



CODEN [USA]: IAJPBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF  
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<https://doi.org/10.5281/zenodo.6300150>Available online at: <http://www.iajps.com>

Research Article

**PREVALENCE AND COMPLICATION OF CELIAC DISEASE  
AMONG SAUDI CHILDREN: A CROSS-SECTIONAL STUDY**

Mariam Mohammed Alrsheedy <sup>1</sup>, Hoda Jehad Abousada <sup>2</sup>, Yasmien Taha Maimani <sup>3</sup>, Nouf Abdulkhaliq Almehmadi <sup>3</sup>, Nada Mohammed Alshantqi <sup>3</sup>, Faisal Fahad Alnazawi <sup>3</sup>, Ghadah Abdulrahman Albalawi <sup>3</sup>, Abdulrahman Ibrahim Alwakil <sup>3</sup>, Samera Hanash Alamri <sup>3</sup>, Hatun Sulaiman ALSurayhi <sup>3</sup>, Elaf Abdulkader Kanoori <sup>3</sup>, Abdullellah Talal Alhazmi <sup>3</sup>, Reem Ibrahim Almuashi <sup>3</sup>, Ghaidaa Faisal Albaz <sup>4</sup>

<sup>1</sup> Assistant professor of pediatrics at the Pediatric Nephrology Department in East Jeddah General Hospital.

<sup>2</sup> Obstetric & Gynecology, KAMC, KSA.

ORCID ID: <https://orcid.org/0000-0002-4938-0601>

<sup>3</sup> Medical Intern, KSA

<sup>4</sup> Medical Student, KSA

**Article Received:** September 2020      **Accepted:** October 2020      **Published:** November 2020

**Abstract:**

**Introduction:** Celiac disease (CD) is a chronic and autoimmune disorder caused by inflammatory T-cells response to the gluten-containing proteins. This disease may be expressed due to genetic predisposition, an autoimmune disorder, or environmental factors. **Methodology:** This is a cross-sectional study that included only the pediatric population and aimed to determine the prevalence and complications of CD among children. A predesigned self-administered questionnaire was constructed by the researcher; it covered the socio-demographic data, the patients' clinical data, including their state, the possible complications of the disease, and the diabetic patients. **Results:** A total of 729 children were included, 63.1% were females, and the ones aging above ten years ranked with 31.7%. The prevalence of CD was 32.4%, and only 11.2% were diabetic. More than half of this population did not suffer any complications at all (54.7%), while malnutrition and bone weakening were the most common complications with (27.8%) and (15.5%), respectively. **Conclusion:** There is a relatively low prevalence of CD among children. The majority of our population did not suffer any complications. Furthermore, malnutrition and bone weakening constituted the most frequent complications among the patients.

**Corresponding author:****Hoda Jehad Abousada,**

Obstetric &amp; Gynecology, KAMC, KSA.

ORCID ID: <https://orcid.org/0000-0002-4938-0601>

QR code



Please cite this article in press Hoda Jehad Abousada *et al*, **Prevalence And Complication Of Celiac Disease Among Saudi Children: A Cross-Sectional Study.**, *Indo Am. J. P. Sci*, 2020; 07(11).

**INTRODUCTION:**

Celiac disease (CD) is a chronic disease resulted from inflammatory T-cells response to the gluten-containing proteins in wheat (gliadin), barley (hordein), and rye (secalin), and they are collectively called gluten [1]. It is characterized by enteropathy, which is represented by histological adjustments of the small bowel of the mucosa, the presence of prototypical autoantibodies [2]. The expression of this disease can be immune-mediated, genetically predisposed, or due to environmental inflammatory reaction damages the small intestine's lining and prevents it causes malabsorption [3]. The intestinal damage often causes diarrhea, fatigue, weight loss, bloating, and anemia, and can lead to serious complications [4].

Though celiac disease is mostly lifelong, having a gluten-free diet makes it very treatable; the mucosa of the small intestine is remodeled to their normal status, and subsequent tests for celiac disease-specific autoantibodies become negative [5].

