

Demographics, serology and vitamin D status in Jordanians with coeliac disease

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ABSTRACT

Background: Coeliac disease (CD) is an immune-mediated enteropathy that causes intestinal villous atrophy and malabsorption. One of the malabsorbed micronutrients is vitamin D.

Objective: This retrospective study analysed epidemiological aspects of Jordanian CD patients, their serum vitamin D levels and anti-tissue transglutaminase (tTG) IgA and IgG antibody levels at King Hussein Medical Centre.

Methods: In this retrospective analysis we identified 116 biopsy-proven CD patients between 2016 and 2019. The computerized patient record system was the referral source for the following clinical and laboratory parameters: age, gender, presenting symptoms, serum 25-hydroxyvitamin D3 level and anti-tTG IgA and IgG antibody levels. Data were analysed with SPSS version 26 software for statistical significance using the Mann-Whitney U test; a p value of < 0.05 was considered to be significant.

Results: 116 CD patients showed female predominance, with a female/male ratio of 1.8:1, and an age range of 3–78 years. Seventeen patients (15%) were asymptomatic. Positive serum tTG IgA or IgG antibodies, or both, were found in 81 patients (69.8%). Sixty patients (51.73%) were vitamin D deficient, 41 (35.33%) were insufficient and 15 (12.93%) had sufficient levels. No correlation was found between any parameters apart from a positive correlation between tTG IgA and IgG antibodies ($p = 0.009$).

Conclusion: Vitamin D deficiency is common in CD patients and should be ruled out regardless of age, presenting symptoms or anti-tTG antibody status.

Keywords: coeliac disease; vitamin D deficiency.

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Introduction

Coeliac disease (CD) is a multifactorial systemic inflammatory disorder characterized by an abnormal immune response elicited by dietary gluten and has an approximate global prevalence rate of 1% (1).

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The clinical picture includes an array of gastrointestinal and non-gastrointestinal symptoms, short stature, decreased bone density, dermatitis herpetiformis, dental problems, iron-deficiency anaemia and hepatitis (2). Gluten is a group of storage proteins that can be found in wheat, rye and barley, among other grains (3). It is mainly composed of gliadin and glutenin subunits, which, due to their resistance to gastric and pancreatic enzymes, reach the proximal small intestine partially indigested, where tissue transglutaminase (tTG) catalyses their deamination; they are then linked to HLA-DQ2 or DQ8 molecules, increasing their immunogenicity and subsequent activation of helper T cells (4). Due to mucosal injury, nutrient malabsorption occurs with an ensuing deficiency of the fat-soluble vitamins A, D, E and K (5).

This study analysed 116 CD patients and compared their serum levels of vitamin D and anti-tTG antibodies.

MATERIALS AND METHODS

We acquired the approval of the ethics committee of the Royal Medical Services, Amman, Jordan. This retrospective study was conducted on 116 CD patients identified using our laboratory database during the time period between 2016 and 2019. We referred to electronic medical records to acquire the following data: age, gender, presenting symptoms, serum 25-hydroxyvitamin D3 (25(OH)D3) level using Cobas e411 analyser and tTG IgA and IgG antibody levels using ELISA technique.

Anti-tTG IgA and IgG antibody assays were considered positive at values of > 10 and > 9 U/ml, respectively. Subjects were divided into three groups according to their serum 25(OH)D3 levels: vitamin D deficient [25(OH)D3 < 20 ng/ml], insufficient [25(OH)D3 20–30 ng/ml] and sufficient [25(OH)D3 >30 ng/ml].

Statistical analysis

Management and statistical analysis of the data was performed using SPSS version 26 software (SPSS Inc., Chicago, IL, USA) and the Microsoft Excel 2007 program. Descriptive data were reported as percentages of the total number of identified CD patients. Means and standard deviations (SD) were calculated and a *p* value below 0.05 was considered to be statistically significant. Non-parametric analysis using the Mann-Whitney U test was carried out on two independent groups based on gender.

