Celiac disease, Pediatric population, Gluten-free diet, Karbala, Iraq

1 INTRODUCTION

Celiac disease (CD) is a systemic, lifelong autoimmune disorder triggered by the ingestion of gluten (a protein derived from wheat, barley and rye) in genetically predisposed people. It involves small intestinal mucosal injury and a broad clinical spectrum of symptoms, from typical symptoms of the gastrointestinal tract to silent and atypical symptoms [1]. Currently, celiac disease is thought to be one of the most prevalent chronic conditions in childhood, with a prevalence of 1% of the world's population. However, its distribution is believed to be grossly underestimated particularly in developing countries because of limited awareness and capacity to diagnose and/or manage [2, 3]. The impact of pediatric celiac disease on growth, development and quality of life can be significant. The classical symptoms—chronic diarrhea, weight loss, abdominal distension, and failure to thrive—may be easily overlooked or misattributed to other common pediatric conditions. Additionally, many children present with non-gastrointestinal symptoms such as iron-deficiency anemia, fatigue, irritability, dental enamel defects, or delayed puberty, further complicating timely diagnosis [4, 5]. Celiac disease can cause a variety of complications if untreated, such as malnutrition, osteoporosis, infertility, and even a higher risk of developing some malignancies in adulthood [6, 7]. Celiac disease is still poorly studied and underreported in children in Iraq and particularly in the city of Karbala. The epidemiology of its true prevalence, clinical presentation and risk factors are lacking in this area. The lack of information is compounded by socio-economic challenges, gluten rich diets, a shortage of specialist diagnostic facilities (e.g. endoscopy, serological tests), and lack of awareness of the disease amongst the public and professionals [8]. Many children may continue to be undiagnosed or misdiagnosed, and may not start a gluten-free diet, the only treatment available at this time [9]. This study aimed to determine the prevalence of celiac disease and to evaluate the associated risk factors, clinical manifestation and dietary habits of children in Karbala City. The study is significant in the framework of enhancing outcomes of pediatric health in Iraq. The findings from this study can aid in developing improved clinical practice guidelines, raising awareness for health care providers, and enabling early intervention and disease management in affected children, based on evidence-driven knowledge of the local epidemiology of celiac disease.

2 METHODOLOGY

2.1 Study Design and Setting

This cross-sectional study was carried out in Karbala City, Iraq from October 1, 2024 to March 31, 2025 in pediatric healthcare centers, hospitals and specialized clinics participating in the management of celiac disease.

2.2 Study Population and Sampling

Children aged ≤ 12 years, who had a confirmed or suspected diagnosis of celiac disease were eligible to participate. The participants were selected through stratified random sampling technique and have been selected to represent each age group and gender. A total of 45 subjects were initially selected and 30 of these subjects were finally included in the analysis.

2.3 Eligibility Criteria

Inclusion criteria were the diagnosis of celiac disease by physicians, using serological evidence (including anti-tTG IgA) and/or histopathology, or symptoms suggestive of celiac disease. Exclusion criteria were those who had a diagnosis of an alternate gastrointestinal disease other than celiac disease, had significant comorbid conditions that might interfere with result interpretation, and had incomplete or missing data.

2.4 Data Collection

The data was obtained through a structured, previously tested questionnaire which was completed face-to-face with patients and/or their caregivers. Demographic data, clinical parameters (such as symptom profile and age of diagnosis), compliance with a gluten free diet and issues relating to disease management (such as availability of gluten-free foods, nutritional support and co-morbidities) were recorded. The questionnaire was prepared in Arabic and then translated into English to guarantee its accuracy.

2.5 Statistical Analysis

Data were entered and analyzed using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the study findings.

3 RESULTS

3.1 Participant Characteristics

There was a total of 30 children with celiac disease who were analyzed. The majority resided in urban areas (73.3%, $n = 22$), while 26.7% ($n = 8$) were from rural settings (Figure 1). Thirty percent ($n = 9$) of those interviewed indicated a positive family history, 40 percent ($n = 12$) reported no family history, and 30 percent ($n = 9$) were unsure (Figure 2).

