

Upper Gastrointestinal Endoscopy Findings in Patients with Chronic Small Bowel Diarrhea: A Cross-Sectional Observational Study at a Tertiary Care Hospital.

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Original Article

Abstract

Background

Chronic small bowel diarrhea is a clinically challenging condition that has a wide etiologic range including malabsorption syndromes, inflammatory diseases and infections. Endoscopy with histopathological examination of duodenal biopsies is a crucial step in clarifying the underlying pathology, particularly when investigations of the same with standard laboratory and stool tests are inconclusive.

Objectives

To determine the diagnostic productivity of UGI endoscopy, determine the range of underlying etiologies, and to match the endoscopic findings with histopathological findings in patients with chronic small bowel diarrhea.

Methods

The study was a cross-sectional observational one carried out at the Department of General Medicine, GMC Jammu, between May 2024 and March 2025. Fifty patients (18 years and above) were enrolled, who came with chronic cases of small bowel diarrhea (duration more than 4 weeks, non-inflammatory, high-output). Endoscopy (UGI) was also done with the help of Olympus video-endoscope, duodenal biopsies (2nd part) were examined histopathological laboratory. Serological testing (anti-TTG IgA ELISA) for Celiac disease was also done. An analysis of data was performed with the help of SPSS 23.0; the level of significance was taken as $p < 0.05$.

Findings

The average age of the study participants was 34.15 ± 15.68 years and 54 percent were males. All patients reported gradual onset of diarrhea with an average of 4.67 ± 1.6 months; 52% said that it was 6-7 times/day. Endoscopic results were mostly normal and the antrum showed gastritis in 14% and second part of the duodenum (D2) showed pathological changes in 50% (grooving 28%, decreased folds 12%, scalloping 6%, mucosal erythema 4%). Normal villous architecture in 66%, mild villous atrophy in 16%, mild villous blunting in 8%, marked villous blunting in 6%, and complete villous atrophy in 4% was revealed by histopathological analysis. The intraepithelial lymphocyte (IEL) count was raised ($\geq 25/100$ enterocytes) in 14 percent cases. Anti-TTG IgA serology was positive in 8% patients and celiac disease was the final diagnosis in 8% of patients.

Conclusion

UGI endoscopy and duodenal biopsy are useful in the diagnosis of chronic small bowel diarrhea. In 8% of cases celiac disease was found. The duodenum second part and the antrum form the most valuable areas in terms of yielding pathologic results. Large percentage of normal results supports the idea that more diagnostic modalities are necessary in non-celiac cases.

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Introduction

The term chronic diarrhea is used to describe the loss of loose or watery stools in a period of longer than four weeks. It is a major diagnostic problem because it is multifactorial etiological with disabling effects on the quality of life. It is estimated that 1-5 percent of adults are affected and some of the possible causes are irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), celiac disease, and microscopic colitis [1]. Its etiology is associated with a complex interaction of reduced luminal solute-absorption, augmented secretion, or impaired intestinal-barrier-function; different infectious, inflammatory, malabsorptive, and motility illnesses trigger these variations [2,3]. Although most cases of acute diarrhea are infectious, chronic manifestations are often caused by secretory, osmotic, and functional pathogenesis [1,2].

The diagnosis of chronic small bowel diarrhea through gastrointestinal

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endoscopy is less well established, and the etiologies of gastrointestinal infections and celiac disease or IBD also vary significantly between the Western and the Asian populations [4]. Recent recommendations provided by the Japan Gastroenterological Association and the British Society of Gastroenterology propose a progressive method of diagnosis, which incorporates endoscopic testing, and accentuate the necessity of differentiating between secondary chronic diarrhea (drug-induced, infection-associated) and idiopathic forms [5,6].

The most common cause of watery diarrhea includes functional disorders like IBS, and excess gas and steatorrhea due to malabsorptive syndromes can be evidence of such pathologies as giardiasis [7]. Another cause is idiopathic secretory diarrhea that is diagnosed in about 20 percent of the specially-centered cases or post-surgery complications [8]. The uncommon infiltrative conditions, like gastrointestinal amyloidosis, and iatrogenic diseases like systemic drugs and herbal medications should also be discussed [9,10,11].

