

## Prevalence of Celiac Disease Among Adults Presenting with Dyspepsia in Tobruk, Libya: A Prospective Cross-Sectional Study

Huda A.M. Aqmati<sup>1</sup>, Abdullah A.A. Altayil<sup>2</sup>, Eman Y A Abdalsameh<sup>3</sup>

<sup>1</sup> Department of Paediatrics, Faculty of Medicine, Tobruk University, Tobruk, Libya

<sup>2</sup> Department of Medicine, Faculty of Medicine, Tobruk University, Tobruk, Libya

<sup>3</sup> Department of Radiology, Faculty of Medical Technology, Tobruk University, Tobruk, Libya

\*Corresponding Author: Abdullah A.A.A. Altayil

Department of Medicine, Faculty of Medicine, Tobruk University, Tobruk, Libya

E-mail: [abdullah.altail@tu.edu.ly](mailto:abdullah.altail@tu.edu.ly)

Submitted: 17 May 2026 Accepted: 14 July 2026 Published: 18 July 2026

### ABSTRACT

**Background:** Celiac disease (CD) is a chronic immune-mediated enteropathy triggered by gluten ingestion. Although classically associated with malabsorption, CD may present with atypical gastrointestinal symptoms, including dyspepsia, which may delay diagnosis. This study aimed to determine the prevalence of CD among patients presenting with uninvestigated dyspepsia and to describe their clinical, serological, endoscopic, and histopathological characteristics. **Methods:** A prospective cross-sectional study was conducted at the Gastroenterology Unit of Tobruk Medical Centre, Libya, between February and October 2024. Patients presenting with uninvestigated dyspepsia underwent clinical assessment, complete blood count, anti-tissue transglutaminase immunoglobulin A (anti-tTG IgA) testing, upper gastrointestinal endoscopy, and duodenal biopsy. Histopathological findings were classified according to the Marsh classification. **Results:** Eighty patients were included (mean age  $34.7 \pm 11.4$  years; 51.2% male). The most common symptoms were abdominal bloating (58.8%), diarrhoea (37.5%), constipation (36.3%), weight loss (33.7%), and vomiting (31.3%). Anti-tTG IgA was positive in 11 patients (13.8%), and endoscopic findings suggestive of duodenal villous atrophy were identified in 29 (36.3%). Histopathological examination confirmed CD in seven patients, corresponding to a prevalence of 8.8%. All confirmed cases had positive anti-tTG IgA serology and endoscopic findings suggestive of villous atrophy. Anti-tTG IgA demonstrated 100% sensitivity, 94.5% specificity, and 95.0% diagnostic accuracy. **Conclusion:** Histologically confirmed CD was identified in 8.8% of patients presenting with uninvestigated dyspepsia. These findings support considering CD in the differential diagnosis of unexplained dyspeptic symptoms. Serological testing followed by histopathological confirmation remains important for establishing the diagnosis. Larger multicentre studies are required to confirm these findings

**Keywords:** Celiac disease; Dyspepsia; Anti-tissue transglutaminase antibodies; Duodenal biopsy

## Introduction

Celiac disease (CD) is a chronic immune-mediated enteropathy triggered by dietary gluten in genetically susceptible individuals. It is characterised by chronic inflammation of the small intestinal mucosa, resulting in villous atrophy, crypt hyperplasia, and impaired nutrient absorption. Once considered an uncommon childhood disorder, CD is now recognised as a common systemic disease affecting approximately 1% of the global population, although many cases remain undiagnosed because of its diverse clinical presentation.<sup>1-4</sup>

Traditionally, CD has been associated with classical gastrointestinal manifestations, including chronic diarrhoea, steatorrhoea, weight loss, and malabsorption. However, increasing evidence indicates that many adults present with non-classical gastrointestinal symptoms or extra-intestinal manifestations, including dyspepsia, iron deficiency anaemia, osteoporosis, infertility, neurological disorders, and abnormal liver function tests.<sup>2, 3, 5</sup> Consequently, delayed diagnosis remains common and may increase the risk of long-term complications, including nutritional deficiencies, osteoporosis, and intestinal lymphoma.<sup>2, 3</sup>

Dyspepsia is one of the most common gastrointestinal syndromes encountered in clinical practice and is defined by the Rome IV criteria as one or more of the following symptoms: epigastric pain, epigastric burning, early satiety, or postprandial fullness.<sup>6</sup> Functional dyspepsia accounts for most cases; however, organic disorders, including CD, should be considered during diagnostic evaluation where clinically appropriate.<sup>6, 7</sup>

Several studies have investigated the prevalence of CD among adults presenting with dyspepsia; however, reported estimates vary considerably across different populations. While some studies have demonstrated a prevalence similar to that of the general population, others have reported substantially higher prevalence rates, suggesting that dyspepsia may represent a non-classical presentation of CD.<sup>4, 8-10</sup> These differences are likely to reflect variations in genetic susceptibility, dietary gluten exposure, environmental factors, healthcare systems, referral pathways, diagnostic criteria, and study design.<sup>4</sup>

Published data describing the prevalence of CD among adults presenting with dyspepsia in Libya remain scarce. Establishing local epidemiological evidence is important for improving disease recognition, informing clinical decision-making, and guiding appropriate diagnostic strategies in routine gastroenterology practice. Therefore, this prospective cross-sectional study aimed to determine the prevalence of histologically confirmed celiac disease among adults presenting with uninvestigated dyspepsia at Tobruk Medical Centre, Libya.



