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Original Article

# Frequency of Celiac Disease in Adult Patients Presenting with Iron Deficiency Anemia

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## Abstract

**Objective:** To determine the prevalence of celiac disease in adult patients with iron deficiency anemia and identify any potential clinical and laboratory markers associated with the condition.

**Methods:** This cross-sectional observational study was conducted at Gulab Devi Hospital, Medicine Department, IPD (Indoor Patient Department) during September 2024 to march 2025. Data were collected from 160 patients including demographic information (age, gender, etc.), clinical symptoms, laboratory results, and the outcome of the serological tests for celiac disease.

**Results:** Data were collected from 160 patients, with a mean age of 42.3 ± 15.8 years. Among the participants, 46.9% were male and 53.1% were female. The most common symptoms reported were fatigue (84.4%), pallor (75%), and weakness (68.8%). Abdominal discomfort, weight loss, and bloating were less frequent, occurring in 28.1%, 18.8%, and 21.9% of patients, respectively. Laboratory results showed a mean hemoglobin level of 9.2 ± 1.4 g/dL, serum ferritin of 9.4 ± 3.6 ng/mL, and transferrin saturation of 10.2% ± 4.7%, indicating severe iron deficiency.

**Conclusion:** It is concluded that celiac disease is a significant but underdiagnosed cause of iron deficiency anemia in adults, with a prevalence of 7.5% in the studied cohort. Clinicians should consider screening for celiac disease in patients with unexplained IDA, particularly those who do not respond to iron supplementation.

**Keywords:** Patients, Celiac disease, Protein, Iron, IDA, Prevalence, Supplementation

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## Introduction

Celiac disease (CD) is a chronic autoimmune disorder in genetically predisposed individuals upon ingesting gluten, a protein found in wheat, barley, and rye. It is, therefore, defined as an immune response that triggers inflammation of the small intestine and specifically affects the villi, which plays a central role in nutrient absorption. This disease can manifest in several ways and may manifest itself in gut-related symptoms like diarrhea, bloating, and stomach pain, to general symptoms like fatigue, weight loss, and iron deficiency anemia (IDA).[1] One is iron deficiency anemia, which can be the early and the first symptom of celiac disease. The prevalence of IDA is higher in developing countries and its prevalence is increasing and the condition is very common in clinical practice. It happens when the body lacks the needed iron to formulate hemoglobin which is an oxygen-carrying protein in red blood cells.[2] The condition can stem from poor diet, chronic blood loss or coeliac disease where the body has a reduced ability to absorb iron. Because celiac disease impairs the small bowel's capacity to absorb nutrients and Vitamin B12, it is among the more common though often undiagnosed causes of iron deficiency anemia. In celiac disease, injury to the small intestinal villi by the immune system leads to a decrease in the area for the absorption of nutrients including iron.[3] This malabsorption, if uncorrected, renders patients with iron deficiency anemia despite receiving iron, possibly causing fatigability, and an altered cognitive