Primary care is accompanied by the first clinical examination which is aimed at objective complications like dehydration and anemia [8]. In the case of continuous watery diarrhea and malabsorption and weight loss, initial tests such as hemograms, albumin, and stool parasite analysis should be carried out before more invasive procedures [12]. Clinicians should also be able to distinguish between organic and functional disease, the latter of which can be characterized by the high frequency of stool despite the normal consistency of feces (pseudodiarrhea) [13]. Anti-tissue transglutaminase antibodies screening of celiac disease must also be implemented early together with thyroid function examination and C-reactive protein [14]. IBD is screened with fecal calprotectin, neuroendocrine tumors with serum chromogranin A, and nutritional deficiencies with vitamin B12, folate, and ferritin [8,15,16].

Breath testing of small intestinal bacterial overgrowth (SIBO), quantification of fecal fat, empirical cholestyramine trial in bile acid diarrhea, and fecal elastase in pancreatic exocrine insufficiency should be used in refractory cases or cases with diagnostic uncertainty [8,17,18,19]. To suspect secretory neuroendocrine tumors, plasma vasoactive hormones should be assessed (gastrin, glucagon, vasoactive intestinal peptide), and localization is done by octreotide scintigraphy or PET-CT [8,20]. Flexible sigmoidoscopy with biopsy is recommended in patients younger than 40 years with suspected functional disorders, who have normal fecal calprotectin, to rule out microscopic colitis; and in patients older than 45 with new symptoms of the condition, full gastrointestinal endoscopy is strongly recommended despite the absence of typical alarm features [19,21].

The Rome IV criteria recommends the deferral of endoscopy in the absence of laboratory abnormalities that indicate that the patient has anemia, hypoalbuminemia, or an elevated fecal calprotectin, as

these are highly likely to yield a positive result of organic disease such as IBD and microscopic colitis [22,23,24]. However, upper gastrointestinal endoscopy is especially useful in chronic small bowel diarrhea, where it makes it possible to observe and biopsy the duodenum directly, which is necessary to diagnose giardiasis, Whipple's disease, tropical sprue, and celiac disease that can have malabsorptive features and normal colonoscopic appearance [3,25]. Villous atrophy, which is a macroscopic finding, e.g., duodenal folds scalloped or fissured, can lead to a definite diagnosis when serology is inconclusive [23]. In spite of this utility, not all patients with diarrhea have duodenal biopsy despite being suggested by major guidelines up to 9% [26]. Clinically important lesions such as ulcers and atrophy of the villus were found in 54.5 percent of the patients in the refractory IBS-like cases, often necessitating the new diagnosis of either Crohn's disease or celiac disease [25]. There are also non-colon cancer disorders, including celiac disease and idiopathic bile acid diarrhea, which contribute to the causes of chronic diarrhea, respectively, about the 4-percent and 25-percent, which underscore the importance of excluding a diagnosis of small bowel pathology with a systematic diagnostic approach [27]. The current research was done to assess the diagnostic utility of upper gastrointestinal endoscopy and compare the endoscopic observations with the histopathological findings in patients with chronic small bowel diarrhea.

Materials and Methods

Study Design

This is a cross-sectional observational study conducted at the Department of General Medicine, Government Medical College (GMC), Jammu. The study was approved by the Institutional Ethics Committee and written informed consent was obtained from all participants prior to enrollment. Patient recruitment, data collection, and result interpretation were carried out from 1st May 2024 to 31st March 2025. A total of 50 patients presenting to the outpatient and inpatient departments (OPD/IPD) of GMC Jammu with chronic small bowel diarrhea who fulfilled the eligibility criteria were enrolled over a 12-month period.

Inclusion criteria were the following: (a) Patients aged 18 years and above presenting with chronic small bowel diarrhea (duration more than 4 weeks, non-inflammatory and high-output in character); (b) patients who underwent upper gastrointestinal endoscopy as part of their diagnostic evaluation; (c) and patients willing to provide written informed consent. Exclusion criteria were the following: (a) Patients who declined to provide consent; (b) patients with a history of recent gastrointestinal surgery or significant comorbidities likely to confound interpretation of endoscopic findings; and (c) cases with inadequate or autolyzed biopsy specimens.

Data Collection

Baseline demographic data (age and gender), detailed clinical history and relevant personal or family history were recorded in a standardized proforma. Systemic

physical examination, including abdominal and digital impact on quality of life (Table 1).

rectal examination, was performed for all participants. Laboratory investigations including stool microscopy and culture, complete blood count (CBC), C-reactive protein (CRP), and anti-tissue transglutaminase IgA (anti-TTG IgA) ELISA were performed as indicated.

Endoscopic and Histopathological Examination

Upper gastrointestinal endoscopy was performed using Olympus Video-Endoscope. Patients fasted from solid food for 8 hours and from liquids for 4 hours before the procedure. Detailed documentation of endoscopic findings including morphological changes in the esophagus, cardia, fundus, body, antrum, first part of the duodenum (D1), and second part of the duodenum (D2) was recorded.