CD was first described by Aretaeus the Cappadocian who lived in the 2<sup>nd</sup> century AD [6]. He observed the distinctive stool and the chronicity of the condition and noticed that children are of the affected groups. Later in 1888, another physician called Samuel Gee described the clinical picture of childhood CD [7]. Furthermore, A Dutch pediatrician, Willem-Karel Dicke, discovered the interrelation between ingestion of gluten and CD symptoms was (1905-1962) [8].

CD is considered as a familial disorder; the first-degree relatives of patients with CD have an increased risk of 5-10% to develop the disorder [9]. Researchers usually use twin studies to evaluate the genetic and environmental components of the susceptibility of the disease. Monozygotic and dizygotic twin both share typical environmental elements but vary by taking part in 100% and 50% of genetic variability, respectively [10].

**Literature review**

According to the other previous study like, Celiac disease is more prevalent among at-risk individuals in Saudi Arabia. The objectives were to perform a meta-analysis for CD among risk populations in the Kingdom of Saudi Arabia (KSA), as well as a comparison with our previously reported meta-analysis in the normal population [11]. Another cross-sectional study aimed to assess the knowledge of CD among healthcare professionals in Riyadh, Saudi Arabia. The results found that knowledge regarding CD is poor among a significant number of physicians, including consultants, which can

potentially lead to delays in diagnosis. Educational programs need to be developed to improve awareness of CD in the health care profession [12]. These findings indicate that it is an important subject for reviews and re-statistics to assess the knowledge of physicians about CD and the prevalence of the disease among specific groups. Additionally, this may be an adequate reason to link between the lack of comprehensive scientific knowledge of CD and its direct proportional relation to the increasing number of cases (unknown and not registered scientifically), there are cases that have not yet been discovered.

Saadah et al. [13] conducted a retrospective study to estimate the prevalence of CD among children and adolescents with type 1 diabetes mellitus (T1DM) screened by anti-tissue transglutaminase (anti-tTG) antibodies from Western Saudi Arabia. The study found that CD with highly prevalent among these patients with T1DM; therefore, routine screening through proper serological testing is recommended.

**Rationale**

Statistical prevalence of the coeliac disease is still not fully known, perhaps because CD is unknown to many, even some doctors do not have comprehensive knowledge about the disease. This study will provide accurate statistics to assess the prevalence and complications of CD among a group of pediatric patients.

**Aim of the study**

This study aimed to determine the prevalence and complications of CD among children. It also aimed to determine which gender is more affected by CD, the most common complications, and to find out how diabetes is associated with celiac disease.

**Participants & Methodology****Study type and population**

This is a cross-sectional study that included only the pediatric population of in- and outpatients attending Ministry of Health hospitals in Saudi Arabia.

**Inclusion criteria**

- Pediatric population attending the clinic
- Parental consent
- Both genders

**Exclusion criteria**

- Non-cooperative or nonconsenting parents
- Recall bias
- Non-Saudi

**Data collection tool**

A predesigned self-administrated questionnaire was constructed by the researcher; validity was checked by the research team and consultants. The questionnaire covered the socio-demographic data (age, gender, nationality, and whether they have CD or not), the clinical data of the patients including their state, the possible complications of the disease (bone weakening, cancer, depression, lactose intolerance, malnutrition, and nervous system problems), and the diabetic patients.

**Ethical consideration:**

Institutional review board approval gained from MOH, Eastern province IRB.

Informed consent was taken before the respondents. All the information in the questionnaires were kept confidential. All the subjects participated voluntarily in the study. Written or verbal consent from all participants' parents was obtained.

**Data management and analysis plan:**

The filled up form was collected by the principal investigators, and data obtained with the questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. The Chi-Square test was used to test the distribution of categorical variables. Statistical significance was accepted at P value < 0.05.

**RESULTS:**

**Table (1)** shows the socio-demographic of 729 children and adolescents, the majority of them (31.7%) aged above ten years, 63.1% of them were females. Of these participants, 74.9% were Saudi, and 67.6% had celiac disease.

