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## Frequency Rate of Celiac Disease in Sudanese Patients presenting with Chronic Diarrhea

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### Abstract

**Background:** Chronic diarrhea is one of the major presenting features of celiac disease (CD). It is an autoimmune gastrointestinal disease caused by intolerance to gluten and dietary proteins present in wheat, rye, and barley. The disease usually manifests in childhood, and symptoms include diarrhea, abdominal pain, and failure to thrive. Symptoms in adulthood include anemia, fatigue, weight loss diarrhea, constipation, and neurological symptoms.

**Objective:** To determine the frequency rate of celiac disease in Sudanese patients presenting with chronic diarrhea.

**Materials and methods:** This was a descriptive cross-sectional study. A total of 54 consecutive patients with chronic diarrhea attending Al Rayan Specialized Laboratory and National Public Health Laboratory for laboratory investigations. Using the enzyme-linked immuno-sorbent assay (ELISA), the serological detection of anti-tissue transglutaminase antibody (AESKU tTG-IgA) and deaminated gliadin peptides (GliadinDP) IgA and IgG (AESKU, Germany) were performed for all patients at the Department of Clinical Immunology and Allergy of the National Public Health Laboratory, Khartoum, Sudan.

**Results:** A total of 54 patients (30 males and 24 females) were included in this study. Patients were suffering from chronic diarrhea for 4 weeks or more. 14 patients (25.9%) were diagnosed as celiac disease (7 males and 7 females); and all under 30 years of age.

**Conclusion:** Children were more susceptible to celiac disease; and frequency rate of celiac disease was higher among females than among males.

**Key words:** Chronic diarrhea, Celiac disease, ELISA, Sudanese patients.

### Introduction

CD can result in bowel symptoms and deficiencies of vitamins, minerals and other nutrients. Celiac disease is successfully treated by abstaining from all types of foods containing gluten in diet, i.e. a gluten-free diet. Such a gluten-free diet may lead to improvement of symptoms and restoration of good health<sup>1</sup>

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CD is a common immune-mediated enteropathy due to allergy to gluten, with a prevalence of approximately 1% worldwide. The causal relation between consumption of bread and cereals and relapsing diarrhea was first recognized by the Dutch pediatrician William K. Dicke. A similar association was observed during the Second World War when chronic diarrhea patients improved during periods of food shortage in the form of bread was replaced by unconventional, non-cereal containing foods. Cereals implicated in this disease were wheat, barley, rye, and oats<sup>2</sup> High-risk associations that prompts testing for celiac disease are: family history of celiac disease (10-20%), autoimmune thyroid disease, type I diabetes, other autoimmune diseases (Addison's disease, Sjogren's syndrome, autoimmune liver disease, dermatitis herpetiformis, Immunoglobulin A deficiency, Down's syndrome, and Turner syndrome. Chronic diarrhea is one of the major presenting features of celiac disease. Chronic diarrheas due to celiac disease remain misdiagnosed as gastroenteritis. Celiac disease is associated with intestinal lymphoma and gastrointestinal carcinoma. CD is difficult to diagnose because it has no specific symptoms, and affects different age groups. CD can be a cause of death as result of electrolyte disturbance leading to hypokalemia, hypocalcemia, and dehydration syndrome<sup>3</sup>. This study aimed to determine the frequency rate of celiac disease in Sudanese patients with chronic diarrhea by detecting anti-IgA and confirm the negative result of TTG due to IgA deficiency by D gp (IgA, IgG) test.

## Materials and methods

This was a descriptive cross-sectional study, conducted during the period from April to June 2018. The study was in accordance with the ethical standards for human experimentation and approved by the Ethics Committee of University of Khartoum. All clinical and epidemiological data including age, gender, and presenting complaints were collected using a structural questionnaire.