Histopathology of Biopsy samples which were taken in the second part of the duodenum (D2) of all the subjects and any other areas that were suspicious and inflamed. All the biopsy specimens assessed microscopically were evaluated in terms of villous architecture (normal, mild atrophy, mild blunting, marked blunting, complete atrophy), the number of intraepithelial lymphocytes (IEL) per 100 enterocytes, villous/crypt ratio, and other specific histological findings that indicate any celiac disease, Crohn's disease, or other forms of inflammatory/infectious pathology.

Statistical Analysis

The data have been analyzed with SPSS (version 23.0) and the quantitative variables were represented as the mean $\pm$ standard deviation (SD). Frequency and percentage were used to represent categorical variables with a p-value <0.05 was considered statistically significant

Results

The data obtained from the patients was evaluated to identify the underlying etiology of chronic small bowel diarrhea. The following tables and descriptive analyses explain the demographic characteristics, clinical symptoms, and diagnostic outcomes observed within this study population.

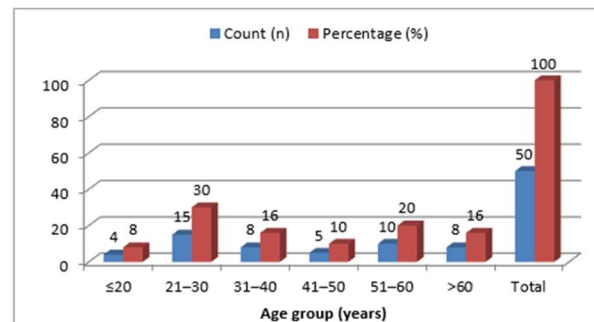
The majority of the participants were in the 21–30 age group (30%), followed by 51–60 (20%), >60 (16%), 31–40 (16%), ≤ 20 (8%), and 41–50 (10%). The mean age of the participants was 34.15 ± 15.68 years, indicating relatively younger but demographically diverse cohort (Figure 1).

Among the study participants males comprised 54% and females 46% which indicates comparatively a balanced gender distribution without significant predominance of either sex.

The most prevalent duration of diarrhea among study participants was 4–5 months (50%), followed by 6–8 months (26%) and 2–3 months (24%). The mean duration of diarrhea was 4.67 ± 1.6 months, which is the conformation of chronicity across all participants.

The majority of participants (52%) reported 6 to 7 episodes of diarrhea per day, followed by 26% having more than 7 episodes/day and 4 to 5 episodes/day in 22%, Signifying a disease burden and considerable

Figure 1: Age distribution of study participants



Frequency (episodes/day)	Count (n)	Percentage (%)
4–5	11	22.00
6–7	26	52.00
>7	13	26.00
Total	50	100.0

Table 1: Frequency of diarrhea episodes per day

Endoscopic results showed majorly normal results in the most parts of the upper gastrointestinal tract. The esophagus (100%), gastric fundus (100%), body (100%), and first part of the duodenum (100%), were normal everywhere. Small hiatus hernia was present in 6% in the cardia region. Antral gastritis was present in 14% of the participants in the antrum. Highest pathology was shown in the second part of the duodenum: only half ($n=25$) of them were normal, with 28% showing grooving, 12% revealed decreased folds, 6% displaying scalloping, and 4% manifesting mucosal erythema (Table 2).

Histopathological evaluation of duodenal biopsies found that normal villous architecture was apparent in 66% of the participants. Mild villous atrophy was found in 16%, mild villous blunting in 8%, marked villous blunting in 6%, and complete villous atrophy in 4%. Thus, a total of 34% of participants showed some level of villous abnormality, with severe changes (marked or complete atrophy) being present in 10% (Table 3).

Inflammatory activity was normal or not elevated as IEL count was below 25 per 100 enterocytes in 86% of the participants. Higher numbers of IEL of 25 to 50 were seen in 6%, and counts above 50 were seen in 8% indicating moderate mucosal inflammation in a few cases (Table 4).

The villous to crypt ratio was within normal limits in 90% ($n=45$) of participants. An increased ratio was observed in 10% ($n=5$), indicating an early histopathological alteration in a subgroup of patients even when overall villous morphology seemed conserved (Table 5).

In 92% anti-tissue transglutaminase IgA (anti-TTG IgA) serology was and positive in 8% of participants.

Confirmatory histopathological features of celiac disease on duodenal biopsy were also found in all four seropositive cases (Table 6).