and/or physical capacity. Celiac disease is already known to be associated with iron deficiency anemia but there is a disparity in the extent of positivity for celiac disease among patients with IDA in adults.[4] Celiac disease has been traditionally diagnosed in patients with gastrointestinal symptoms many of whom with truly refractory or severe disease may be undiagnosed because of confined examination of only this category of patients.[5] This is because many celiac adults do not present severe gut symptoms or may have some mild or nonspecific symptoms making diagnoses difficult. Nevertheless, CD may not be diagnosed for years, in which case complications, including osteoporosis, infertility, and malignancy, may develop. The clinical reality is identifying the etiology of iron deficiency anemia between PICA, chronic blood loss, or a secondary cause including celiac disease.[6] The less likely but more suspicious indication would be if a patient complains of persistent or inadequately explained iron deficiency anemia despite being on iron-containing preparations. Based on the present evidence, it has been estimated that 2- 5% of all patients with unexplained iron deficiency anemia may have celiac disease, although this percentage could be different depending upon the population being studied. In addition, it has been established that there is a higher prevalence of celiac disease in those with IDA, who demonstrate non-responsiveness to oral iron therapy; this can be attributed to the fact that, there is likely unsuspected celiac disease.[7] Celiac disease is often diagnosed in adults with IDA using clinical suspicion, serology, and histology. Celiac disease is confirmed through serum tests for anti-tissue transglutaminase (tTG) antibodies, and endoscopic biopsy of the small intestine.[8] Nevertheless, these screening tests are not always easily accessible, and are not always definitive, especially when specific symptoms are absent. The value of screening for HLA-DQ2 and HLA-DQ8 genes associated with almost all celiac disease patients is also under investigation as a diagnostic tool.[9] Health repercussions to unproblematic celiac disease in patients with iron deficiency anemia are influential. Failure to compounds and difficult iron, and folate, as well as other nutrients absorption the condition will deteriorate and worsen symptoms of anemia. Also, some unaddressed symptoms due to this condition include osteoporosis, infertility, neurological problems, and higher risks of certain cancers of the digestive system.[10] As a result, assessment and correct diagnosis and treatment of celiac disease at the initial stage help to avoid these unfavourable consequences. The gold standard for the management of celiac disease is a gluten-free diet throughout life to permit the healing of mucosa of the small intestine and the correction of nutrient deficiencies and symptoms.[11] Due to increased awareness regarding the possible atypical manifestation of celiac disease in adults which may present with IDA, this study tries to determine the prevalence of celiac disease in adult patients with IDA. It will enable healthcare providers the world over to be informed and consequently more proactive with screening and diagnosing patients with both diseases. In addition, it will stress enhancing first-line practitioners' awareness of celiac disease as a potential cause of IDA and possible poor response to iron replacement, besides other symptoms and signs.[12]

Considering above the aim of this study was to determine the prevalence of celiac disease in adult patients with iron deficiency anemia and identify any potential clinical and laboratory markers associated with the condition.

## Methods

This cross-sectional observational study was conducted at Gulab Devi Hospital, Medicine Department, IPD (Indoor Patient Department) during September 2024 to march 2025. Data were collected from 160 patients.

***Inclusion Criteria:*** All *a*dults (18 years and above) presenting with iron deficiency anemia, as defined by clinical and laboratory findings (low hemoglobin and low serum ferritin levels) and patients who had not previously been diagnosed with celiac disease or started a gluten-free diet.

***Exclusion Criteria:*** All patients with known chronic conditions that caused iron deficiency anemia, such as gastrointestinal bleeding, chronic kidney disease, or heavy menstrual bleeding and patients with conditions that interfered with gluten absorption or those already diagnosed with celiac disease.

***Data collection:*** Data were collected from each patient, including demographic information (age, gender, etc.), clinical symptoms, laboratory results, and the outcome of the serological tests for celiac disease. A thorough clinical study for every patient was conducted by collecting data about their medical history, general body check-ups, and clinical symptoms indicative of celiac disease including diarrhea, abdominal pain, bloating, weight loss, and fatigue. All patients had basic investigations including full blood count, serum ferritin, and iron profile to confirm the diagnosis of IDA. Further tests that were taken included serum vitamin B12 and folate since this could also cause anemia. Celiac

disease serological testing was performed on patients with laboratory-proven IDA. The first and main test was when we checked the titer of antibody against tissue transglutaminase (tTG-IgA) which is the gold standard in celiac disease screening. If the tTG-IgA level was higher, then EMA and total IgA level were done to confirm the CD diagnosis. If serological tests pointed to CD, the patient underwent upper gastrointestinal endoscopy to biopsy the duodenum. Morphologic evaluation of the biopsy specimens was done to quantify deterioration in villi and the presence of other pathological features suggestive of coeliac disease.

*Data Analysis:* Data were analyzed using SPSS v26. Descriptive statistics were used to summarize the data, and chi-square tests were performed to assess associations between celiac disease and various demographic or clinical factors.