## **MATERIALS AND METHODS**

### **Study design and setting**

A prospective cross-sectional study was conducted at the Gastroenterology Unit, Tobruk Medical Centre, Tobruk, Libya. All eligible patients presenting with uninvestigated dyspepsia between February and October 2024 were included to determine the prevalence of celiac disease (CD) in this population.

### **Study population**

Patients aged  $\geq 16$  years presenting with uninvestigated dyspepsia were eligible for inclusion. Dyspepsia was defined as the presence of one or more of the following symptoms: epigastric pain or discomfort, epigastric burning, early satiety, or postprandial fullness.

Patients with a previous diagnosis of CD, lactose intolerance, other recognised malabsorption syndromes, or incomplete clinical data were excluded.

### **Clinical and laboratory assessment**

All participants underwent a detailed medical history and physical examination. Clinical symptoms, including abdominal bloating, diarrhoea, constipation, vomiting, and weight loss, were recorded. Laboratory investigations included complete blood count and serum anti-tissue transglutaminase immunoglobulin A (anti-tTG IgA) measurement.

### **Endoscopic and histopathological assessment**

All participants underwent upper gastrointestinal endoscopy. Multiple biopsy specimens were obtained from the second part of the duodenum and examined using standard histopathological techniques. Histological diagnosis was based on the Marsh–Oberhuber classification. Endoscopic findings suggestive of CD included scalloping of duodenal folds, a mosaic mucosal pattern, and features consistent with villous atrophy.

### **Statistical analysis**

Data were analysed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarised as frequencies and percentages, and continuous variables as mean  $\pm$  standard deviation or median (interquartile range), as appropriate. Diagnostic performance was assessed using sensitivity, specificity, positive predictive value, negative predictive value, and accuracy. A two-sided  $p$  value  $< 0.05$  was considered statistically significant.

### **Ethical approval**

The study was approved by the Research Ethics Committee of Tobruk University (Approval No. NBC:009. H.26.17). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

## Results

### Baseline characteristics

A total of 80 adults presenting with uninvestigated dyspepsia were included in the study. The mean age was  $34.67 \pm 11.44$  years (range, 16–60 years), and 41 patients (51.2%) were male.

Abdominal bloating was the most frequently reported symptom (47 patients, 58.8%), followed by diarrhea (30, 37.5%), constipation (29, 36.3%), weight loss (27, 33.7%), and vomiting (25, 31.3%).

The mean hemoglobin concentration was  $12.09 \pm 1.96$  g/dL, and the mean platelet count was  $377.81 \pm 131.89 \times 10^3/\text{mm}^3$ . The median white blood cell count was  $10.0 \times 10^3/\text{mm}^3$  (IQR, 6.6–13.93), while the median ALT and AST concentrations were 27 U/L (IQR, 13–38) and 23 U/L (IQR, 17–36), respectively.

Baseline demographic, clinical, and laboratory characteristics are summarized in **Table 1**.

### Serological, endoscopic and histopathological findings

Anti-tissue transglutaminase immunoglobulin A (anti-tTG IgA) antibodies were positive in 11 patients (13.8%). Upper gastrointestinal endoscopy demonstrated findings suggestive of duodenal villous atrophy in 29 patients (36.3%).

Histopathological examination confirmed celiac disease in seven patients, corresponding to a prevalence of 8.8%.

All patients with histologically confirmed celiac disease had positive anti-tTG IgA serology and endoscopic findings suggestive of villous atrophy.

Among the seven patients with confirmed celiac disease, five (71.4%) were female and two (28.6%) were male. Ages ranged from 17 to 55 years. Abdominal bloating was the most common presenting symptom (6/7, 85.7%), followed by diarrhoea (3/7, 42.9%), constipation (2/7, 28.6%), vomiting (1/7, 14.3%), and weight loss (1/7, 14.3%).

### Diagnostic performance

Using histopathological examination as the reference standard, anti-tTG IgA demonstrated a sensitivity of 100%, specificity of 94.5%, positive predictive value of 63.6%, negative predictive value of 100%, and an overall diagnostic accuracy of 95.0%.