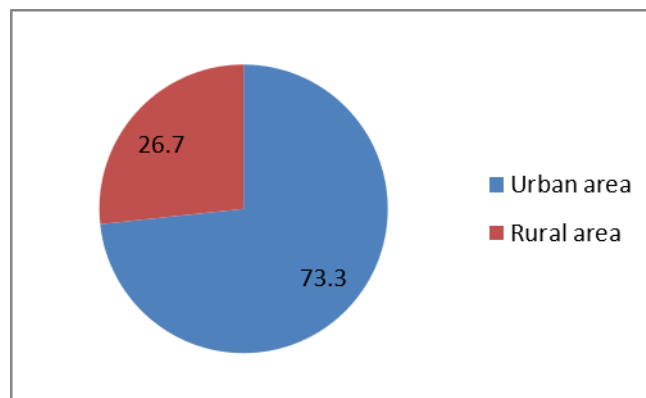


Figure 1: Residential Distribution of Children with Celiac Disease in Karbala

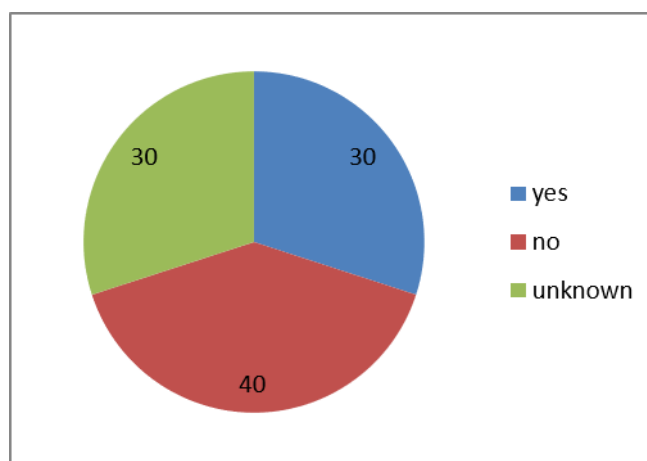


Figure 2: Family History of Celiac Disease among Pediatric Participants

3.2 Clinical Characteristics

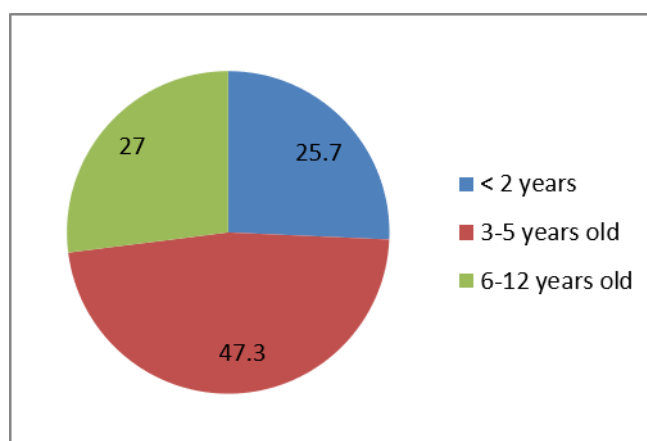


Figure 3: The age of child diagnosed with celiac disease

Most children were diagnosed between the ages of 3–5 years (47.3%), followed by 6–12 years (27.0%) and <2 years (25.7%), as shown in Figure 3. The most frequently reported symptoms before diagnosis were weight loss/ growth

delay (33.3%), abdominal pain (26.7%), and diarrhea (23.3%). Nausea or vomiting (6.7%), constipation (6.7%), and anemia (3.3%) were less common (Figure 4).