Region	Finding	Count (n)	Percentage (%)
Esophagus	Normal	50	100.0
Cardia	Normal	47	94.00
	Small hiatus hernia	3	6.00
Fundus	Normal	50	100.0
Body	Normal	50	100.0
Antrum	Normal	43	86.00
	Antral gastritis	7	14.00
Duodenum 1st Part	Normal	50	100.0
Duodenum 2nd Part	Normal	25	50.00
	Grooving	14	28.00
	Decreased folds	6	12.00
	Scalloping	3	6.00
	Mucosal erythema	2	4.00

Table 2: Endoscopic findings by region

Villi Histopathology	Count (n)	Percentage (%)
Normal	33	66.00
Mild villous atrophy	8	16.00
Mild villous blunting	4	8.00
Marked villous blunting	3	6.00
Complete villous atrophy	2	4.00
Total	50	100.0

Table 3: Villous histopathology

IEL Count (per 100 enterocytes)	Count (n)	Percentage (%)
<25	43	86.00
25–50	3	6.00
>50	4	8.00
Total	50	100.0

Table 4: Intraepithelial Lymphocyte (IEL) count

Villous to Crypt Ratio	Count (n)	Percentage (%)
Normal	45	90.00
Increased	5	10.00
Total	50	100.0

Table 5: Villous to crypt ratio

Table 6: Serological testing — Anti-TTG IgA ELISA

Anti-TTG IgA ELISA	Count (n)	Percentage (%)
Negative	46	92.00
Positive	4	8.00
Total	50	100.0

In 92% of the participants the final diagnosis was normal (no identifiable organic pathology). In 8% it was determined that celiac disease was the definitive diagnosis and was confirmed by a combination of positive anti-TTG IgA serology and consistent histopathological abnormalities, such as villous atrophy and high IEL counts (Table 7).

Table 7: Final diagnosis

Final Diagnosis	Count (n)	Percentage (%)
Normal (No pathology detected)	46	92.00
Celiac Disease	4	8.00
Total	50	100.0

Discussion

This cross-sectional observational study assessed the upper gastrointestinal endoscopic findings, histopathological features, and final diagnoses in 50 patients with chronic small bowel diarrhea at a tertiary care facility. The results offer a detailed characterization of the demographic, clinical, endoscopic, and histopathological attributes within this patient population, revealing celiac disease as the sole identifiable organic diagnosis (8%), alongside a prevalence of normal findings throughout the cohort.

The average age of the participants was 34.15 ± 15.68 years, with the majority of the participants (30%) being 21–30 years old. This is in line with what has been said about chronic diarrhea affecting younger adults. This aligns with the findings of Shah et al. [28], which indicated a mean age of 36.2 years among patients with chronic diarrhea undergoing UGI endoscopy. However, our cohort was younger than those in the studies by Radhakrishna and Boda [29], with a mean age of 43.8 years, and Rauta et al. [30], with a mean age of 52.25 years; these differences are likely due to the specific focus on small bowel diarrhea rather than general dyspepsia. The gender distribution in this study was fairly even, with 54% males and 46% females. This is in line with earlier studies that found no strong gender preference for chronic diarrhea. Fine et al. [31] likewise reported a composition of 52% male and 48% female in their cohort. Limsrivilai et al. [4], in a substantial multicenter Thai study, reported 46.3% males, which aligns with our findings. The nearly equal gender distribution likely indicates the heterogeneous, multifactorial etiology of chronic small bowel diarrhea rather than a sex-linked pathology.

All participants reported a gradual onset of diarrhea, indicating an insidious instead of an acute or infectious

etiology. The typical period of diarrhea was 4.67 ± 1.6 months, and in half of the participants it lasted 4 to 5 months. This chronicity is similar to what Patel et al. [32] found in a similar endoscopy cohort, where the average length of time was 5.2 months, in addition to what May et al. [33] found in capsule endoscopy patients, where the average length of time was 4.8 months. These numbers confirm that the chronicity threshold used to define the study population is correct. Fifty-two percent of patients reported six to seven daily episodes, and twenty-six percent reported more than seven episodes. This high frequency of diarrhea in our cohort indicates a significant disease burden. This is different from May et al. [33], which found that the most common frequency was 4 to 6 episodes per day. The increased frequency of episodes in our study may indicate regional variations in disease severity or delays in seeking treatment, leading to a more advanced presentation.