## Results

Data were collected from 160 patients, with a mean age of 42.3 ± 15.8 years. Among the participants, 46.9% were male and 53.1% were female. The most common symptoms reported were fatigue (84.4%), pallor (75%), and weakness (68.8%). Abdominal discomfort, weight loss, and bloating were less frequent, occurring in 28.1%, 18.8%, and 21.9% of patients, respectively. Laboratory results showed a mean hemoglobin level of 9.2 ± 1.4 g/dL, serum ferritin of 9.4 ± 3.6 ng/mL, and transferrin saturation of 10.2% ± 4.7%, indicating severe iron deficiency.

**Table 1:** *Demographic Characteristics of the Study Population (n = 160)*

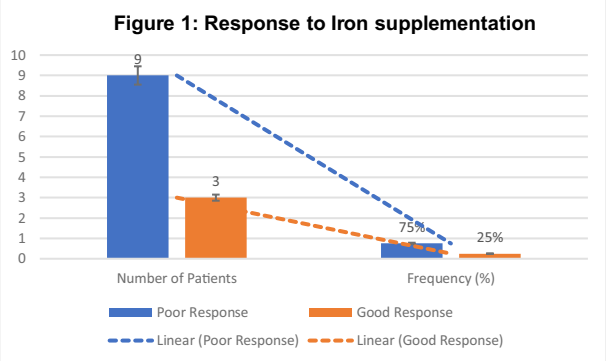
| Characteristic | | Value |
|---|---|---|
| **Mean Age (Years)** | | 42.3 ± 15.8 |
| **Gender** | Male | 75 (46.9%) |
| | Female | 85 (53.1%) |
| **Symptoms** | Fatigue | 135 (84.4%) |
| | Pallor | 120 (75%) |
| | Weakness | 110 (68.8%) |
| | Abdominal discomfort | 45 (28.1%) |
| | Weight loss | 30 (18.8%) |
| | Bloating | 35 (21.9%) |
| | Hemoglobin | 9.2 ± 1.4 g/dL |
| | Serum Ferritin | 9.4 ± 3.6 ng/mL |
| | Transferrin Saturation | 10.2% ± 4.7% |

The serological testing revealed that 15.6% of patients tested positive for anti-tissue transglutaminase (tTG-IgA), and 6.3% tested positive for anti-endomysial antibodies (EMA). A combination of positive tTG-IgA and EMA was used to diagnose celiac disease in 7.5% of patients. Additionally, endoscopic biopsy showed villous atrophy in 7.5% of the patients, confirming celiac disease, while 1.9% had normal biopsy results.

**Table 2:** *Serological and Endoscopy Results for Celiac Disease (n = 160)*

| Test | | Positive Results | |
|---|---|---|---|
| | | n | % |
| **Serology** | Anti-tissue Transglutaminase (tTG-IgA) | 25 | 15.6 |
| | Anti-endomysial Antibodies (EMA) | 10 | 6.3 |
| | Combination of tTG-IgA + EMA (Celiac Disease Diagnosis) | 12 | 7.5 |
| **Endoscopy** | Villous Atrophy (Celiac Disease) | 12 | 7.5 |
| | Normal Biopsy | 3 | 1.9 |

Among the patients diagnosed with celiac disease, 75% (9 patients) showed a poor response to iron supplementation, while 25% (3 patients) had a good response.




Of the patients diagnosed with celiac disease, 75% (9 patients) showed a poor response to iron supplementation, while only 25% (3 patients) responded well. In contrast, among patients without

celiac disease, 25% (35 patients) showed a poor response to iron supplementation, and 75% (113 patients) had a good response. A significant difference ($p<0.03$) in outcomes of iron supplementation was noted among celiac and non-celiac diseases.