RESULTS

A total of 116 confirmed CD patients were included in the study. Their ages ranged between 3 and 78 years, with a mean (SD) of 22.7 (17.8) years. The age data showed positive skewness, as ages below 20 years were more frequent. Gender distribution showed female predominance, with 74 (64%) females and 42 (36%) males. The majority (85%) were symptomatic, as opposed to 17 asymptomatic patients who underwent investigation due to strong positive family history.

Eighty-one patients (69.8%) had positive serum tTG IgA and/or IgG antibodies. Sixty patients (51.7%) were vitamin D deficient, 41 (35.3%) were insufficient and 15 (12.9%) had sufficient vitamin D levels. **Tables I and II.**

All nine patients (100%) who presented with short stature had a deficient or insufficient 25(OH)D3 level. Data for serum 25(OH)D3 and anti-tTG IgA and IgG levels were not normally distributed. Correlation analysis found no significant correlation between age, gender, vitamin D or tTG antibody level, with $p > 0.05$. Only one significant positive correlation was found between tTG IgA and IgG antibodies, with a p value of 0.009.

Table I: The frequency of demographic and serologic parameters among CD patients.

Variable	Categories	Frequency	Percent (%)
Gender	Male	42	36.2
	Female	74	63.8
Vitamin D level*	Deficient	60	51.7
	Insufficient	41	35.3
	Sufficient	15	12.9
Anti tTg antibodies**	Positive	81	69.8
	Negative	35	30.2
Symptoms	Symptomatic	99	85.3
	Asymptomatic	17	14.7

* Vitamin D deficient [25(OH)D3 < 20 ng/ml], insufficient [25(OH)D3 20–30 ng/ml] and sufficient [25(OH)D3 >30 ng/ml].

** Positive at values of > 10 U/ml and > 9 U/ml for IgA and IgG, respectively.

Table II: Clinical manifestations in celiac disease, in percent

	Children/adolescent (%)	Adults (%)
Chronic diarrhea	55	45
Abdominal pain	30	20
Anemia	14	52
Short stature	16.6	-
Failure to thrive	25	35*
Hypoalbuminemia**	25.5	36
Asymptomatic	7.4	22

*Weight loss.

** Albumin less than 2.5g/dl.

DISCUSSION

CD is a common enteropathy and Nusier et al. estimated the serological prevalence to be 1:124 in Jordanian schoolchildren (7). A study conducted by Rawashdeh et al. (8) confirmed to the well-known female preponderance in CD, similar to our results, whereas Al Tamimi (9) found a slight male preponderance in CD children in south Jordan.

A conditional recommendation by the American College of Gastroenterology was to assess micronutrient levels in CD patients, including vitamin D (10). Malabsorption of vitamin D and decreased bone density are seen in two-thirds of CD patients: between 9% and 72%, depending on the population and compliance to diet (11,12). A review by Di Nardo et al. showed an increased risk of inadequate vitamin D consumption in CD children, regardless of diet restriction (13). Our current study found 25(OH)D₃ < 30 ng/ml in 87% of patients with CD.

Anti tTG antibodies and clinical symptoms absent in CD patients as in 30% and 15% of patients, respectively. This emphasizes the importance of family screening and the diagnostic role of duodenal biopsy.

In comparison with the general population of Jordan, Khasawneh et al. calculated a slightly lower rate (68%) of insufficient and deficient vitamin D levels, whereas Batieha et al. found a much lower rate of 37.3% in females and 5.1% in males (14,15). We did not find a significant difference based on gender. An interesting finding, however, was that all of the patients who presented with short stature had low vitamin D levels.

With regard to age, Lerner et al. suggested a negative correlation with vitamin D serum levels in CD patients (16). In the present study, however, no relation was found between vitamin D level and age. Furthermore, no relation was found with anti-tTG antibody levels.

Further prospective analyses to determine the effect of diet compliance on vitamin D level, antibody status as well as other mal-absorption related parameters are needed.

Unfortunately, one of the limitations of this analysis was that no control group was included

CONCLUSION

Vitamin D deficiency and insufficiency are common in CD patients, with no relation to age, gender or tTG antibody levels.

Abbreviations

CD	coeliac disease
25(OH)D3	25-hydroxyvitamin D3
tTG	tissue transglutaminase

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