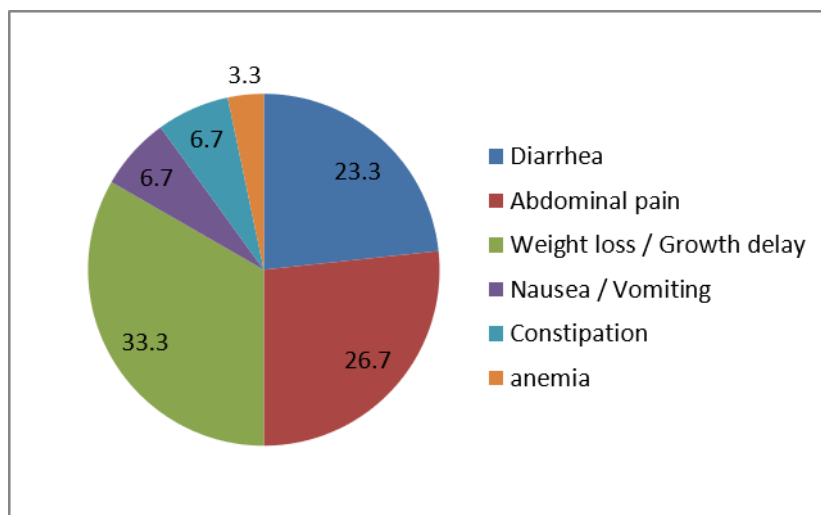


Figure 4: Symptoms Experienced Before Celiac Disease Diagnosis

3.3 Adherence to Gluten-Free Diet

As illustrated in Figure 5, 70.0% of adhered to a gluten-free diet strictly or mostly strictly and 30.0% adhered inconsistently. Nonetheless, a significant number of families (86.7%) still found it difficult to access acceptable gluten-free food products frequently.

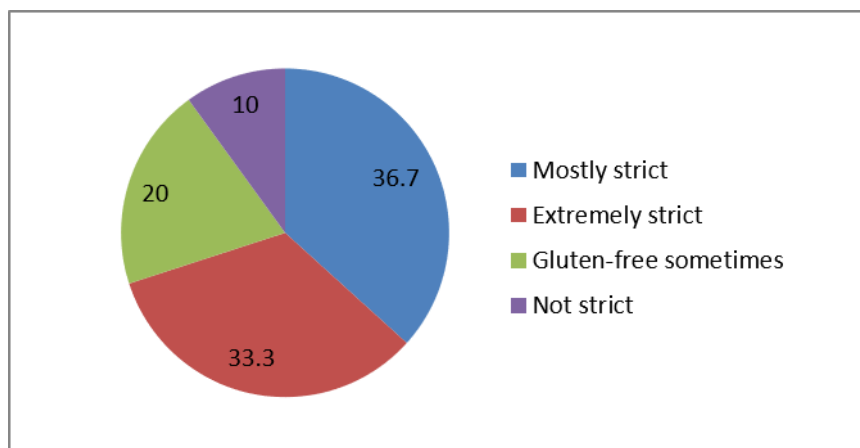


Figure 5: Adherence to Gluten-Free Diet

3.4 Nutritional Support and Management Challenges

Nutritional support from healthcare professionals was available to 70.0% of participants, whereas 30.0% lacked structured dietary counseling (Figure 6). Limited availability, affordability, and palatability of gluten-free foods were identified as major barriers to effective disease management.

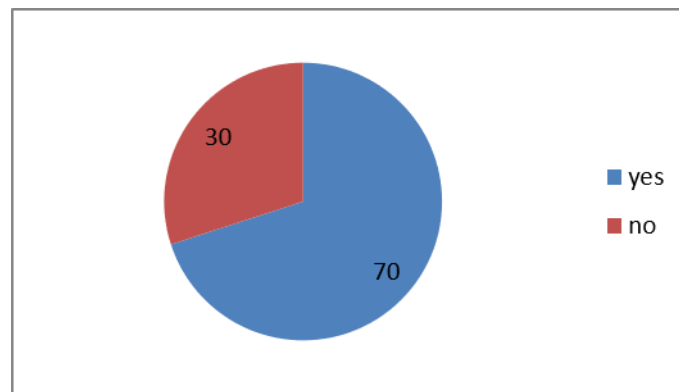


Figure 6: Nutritional Support for Children with Celiac Disease

3.5 Coexisting Autoimmune Diseases

As illustrated in Figure 7, a significant number of participants had autoimmune diseases coexisting. The most common comorbidities were type 1 diabetes (36.6%) and irritable bowel syndrome (16.7%). Other diseases mentioned were rheumatoid arthritis (6.7%), psoriasis (6.7%), and Crohn's disease (3.3%). Notably, 30.0% of the children ($n = 9$) reported no additional autoimmune diseases.