Endoscopic findings suggestive of villous atrophy also demonstrated a sensitivity of 100%, specificity of 69.9%, positive predictive value of 24.1%, negative predictive value of 100%, and an overall diagnostic accuracy of 72.5%.

The diagnostic performance of anti-tTG IgA and endoscopic findings is presented in **Table 2**.

**Table 1. Baseline demographic, clinical, and laboratory characteristics of the study population (N = 80)**

| Characteristic                                                     | Value               |
|--------------------------------------------------------------------|---------------------|
| Age (years), mean $\pm$ SD                                         | 34.67 $\pm$ 11.44   |
| Male, n (%)                                                        | 41 (51.2)           |
| Female, n (%)                                                      | 39 (48.8)           |
| <b>Presenting symptoms, n (%)</b>                                  |                     |
| Abdominal bloating                                                 | 47 (58.8)           |
| Diarrhoea                                                          | 30 (37.5)           |
| Constipation                                                       | 29 (36.3)           |
| Weight loss                                                        | 27 (33.7)           |
| Vomiting                                                           | 25 (31.3)           |
| Haemoglobin (g/dL), mean $\pm$ SD                                  | 12.09 $\pm$ 1.96    |
| Platelet count ( $\times 10^3/\text{mm}^3$ ), mean $\pm$ SD        | 377.81 $\pm$ 131.89 |
| White blood cell count ( $\times 10^3/\text{mm}^3$ ), median (IQR) | 10.0 (6.6–13.93)    |
| ALT (U/L), median (IQR)                                            | 27 (13–38)          |
| AST (U/L), median (IQR)                                            | 23 (17–36)          |

Data are presented as mean  $\pm$  standard deviation (SD), median (interquartile range [IQR]), or number (%).

**Table 2. Diagnostic performance of anti-tTG IgA and endoscopic findings for histologically confirmed celiac disease**

| Diagnostic test                                   | Sensitivity (%) | Specificity (%) | PPV (%) | NPV (%) | Accuracy (%) |
|---------------------------------------------------|-----------------|-----------------|---------|---------|--------------|
| Anti-tTG IgA                                      | 100.0           | 94.5            | 63.6    | 100.0   | 95.0         |
| Endoscopic findings suggestive of villous atrophy | 100.0           | 69.9            | 24.1    | 100.0   | 72.5         |

PPV, positive predictive value; NPV, negative predictive value.

## Discussion:

This prospective cross-sectional study investigated the prevalence of celiac disease (CD) among adults presenting with uninvestigated dyspepsia at Tobruk Medical Centre, Libya. Histopathological examination confirmed CD in 8.8% of the study population, indicating that a clinically relevant proportion of adults with dyspeptic symptoms had previously unrecognised disease. Although this was a single-centre study with a relatively small sample size, the findings support considering CD in the differential diagnosis of patients presenting with persistent or unexplained dyspepsia, particularly in populations where local epidemiological data are limited.<sup>1-5</sup>

The prevalence observed in the present study is considerably higher than that reported in the general population, where CD affects approximately 1% of individuals worldwide, but is comparable with studies reporting an increased prevalence among patients undergoing investigation for dyspepsia.<sup>4</sup> Previous studies have reported substantial variation in the prevalence of CD among dyspeptic patients. A study from Iran reported a prevalence of approximately 7%, whereas a study from Mexico found a prevalence like that of the general population.<sup>8,9</sup> Differences between studies are likely to reflect variations in genetic susceptibility, dietary gluten exposure, environmental factors, referral patterns, diagnostic strategies, and study populations. Similar geographical variation has been demonstrated in systematic reviews and international epidemiological studies.<sup>4,10</sup>

Historically, CD has been regarded as a disorder characterised by chronic diarrhoea, steatorrhea, weight loss, and malabsorption. However, contemporary evidence indicates that many adults present predominantly with non-classical gastrointestinal symptoms or extra-intestinal manifestations rather than the classical malabsorptive syndrome.<sup>1-3</sup> Current international guidelines recommend considering CD in patients with persistent or unexplained gastrointestinal symptoms, particularly when accompanied by iron deficiency anaemia or other features suggestive of malabsorption.<sup>2,3</sup> In the present study, all patients with histologically confirmed CD presented with dyspeptic symptoms, whereas classical manifestations such as diarrhoea, vomiting, and weight loss were inconsistent. These findings support the expanding clinical spectrum of CD and emphasise that the absence of classical symptoms should not exclude the diagnosis.<sup>1,2,5</sup>

Anti-tissue transglutaminase immunoglobulin A (anti-tTG IgA) demonstrated excellent diagnostic performance when compared with histopathological examination, with all confirmed cases testing positive and a specificity of 94.5%. These findings are consistent with current international guidelines, which recommend anti-tTG IgA as the preferred first-line serological investigation because of its high sensitivity and specificity in patients with normal total immunoglobulin A concentrations.<sup>2,3,6</sup> Nevertheless, the apparent 100% sensitivity observed in the present study should be interpreted cautiously because it was based on only seven histologically confirmed cases. Consequently, the diagnostic performance estimates require confirmation in larger prospective studies.