SPSS software (v. 11.5) was used for statistical analysis of the data and descriptive statistics were reported. Quantitative variables were expressed as the mean  $\pm$  the standard deviation (SD), and comparisons performed using the two-sample t test. Statistical significance was set when  $p < 0.05$ . Ethical approval for this study was A total of 54 consecutive patients with chronic diarrhea attending Al Rayan Specialized Laboratory and National Public Health Laboratory. SPSS software (v. 11.5) was used for statistical analysis of the data and descriptive statistics were reported. Quantitative variables were expressed as the mean  $\pm$  the standard deviation (SD), and comparisons performed using the two-sample t test. Statistical significance was set when  $p < 0.05$ . Ethical approval for this study was 3 ml venous blood were collected from each patient. Samples were centrifuged and the serum was separated, and immediately stored at  $-20^{\circ}\text{C}$  till analyzed in Germany, using ELISA technique. Serological detection of anti-tissue transglutaminase antibody (AESKU tTG-IgA) and deaminated gliadin peptides (GliadinDP) IgA and IgG (AESKU, Germany) were performed for all patients in the Department of Clinical Immunology and Allergy at the National Public Health Laboratory (Khartoum, Sudan). The assays were carried out as per manufacturer's instructions. Results were considered negative when tTGA levels were  $< 12$  U/ml, equivocal between 12 to 18 U/ml and positive  $> 18$  U/ml.

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Deaminated gliadin peptide DGP-IgA and (DGP-IgG) were considered negative when levels were <16 U/ml, equivocal between 16-24 U/ml and positively >24 U/ml.

The newest generation of POC test is based on a combination of DGP and tTG together and has a reported sensitivity of 93.1% and specificity of 95%. A combination of immunoassays is particularly useful as an addition to detect patients with CD who are IgA deficient, however IgG-DGP was able to detect a small number of IgA-sufficient patients who are sero-negative for IgA-tTG<sup>4</sup>.

## Results

A total of 54 patients (30 males and 24 females) were included in this study. Patients were suffering from chronic diarrhea for 4 weeks or more. 14 patients (25.9%) were diagnosed as celiac disease (7 males and 7 females); and all were under 30 years of age.

The commonest presenting symptoms in these patients were anemia, abdominal tenderness, constipation, and weight loss (Table 1).

Table (1): Frequency rates of patients investigated according to symptomatology, gender, and positive celiac disease patients

Parameters	Frequency	Percent
Aneamia	27	50%
Abdominal tenderness	19	35.7%
Constipation	12	19.3%
Weight loss	8	7.7%
Males	30	16.2%
Females	24	12.9%
Positive celiac disease patients	14	25.9%

## Discussion

Until the 1990s the presence of celiac disease in Sudan was considered infrequent. However, with the introduction of assays for anti-tissue transglutaminase antibodies (ATTGA) and antigliadin antibodies (AGA), CD became more readily detected and reported in Sudan. Celiac disease (gluten-sensitive enteropathy), is sometimes called sprue. It is an immune reaction eating the gluten protein found in wheat, barley and rye. The eaten gluten triggers an immune response in the small intestine<sup>5</sup>.

In this study, the frequency rate of CD among chronic diarrhea patients was assayed. 14 patients (25.9%) out of 54 patients were found positive by Ttg-IgA and DGP (IgA & IgG ). The findings of the study were high when comparing with the study conducted in Egypt where 16 patients (14.2%) out of 113 patients with CD and positive IgA antitTG, histopathology, and response to gluten free diet<sup>6</sup>.

Also, in the study conducted by Rajasthan<sup>7</sup>, 100 chronic diarrhea cases were selected, and the

prevalence rate of celiac disease was around 10%.

The findings of the present context were approximately similar to an Indian study conducted among 137 children with chronic diarrhea, and celiac disease was accounting for 26%<sup>8</sup>. Furthermore, all patients of this study were suffering from chronic diarrhea, anemia (50%), abdominal tenderness (35.7%), constipation (21.4%), and weight loss (14.2%). These findings were in agreement with the findings reported from Red Sea State (Sudan) where the commonest presenting symptom was chronic diarrhea (20.3%). Males and females were nearly equally affected. All age groups were affected with a peak incidence between 5 to 10 years<sup>6</sup>.

On the other hand, the findings of this study was in agreement with the findings of a study conducted in India where the most common presentation was diarrhea (80.7%), followed by anemia (63.2%).

From this study, it may be recommended that more studies on large number of patients are needed to confirm the findings of the present study.

Conclusion: Children were more susceptible to celiac disease; and frequency rate of celiac disease was higher among females than among males.

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