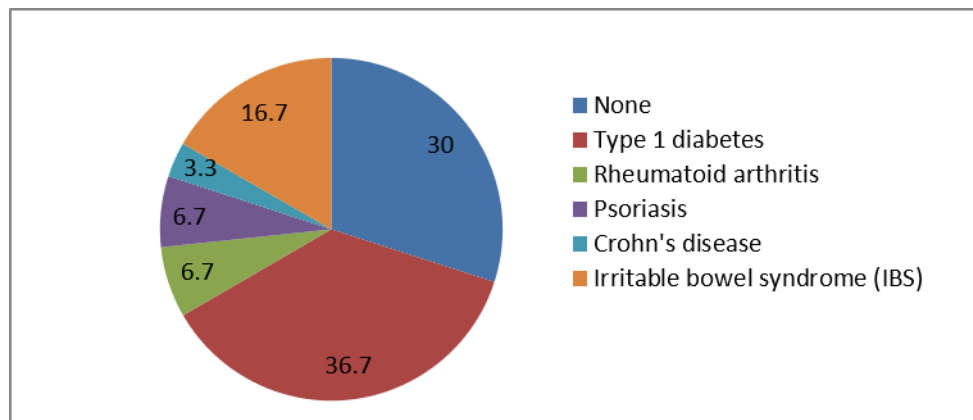


Figure 7: Coexisting Autoimmune Diseases in Children with Celiac Disease

3.6 Food Allergies

As depicted in Figure 8, 40% of participants reported having other food allergies, most commonly to dairy products, eggs, or nuts.