**Table (2)** assembled the clinical data of the participants (N=729). Of them, 84.9% were outpatients, and only 11.2% were diabetic. More than half of the population (54.7%) did not have any complications, while (27.8%) of them had malnutrition, 15.5% had bone weakening, 11.7% had nervous system problems, 6.6% had depression. 5.5% had lactose intolerance, and only 1% had cancer.

**Table (3)** indicated the association between age, sex, nationality, state, DM, and complications with CD. Age demonstrated a significant association with CD (P=0.000), as most of the affected patients were under two years (83.7%), followed by the patients who aged from 2-4 years with a percentage of (75.2%), the group above ten years counted (69.3%), then the ones aging from 5-7 years and 8-10 years with (60.1%) and (54.5%), respectively. State (P=0.000) and diabetes mellitus (P=0.000) also demonstrated a significant association with CD, as the outpatients constituted the majority of our sample (72.9%), and only (29.3%) were diabetic. There have been significant associations regarding the following complications; bone weakening (P=0.000), depression (P=0.003), lactose intolerance (P=0.000), malnutrition (P=0.000) and nervous system problems (P=0.000), and having no complications at all (P=0.000).

**Table (1): Socio-demographic data of the participants, KSA, 2020 (N=729).**

Parameter	Frequency	Percent
<b>Age</b>		
• Below two years	86	11.8%
• 2-4 years	133	18.2%
• 5-7 years	158	21.7%
• 8-10 years	121	16.6%
• Above ten years	231	31.7%
<b>Gender</b>		
• Male	269	36.9%
• Female	460	63.1%
<b>Nationality</b>		
• Saudi	546	74.9%
• Non-Saudi	183	25.1%
<b>Celiac disease</b>		
• Yes	236	32.4%
• No	493	67.6%

Table (2): Clinical data of participants (N=729).

Parameter	Frequency	Percent
<b>State</b>		
• Inpatient	110	15.1%
• Outpatient	619	84.9%
<b>Complications</b>		
• Bone weakening	113	15.5%
• Cancer	7	1.0%
• Depression	48	6.6%
• Lactose intolerance	40	5.5%
• Malnutrition	203	27.8%
• Nervous system problems	85	11.7%
• None of the above.	399	54.7%
<b>Diabetes Mellitus</b>		
• Yes	82	11.2%
• No	647	88.8%

Table (3): Association between age, sex, nationality, state, DM, and complications with CD (N=729).

Parameter	Celiac disease		P-value*
	Yes	No	
Age	• Below 2 years	83.7%	0.000
	• 2-4 years	75.2%	
	• 5-7 years	60.1%	
	• 8-10 years	54.5%	
	• Above 10 years	69.3%	
Sex	• Male	69.1%	0.503
	• Female	66.7%	
Nationality	• Saudi	69.1%	0.254
	• Non-Saudi	71.0%	
State	• Inpatient	38.2%	0.000
	• Outpatient	72.9%	
Diabetes mellitus	• Yes	29.3%	0.000
	• No	72.5%	
Complications	• Bone weakening	38.1%	0.000
	• Cancer	57.1%	0.551
	• Depression	47.9%	0.003
	• Lactose intolerance	12.5%	0.000
	• Malnutrition	36.0%	0.000
	• Nervous system problems	36.5%	0.000
	• None of the above.	87.0%	0.000

\*P-value is calculated by Chi-Square Test  
P-value <0.05 is statistically significant

**DISCUSSION:**

CD was considered to be an infrequent mal-absorptive disease of early childhood and adolescents; however, recent studies have focused on the prevalence of this disease in this specific group of patients. Studies from Arab countries have revealed a ranking trend regarding CD [14, 15, 16], but there is limited data on the complications and clinical features of the disease. Our cross-sectional study showed (32.4%) prevalence of CD among children and (11.2%) prevalence of DM.

Another large cross-sectional, prospective, population-based study among Saudi school students in Riyadh, they screened 7930 students and reported a prevalence of CD among the school-aged children of (1.5%) [17]. This estimated prevalence by Al-Hussaini *et al.* [18] is two times the prevalence in North America and Europe [19]. A study was conducted among 123 patients with T1DM attending the pediatric diabetic clinic at King Faisal Specialist Hospital and Research Centre, Riyadh, KSA, and reported a maximum and minimum CD prevalence of (8.1%) and (4.9%), respectively [20].