Among the 160 patients, 12 were diagnosed with celiac disease, accounting for 7.5% of the total cohort. The highest frequency of celiac disease was observed in the 51-60 years age group, with 2 patients (9.1%) diagnosed. The 31-40 years group had 4 patients (8.3%), followed by the 41-50 years group with 3 patients (7.5%). The 18-30 years age group had the lowest frequency, with only 2 patients diagnosed (6.3%). The >60 years age group had 1 patient diagnosed (5.6%).

**Table 3:** *Association Between Age and Celiac Disease Diagnosis*

| Age Group (Years) | Celiac Diseased | Total Patients | (%) |
|---|---|---|---|
| **18-30** | 2 | 32 | 6.3 |
| **31-40** | 4 | 48 | 8.3 |
| **41-50** | 3 | 40 | 7.5 |
| **51-60** | 2 | 22 | 9.1 |
| **>60** | 1 | 18 | 5.6 |
| **Total** | 12 | 160 | 7.5 |

Fatigue was reported by 91.7% of celiac disease patients and 83.8% of non-celiac IDA patients, but the difference was not statistically significant ($p = 0.52$). Pallor was equally common in both groups, with 75% of patients in both categories reporting this symptom ($p = 1.00$). Abdominal discomfort and bloating were more common in celiac disease patients (41.7%) compared to non-celiac IDA patients (27% and 20.3%, respectively), although these differences were not statistically significant ($p = 0.27$ and $p = 0.09$, respectively). Weight loss was reported by 16.7% of celiac disease patients and 18.9% of non-celiac IDA patients, with no significant difference ($p = 0.78$).

**Table 4:** *Clinical Symptoms in Patients Diagnosed with Celiac Disease vs. Non-Celiac Disease IDA Patients*

| Symptom | Celiac Disease (n = 12) | Non-Celiac IDA (n = 148) | p-value |
|---|---|---|---|
| **Fatigue** | 11 (91.7%) | 124 (83.8%) | 0.52 |
| **Pallor** | 9 (75%) | 111 (75%) | 1 |
| **Abdominal Discomfort** | 5 (41.7%) | 40 (27%) | 0.27 |
| **Bloating** | 5 (41.7%) | 30 (20.3%) | 0.09 |
| **Weight Loss** | 2 (16.7%) | 28 (18.9%) | 0.78 |

## Discussion

The findings of this study provide valuable insights into the prevalence of celiac disease among adult patients with iron deficiency anemia (IDA). The current study was done on 160 adult patients of IDA in Gulab Devi Hospital which is a tertiary care center and the sample was collected between January 2024 to June 2024. Of these, 12 (7.5%) were diagnosed with celiac disease out of biopsy-proven cases of gluten-sensitive enteropathy. This study demonstrates that the frequency of celiac disease is relatively high in a population with IDA and supports the screening of serological markers of celiac disease in patients with IDA who do not respond to iron supplementation.[13] This significant discovery means that out of 100 patients who had IDA, 7.5% of them had celiac disease. This agrees with other literature that has posited that celiac disease can be largely a missed culprit for IDA in adults. For example, Volta et al. in a study showed that in patients with unexplained IDA, celiac disease could be possibly a cause, ranging from 5-10 percent. This underlines the necessity of searching for celiac disease in those IDA adults who do not respond to iron treatments. Thus, it is a requirement for clinicians to always consider celiac disease given the high prevalence in this group especially in patients presenting with recurrent or chronic anemia. It is noteworthy that the overall clinical picture of celiac disease identified in this study was relatively mild. A very large number of patients with celiac disease (91.7%) reported fatigue and this is a common symptom both among IDA and celiac disease patients.[14] The two most often reported symptoms of IDA- pallor and fatigue were seen in 75% of the celiac study group. However, other symptoms common to celiac diseases including diarrhea, weight loss, and severe abdominal indisposition were not common in this particular group. This agrees with earlier findings showing that many adults with celiac disease may present in atypical or asymptomatic forms, with the typical gastrointestinal symptoms may be missing.[15]