The overall endoscopic results in upper gastrointestinal tract were normal. This is in line with the known pattern that these areas don't often have macroscopic pathology in people with chronic watery diarrhea. The antrum exhibited the initial significant pathology, with 14% indicating antral gastritis. This percentage is similar to the 12% that Giardiello et al. [34] found in patients with chronic diarrhea and the broader finding in Chinese national data [35] that gastritis is often found by chance in patients who are having UGI endoscopy for gastrointestinal symptoms. The second part of the duodenum (D2) yielded the highest endoscopic diversity and pathological load. Half of the participants had a completely normal D2, while the other half showed grooving (28%), fewer folds (12%), scalloping (6%), and mucosal erythema (4%). The prevalence of D2 abnormalities in our study (50%) significantly exceeds the 25% reported by Bouhnik et al. [36] and the 15% erythema rate documented by Yusoff et al. [37]. The elevated incidence of grooving (28%) requires scrutiny, as this indicator, alongside scalloping and reduced folds, is regarded as a proxy endoscopic marker for villous atrophy and has been linked to celiac disease and other malabsorption syndromes. The higher rate in our study may be due to differences in the disease patterns in the area, the fact that we only included symptomatic patients, or the fact that the endoscopists had different levels of experience and reporting standards.

Villi architecture was normal in 66% of participants on duodenal biopsy, resembling the 70% normal rate reported by Stotzer et al. [38] and the 60% reported by Thomas et al. [39]. Mild villous alterations (atrophy or blunting) constituted 24% of cases, while severe alterations (known as blunting or total atrophy) were observed in 10%. These results suggest that significant structural mucosal damage is not the primary histological characteristic in chronic small bowel diarrhea at this tertiary center, and that functional or non-mucosal mechanisms may be responsible for symptoms in a considerable number of patients. In 14%

of cases, the IEL count was high ($\geq 25/100$ enterocytes). Bini et al. [40] identified increased IEL counts in 15% of chronic diarrhea patients, corroborating our findings. Increased IEL counts, even without full villous atrophy, are acknowledged as an early or potential manifestation of celiac disease (Marsh I lesion) and may also signify lymphocytic enteritis due to alternative etiologies. The villous to crypt ratio increased in 10% of participants, indicating early histopathological remodeling, a subtle finding that could be overlooked in routine assessments and underscores the importance of systematic biopsy interpretation.

Anti-TTG IgA serology was positive in 4 participants (8%), and all four cases exhibited consistent histopathological evidence of celiac disease, resulting in a final diagnosis of celiac disease in 8% of the study cohort. This prevalence is a little higher than the ~2% reported in Japanese patients [41], which is thought to be due to genetic and dietary factors. It is, however, lower than the 15–17% reported in Western populations [42] and Northern Indian cohorts [43], where wheat consumption is high and the HLA DQ2/DQ8 haplotype is common. The 8% celiac disease rate found in our Jammu cohort probably shows the middle level of prevalence that is expected in northern India, where people eat a lot of wheat. The remaining 92% of participants were ultimately diagnosed as 'normal,' indicating that most cases in this cohort likely have functional causes of chronic diarrhea (e.g., irritable bowel syndrome or bile acid diarrhea) or pathologies not identifiable through UGI endoscopy alone. This aligns with the results of Fry et al. [44], which indicated normal endoscopic and histopathological findings in 88% of patients with chronic diarrhea. The ASGE guidelines [45] also say that normal endoscopic and histopathological results are common in cases of chronic diarrhea and that non-organic causes should be looked into in these cases.

Conclusion

This cross-sectional observational study reveals that upper gastrointestinal endoscopy with duodenal biopsy is an informative and useful investigation in patients with chronic small bowel diarrhea. The cohort of the study was mainly young and has been of balanced gender distribution and with a high burden of chronic and high frequency diarrhea (means 4.67 months, 6-7 diarrhea episode/day in most of them). The endoscopic abnormalities were mainly concentrated on the antrum (14% antral gastritis) and the second duodenum section (50% pathological changes). Histopathological analysis showed that the villous architecture was normal in 66% of participants, and mild to severe changes in mucosa were found in 24 and 10 percent, respectively. A combination of positive anti-TTG IgA serology and compatible histopathological features confirmed 8% of cases with celiac disease.

The large number of normal endoscopic and histopathological results stresses that chronic small bowel diarrhea is often functional or due to other causes not identifiable using UGI endoscopy. It is suggested

that multi-biopsies of D2 be used selectively in cases where endoscopic abnormalities are present, even mild, in combination with other tests like video capsule endoscopy, colonoscopy and serological analysis in order to achieve the maximum diagnostic results. Furthermore the multicentric researches involving increased sample sizes should be conducted to further define the etiological spectrum of chronic small bowel diarrhea in the Indian population in the north.

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