In our study, we demonstrated a significant association between age and CD with ( $P=0.000$ ), as it is noteworthy that the most affected age group was below two years (83.7%), while the older patients were less frequent. There is also a significant association between bone-weakening as a complication and CD ( $P=0.000$ ) with a frequency of (38.1%). A retrospective, hospital-based study in Riyadh, and they recorded an 8.7% prevalence of CD in their population, with 65.2% of patients with bone pain and ache [17]. Another Saudi study reported a CD prevalence of (6.17%), 67.2% had bone pain and ache, 18.97% had skeletal deformities, and 6.9% had fractures [21].

Our findings also reported significant associations with CD regarding the following complications; depression ( $P=0.003$ ), malnutrition ( $P=0.000$ ), lactose intolerance ( $P=0.000$ ), and nervous system problems ( $P=0.000$ ). There is also a significant relationship between the patients who had no complications at all and CD ( $P=0.000$ ), as the total population (87%) did not suffer any complications.

A cross-sectional study included 264 subjects with age range (5-14 years) and assessed the health-related quality of life among patients with CD. The study reported a mean score for the emotional well-being, social functioning, and physical functioning of ( $57.8\pm 20.3$ ), ( $67.95\pm 23.1$ ) and ( $69.36\pm 35.23$ ), respectively [22]. Assiri *et al.* [12] conducted a cross-

sectional study to evaluate the knowledge of CD among healthcare providers in Riyadh, KSA, and found that there is a low level of knowledge regarding CD among a significant number of physicians, including consultants, that can affect the diagnosis of cases or delay it. Therefore, educational programs are necessary to reinforce the awareness of health care workers about the CD.

**CONCLUSION:**

Concerning CD among children, we found a relatively low prevalence of the disease. We also observed that young children are at higher risk than others. It was clear from the findings that the majority of our population did not suffer any complications. Furthermore, malnutrition and bone weakening constituted the most frequent complications among the patients. Altogether, we noticed a lack of Saudi studies that discuss the complications of CD among children.

**REFERENCES:**

- Schuppan, D., & Zimmer, K. P. (2013). The diagnosis and treatment of celiac disease. *Deutsches Ärzteblatt International*, 110(49), 835.
- Felber, J., Aust, D., Baas, S., Bischoff, S., Bläker, H., Daum, S., ... & Roeb, E. (2014). Results of a S2k-Consensus Conference of the German Society of Gastroenterology, Digestive- and Metabolic Diseases (DGVS) in conjunction with the German Coeliac Society (DZG) regarding coeliac disease, wheat allergy and wheat sensitivity. *Zeitschrift für Gastroenterologie*, 52(7), 711-743.
- Mearin, M. L. (2007). Celiac disease among children and adolescents. *Current problems in pediatric and adolescent health care*, 37(3), 86-105.
- Husby, S., Koletzko, S., Korponay-Szabó, I. R., Mearin, M. L., Phillips, A., Shamir, R., ... & Lelgeman, M. (2012). European Society for Pediatric Gastroenterology, Hepatology, and Nutrition guidelines for the diagnosis of coeliac disease. *Journal of pediatric gastroenterology and nutrition*, 54(1), 136-160.
- Mayo Clinic. (2019). Celiac disease - Symptoms and causes. [online] Available at: <https://www.mayoclinic.org/diseases-conditions/celiac-disease/symptoms-causes/syc-20352220> [Accessed 1 Nov. 2020].
- Adams F. The extant works of Aretaeus the Cappadocian. London: London Sydenham Society; 1856. p. 350
- Gee, S. (1888). On the coeliac affliction. *St Barth. Hosp. Rep.*, 24, 17-20.