Endoscopic findings suggestive of villous atrophy also identified all histologically confirmed cases but demonstrated lower specificity than anti-tTG IgA. This finding is expected because endoscopic features of villous atrophy are not specific to CD and may occur in other disorders affecting the small intestine.<sup>1-3</sup> Consequently, endoscopic findings should always be interpreted in conjunction with serological and histopathological assessment. Current international guidelines continue to recommend multiple duodenal biopsy specimens as the diagnostic reference standard for confirming CD in adults.<sup>2,3,6</sup>

The strengths of this study include its prospective design and the systematic evaluation of all participants using a standardised diagnostic pathway comprising clinical assessment, serological testing, upper gastrointestinal endoscopy, and histopathological examination. Applying the same diagnostic protocol to all participants reduced the likelihood of verification bias and strengthened the internal validity of the findings. Furthermore, this study provides one of the first reports describing the prevalence of CD among adults presenting with dyspepsia in eastern Libya, contributing valuable regional epidemiological evidence where published data remain limited.

Several limitations should be acknowledged. First, the study was conducted at a single tertiary referral centre, which may limit the generalisability of the findings. Second, the relatively small sample size and the limited number of histologically confirmed CD cases reduced the precision of the prevalence estimate and diagnostic performance measures. Third, total serum immunoglobulin A concentrations were not measured; therefore, selective immunoglobulin A deficiency, an important cause of false-negative anti-tTG IgA results, could not be excluded. Current guidelines recommend measuring total immunoglobulin A during the initial serological evaluation of suspected CD.<sup>2,3</sup> Finally, HLA-DQ2/DQ8 genotyping and assessment for alternative causes of villous atrophy were not performed and may have provided additional diagnostic information in selected patients.

In conclusion, histologically confirmed CD was identified in 8.8% of adults presenting with uninvestigated dyspepsia at Tobruk Medical Centre. These findings support considering CD in the differential diagnosis of persistent or unexplained dyspeptic symptoms. Anti-tTG IgA is an appropriate first-line serological investigation; however, histopathological confirmation remains essential for establishing the diagnosis in adults. Larger multicentre studies are required to validate these findings and to further define the role of targeted screening for CD among adults presenting with dyspepsia.<sup>1-6</sup>



### Conflict of Interest

The authors declare that they have no conflict of interest.

### References

1. Lebwohl B, Sanders DS, Green PHR. Coeliac disease. *Lancet*. 2018;391(10115):70–81.
2. Rubio-Tapia A, Hill ID, Semrad C, Kelly CP, Lebwohl B. American College of Gastroenterology guidelines: diagnosis and management of celiac disease. *Am J Gastroenterol*. 2023;118(1):59–76.
3. Ludvigsson JF, Bai JC, Biagi F, Card TR, Ciacci C, Ciclitira PJ, et al. Diagnosis and management of adult coeliac disease: guidelines from the British Society of Gastroenterology. *Gut*. 2014;63(8):1210–28.
4. Singh P, Arora A, Strand TA, Leffler DA, Catassi C, Green PHR, et al. Global prevalence of celiac disease: systematic review and meta-analysis. *Clin Gastroenterol Hepatol*. 2018;16(6):823–36. e2.
5. Fasano A, Catassi C. Celiac disease. *N Engl J Med*. 2012;367(25):2419–26.
6. Al-Toma A, Volta U, Auricchio R, Castillejo G, Sanders DS, Cellier C, et al. European Society for the Study of Coeliac Disease guideline for coeliac disease and other gluten-related disorders. *United European Gastroenterol J*. 2019;7(5):583–613.
7. Stanghellini V, Chan FKL, Hasler WL, Malagelada JR, Suzuki H, Tack J, et al. Gastroduodenal disorders. *Gastroenterology*. 2016;150(6):1380–92.
8. Talley NJ, Ford AC. Functional dyspepsia. *N Engl J Med*. 2015;373(19):1853–63.
9. Keshavarz AA, Bashiri H, Ahmadi A, Bazargan-Hejazi S. The prevalence of occult celiac disease among patients with functional dyspepsia: a study from the western region of Iran. *Gastroenterol Res Pract*. 2010; 2010:170702.
10. Remes-Troche JM, Ochoa-Carrillo FJ, et al. Celiac disease seroprevalence in subjects with dyspeptic symptoms: a study from Veracruz, Mexico. *Rev Gastroenterol Mex (Engl Ed)*. 2023;88(4):347–54.