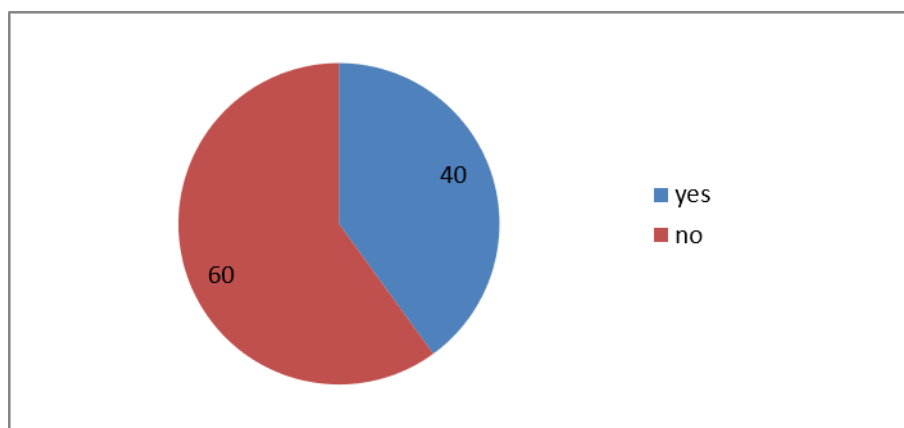


Figure 8: Prevalence of Allergies in Children with Celiac Disease

4 DISCUSSION

The current study offers valuable clinical insights into the features, dietary compliance, and management difficulties of children with celiac disease in Karbala, Iraq, underscoring the similarities and differences with international findings in a resource-constrained environment. The high proportion of cases in urban areas may be explained by the fact that urban areas provide better access to health care services and diagnostic facilities, rather than by a difference in disease distribution. This indicates that, in rural communities, the lack of awareness and access to specialized treatment may result in delayed diagnosis and management of celiac disease. Changing patterns of access to and use of health services have been described in other LMIC countries, and there are clear urban–rural differences in this regard, highlighting the importance of enhancing access to and use of health services and implementing screening programs [10, 11]. In terms of family history, 30.0% of participants had a positive family history, with 40.0% having no family history and 30.0% not knowing their families' history. While the disease has a strong genetic link, especially among first-degree relatives, many cases of celiac disease occur without a known family history of the disease [12]. These findings underscore the need for symptom monitoring and surveillance in children of any genetic background who present with symptoms. The age at diagnosis observed, peaking from 3 to 5 years, is similar to that reported internationally in children and to the age at which gluten is introduced. This age finding has been described in other pediatric populations in Europe and North America [13, 14]. However, clinical signs such as diarrhea, belly pain and growth delay are still present before diagnosis, which suggests that there may be some clinical recognition lag. This is a reminder of the importance of raising awareness amongst health professionals for earlier diagnosis particularly amongst children with non-specific or extraintestinal symptoms. These classic symptoms have been described in many different parts of the world in children [15, 16]. However, less frequent and non-gastrointestinal symptoms such as anemia were also observed, which supports the need for broader diagnostic criteria and increased awareness among healthcare providers [17]. Dietary adherence remains a cornerstone of celiac disease management [18]. In this study, approximately 70% of participants reported strict or near-strict adherence to a gluten-free diet, a rate comparable to that reported in higher-resource settings [19]. Nevertheless, there is little evidence that patient related factors are influencing adherence. The high rate of families experiencing access to acceptable gluten-free food is an important finding that highlights a key deficiency in the local food supply system. Limited availability, high cost, and poor palatability of gluten-free products likely compromise long-term adherence and, consequently, disease outcomes. Most participants received nutritional support, but a significant number did not receive formal dietary advice. Because it is difficult to adhere to a strict gluten-free diet, it may be possible for someone to accidentally ingest gluten and suffer from nutritional deficiencies [20]. The results of this study underscore the need for dietitian-led care in standard practices. The high prevalence of associated autoimmune diseases, such as type 1 diabetes, is in line with the underlying immunopathogenesis of these diseases. Again, this highlights the need for routine evaluation of people with high risk of celiac disease, and the need for routine evaluation of people with low risk of celiac disease [21]. The presence of other conditions, like irritable bowel syndrome (IBS) and food allergies further makes disease management difficult and can affect quality of life [22].

This study has a number of limitations, although it offers useful insights. This is due to the small sample size and the single city nature of the sample. Furthermore, this cross-sectional study cannot distinguish between cause and effect or long-term effects. Self-report questionnaires, especially for adherence to diet, may also exhibit recall or reporting bias. However, this study is filling an important gap in the literature as it offers data on pediatric celiac disease in a region-specific context in Iraq. The results highlight the need for specific public health actions such as increasing awareness, early screening protocols and providing better access to affordable gluten-free food, as well as developing a multi-disciplinary care plan. Large, multicenter, longitudinal studies are needed in the future to provide a better understanding of disease progression and to best manage the disease.

5 CONCLUSION

This study underscores the fact that the clinical manifestation of pediatric celiac disease in Karbala, Iraq is quite variable, the gluten-free diet is not always followed strictly, and there are significant management difficulties. While there was overall good compliance with dietary guidelines and a good level of access to nutritional support, there are still a number of barriers to good disease control, especially the limited availability and affordability of gluten-free foods, and the limited acceptability of foods. The close association with other autoimmune diseases also highlights the importance of a multidisciplinary approach and baseline screening in susceptible individuals. The results highlight the need to further improve the healthcare structure by increasing dietary awareness and support, as well as the availability of gluten-free foods at affordable prices. Further larger, multicenter studies are needed to confirm these results, and to guide the development of evidence-based approaches to enhance long-term outcomes in resource-limited children with celiac disease.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Statement of ethical approval

The study protocol was approved by the Ethics Committee of the University of Al-Ameed.

Statement of informed consent

Written informed consent was obtained from parents or guardians prior to participation. All procedures were conducted in accordance with the Declaration of Helsinki, ensuring confidentiality and anonymity of participant data.

Author's Contribution

Abdullah H. Maad and Abdul Sattar A. K. Al-Saeedi contributed to methodological guidance, critical review, and supervision. Kamil K. Atiyah Altameemi was responsible for the conceptualization, study design, data analysis, manuscript writing, and final revision. All authors reviewed and approved the final manuscript.

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