8. van Berge-Henegouwen, G. P., & Mulder, C. J. (1993). Pioneer in the gluten free diet: Willem-Karel Dicke 1905-1962, over 50 years of gluten free diet. *Gut*, 34(11), 1473.
9. Babron, M. C., Nilsson, S., Adamovic, S., Naluai, A. T., Wahlström, J., Ascher, H., ... & Clerget-Darpoux, F. (2003). Meta and pooled analysis of European coeliac disease data. *European journal of human genetics*, 11(11), 828-834.
10. van Heel DA, Hunt K, Greco L, Wijmenga C. Genetics in coeliac disease. *Best Pract Res Clin Gastroenterol* 2005;19:323-39.
11. Safi, M. A. A. (2019). Celiac disease among at-risk individuals in Saudi Arabia. *Saudi Medical Journal*, 40(1), 9.
12. Assiri, A. M., Saeed, A., Saeed, E., El-Mouzan, M. I., Alsarkhy, A. A., Al-Turaiki, M., ... & Ullah, A. (2015). Assessment of knowledge of celiac disease among health care professionals. *Saudi Medical Journal*, 36(6), 751.
13. Saadah, O. I., Al-Agha, A. E., Al Nahdi, H. M., Bokhary, R. Y., Bin Talib, Y. Y., Al-Mughales, J. A., & Al Bokhari, S. M. (2012). Prevalence of celiac disease in children with type 1 diabetes mellitus screened by anti-tissue transglutaminase antibody from Western Saudi Arabia. *Saudi Med J*, 33(5), 541-546.
14. Aljebreen, A. M., Almadi, M. A., Alhammad, A., & Al Faleh, F. Z. (2013). Seroprevalence of celiac disease among healthy adolescents in Saudi Arabia. *World Journal of Gastroenterology: WJG*, 19(15), 2374.
15. Al Attas, R. A. (2002). How common is celiac disease in Eastern Saudi Arabia?. *Annals of Saudi Medicine*, 22(5-6), 315-319.
16. Abu-Zekry, M., Kryszak, D., Diab, M., Catassi, C., & Fasano, A. (2008). Prevalence of celiac disease in Egyptian children disputes the east-west agriculture-dependent spread of the disease. *Journal of pediatric gastroenterology and nutrition*, 47(2), 136-140.
17. Al-Hussaini, A., Troncone, R., Khormi, M., AlTuraiki, M., Alkhamis, W., Alrajhi, M., ... & Elchentoufi, A. (2017). Mass screening for celiac disease among school-aged children: Toward exploring celiac iceberg in Saudi Arabia. *Journal of pediatric gastroenterology and nutrition*, 65(6), 646-651.
18. Catassi, C., Gatti, S., & Fasano, A. (2014). The new epidemiology of celiac disease. *Journal of pediatric gastroenterology and nutrition*, 59, S7-S9.
19. Al-Ashwal, A. A., Shabib, S. M., Sakati, N. A., & Attia, N. A. (2003). Prevalence and characteristics of celiac disease in type 1 diabetes mellitus in Saudi Arabia. *Saudi medical journal*, 24(10), 1113-1115.
20. Al-Jurayyan, N. A., Al Jurayyan, A. N., Al Jurayyan, R. N., Al Jurayyan, A. N., & Al Issa, S. D. (2015). ADOLESCENT OSTEOMALACIA IN SAUDI ARABIA: A HOSPITAL-BASED STUDY. *European Journal of Biotechnology and Genetic Engineering Vol*, 2(1).
21. Al Jurayyan, N. A., Mohamed, S., Al Issa, S. D., & Al Jurayyan, A. N. (2012). Rickets and osteomalacia in Saudi children and adolescents attending endocrine clinic, Riyadh, Saudi Arabia. *Sudanese journal of paediatrics*, 12(1), 56.
22. Al-Qefari, S. N., Al-Twijri, A. W., Al-Adhadh, A. M., Al-Rashed, O. A., & Al-Jarallah, B. (2018). Health-related quality of life among patients with celiac disease in Saudi Arabia. *Annals of Medical and Health Sciences Research*.

#### **Ethical consideration:**

- Individual consent from participants (written on the front page of the questionnaire).
- All information will be kept confidential.