Notably, while both abdominal discomfort and bloating were present in 41.7% patients with celiac disease, these symptoms were manifesting less in our IDA patients than in the general population of IDA patients, where 28% are experiencing abdominal discomfort and 21.9% are suffering from bloating. This implies that several celiac disease patients may have atypical gastrointestinal symptoms or else may have none at all, which may make diagnosis difficult

without the help of serological testing.[16] Concerning diagnostic tools 15. 6% of the patients in the study had raised anti-tissue transglutaminase (tTG-IgA) which is coherent with the details of this test in case of celiac disease. Of these 40% also had IgA anti-endomysial antibodies that are abundant in coeliac disease hence confirming the disease. The description was finalized with duodenal biopsies in 25 patients, of which twelve (7.5 percent of the whole group) were proved to have villous atrophy, which is characteristic of celiac disease.[17]

The PPV of serological testing in this population indicates that screening for celiac disease in patients with unexplained IDA, particularly those who demonstrate a poor response to iron supplementation, is helpful. tTG-IgA, EMA, and histological examination with biopsy is the gold standard approach for diagnosing celiac disease because biopsy is indispensable for an accurate diagnosis as well as proper patient management. Another interesting feature that was noted in the context of the present study concerns the low efficacy of iron supplementation in many patients with celiac disease.[18] Celiac disease was identified in 6/12 patients; 5 out of 6 (83%) had inadequate improvement as judged by the Hb alone even with iron supplementation. Such a lack of response or even worsening of anemia status in response to iron therapy should alert the clinician to consider other potential etiologies of anemia and celiac disease should be on the list. Non-celiac IDA patients in the study did improve with iron therapy, which only underscores the usefulness of this clinical cue in diagnosing celiac disease.[19]

These results are consistent with previous studies that indicate iron deficiency anemia may even be aggravated by untreated celiac disease because of the resulting increase in the small intestine's nutrient malabsorption, including iron. Introduction of gluten-free diet in patients with celiac disease often leads to a progressive rise in iron absorption, and inversely anemia. Celiac disease was most common in the age group 30–50 years; the mean age was 39.2 ± 11.1 years. This age range is consistent with other studies, which showed that celiac disease can develop in adulthood and can remain undiagnosed for years. We found that celiac disease more frequent in females than in males in our 19 female patients with celiac disease compared to 13 male patients with celiac disease; this is similar to a higher prevalence of celiac disease in females that noted by other researchers.[20] Thus, while overall, there was a difference in gender distribution between the two groups, this was not statistically significant within this cohort. Nevertheless, this research has several weaknesses. Firstly, it is a single center study and as such we cannot be very sure that what we have found will be replicated in other centers or populations. Regarding the individual associations, the small number of patient diagnosed with celiac disease (n = 12) making it difficult to find more complex associations. Additionally, endoscopic biopsy was only performed in 25 patients, which probably means that celiac disease is more widespread in the IDA population than shown in the report because biopsy is not done in all suspected cases.

## Conclusion

It is concluded that celiac disease is a significant but underdiagnosed cause of iron deficiency anemia in adults, with a prevalence of 7.5% in the studied cohort. Clinicians should consider screening for celiac disease in patients with unexplained IDA, particularly those who do not respond to iron supplementation. Early diagnosis and a gluten-free diet can improve anemia and prevent long-term complications associated with untreated celiac disease.

**Ethical Approval:** The IRB/EC approved this study via letter no. AAMC/IRB/EA-08-2025 dated February 10, 2025.

**Conflict of Interest:** *None*

**Funding Source:** *None*

**Authors' Contribution**

**SB,FAK:** Conception

**ARP,NS:** Design of the work

**FJ,HAR:** Data acquisition, analysis, or interpretation

**ARP,FJ,HAR,NS:** Draft the work

**SB,FAK:** Review critically for important intellectual content

All authors approve the version to be published

All authors agree to be accountable for all aspects of the work

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