Journal of Translational Gastroenterology **2025** vol. 3(2) | 51–61
DOI: 10.14218/JTG.2025.00001

Original Article

Upper Gastrointestinal Manifestations in Adult Egyptian Patients with Ulcerative Colitis: A Cross-sectional Study

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Received: January 03, 2025 | **Revised:** February 04, 2025 | **Accepted:** March 05, 2025 | **Published online:** March 19, 2025

Abstract

Background and objectives: This study investigates upper gastrointestinal tract (UGIT) involvement in patients with ulcerative colitis (UC), a condition traditionally considered limited to the colon. Although extra-colonic manifestations of UC are well recognized, UGIT issues have received less attention. This research aimed to document the clinical, endoscopic, and histopathological UGIT findings in adults with UC and assess their association with disease severity and extent.

Methods: This descriptive cross-sectional study was conducted at Ain Shams University over one year. A total of 78 UC patients underwent comprehensive clinical evaluations, including assessments of gastrointestinal complaints, medication history, disease progression, surgeries, and physical examinations. Endoscopic assessments of both the UGIT and colon were performed, accompanied by biopsies for histopathological analysis.

Results: The study population had a mean age of 35.26 years, with a nearly equal gender distribution. Endoscopic findings revealed significant UGIT involvement: 64% of patients had esophagitis and/or gastroesophageal reflux disease, 93% had gastritis, and 80% had duodenitis. Histopathological findings showed notable inflammation, basal cell hyperplasia, and ulcerations in the esophagus, with 51.3% of patients exhibiting chronic gastritis and 38.5% testing positive for *Helicobacter pylori* infection. Statistical analysis demonstrated a strong association between colonic disease severity and UGIT endoscopic ($p < 0.0001$ and $p < 0.001$ in the esophagus and stomach, respectively) and histopathological ($p < 0.004$, $p < 0.001$, and $p < 0.005$ in the esophagus, stomach, and duodenum, respectively) findings, particularly in patients with UGIT symptoms.

Conclusions: This study concludes that UGIT endoscopic and histopathological changes are prevalent among Egyptian UC patients, suggesting a significant link between UC and these UGIT findings.

Introduction

Inflammatory bowel disease (IBD) includes a spectrum of diseases, with Crohn's disease (CD) and ulcerative colitis (UC) representing the two main subtypes of IBD.[1] In contrast to Crohn's disease, which can affect areas of the gastrointestinal tract (GIT) outside of the colon, inflammation in UC is usually confined to the colon, typically affecting the rectum, with involvement extending proximally.[2]

Ulcerative colitis is a chronic, idiopathic inflammatory disease characterized by relapsing and remitting colonic mucosal inflammation.[3,4] It is known that this disease is confined to the colon, starting at the rectum and extending proximally for a variable distance, sometimes reaching the cecum. Despite UC having various extracolonic presentations, the upper gastrointestinal tract (UGIT) is not generally considered a target organ. UGIT involvement in IBD is typically thought to occur in CD. Furthermore, UGIT involvement in cases of indeterminate colitis often makes the diagnosis favor CD.[5]

However, many studies describing gastroduodenal lesions in adult patients with UC have questioned this clinical concept.[6] Recently, emerging evidence has highlighted reports of macroscopic

Keywords: Ulcerative colitis; Inflammatory bowel disease; IBD; Gastrointestinal tract; GIT; Upper GIT manifestations; Egyptian patients.

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How to cite this article: Elwakil O, Elwakil R, Hamed WAA, Nada OH, Saad-Hussein A, Ghoraba D, *et al*. Upper Gastrointestinal Manifestations in Adult Egyptian Patients with Ulcerative Colitis: A Cross-sectional Study. *J Transl Gastroenterol* 2025; 3(2):51–61. doi: 10.14218/JTG.2025.00001.

and microscopic findings, as well as a variety of accompanying symptoms involving the UGIT in patients with UC.[7]

Several research groups have reported endoscopic and histopathologic manifestations in the stomach and duodenum in UC cases. Such involvement has been termed "gastroduodenitis associated with ulcerative colitis".[7–9]

Oesophageal, gastric, and duodenal involvement has also been mentioned in ulcerative colitis cases in some case reports.[10,11] On the other hand Rubenstein *et al*.[12] indicated that multiple erosions in the UGIT are rare (0–3%) in UC patients. Gastritis is reported as the most common manifestation of UGIT in ulcerative colitis, with endoscopic findings reported in about 8% and histologic changes in about a third of the cases.[6] Duodenal manifestations were reported in about 3% to 10% of adult UC cases. It is noted that UC-related gastritis, as well as duodenitis, were more frequently reported in cases with severe UC that required colectomy.[9]

However, the data collected on UGIT manifestations in UC are still limited compared to CD.[10] Additionally, the data presented are nonspecific due to the absence of granulomatous reaction—a pathognomonic finding associated with CD—in contrast to the nonspecific findings reported in oesophageal UC. Other differential diagnoses causing inflammation in the UGIT are yet to be excluded.[6]

When treating ulcerative colitis, UGIT involvement may be overlooked because of the lack of recognition of possible involvement of the stomach and duodenum. Consequently, UGIT endoscopy might not be indicated, as no criteria suggesting UC-associated UGIT inflammation have been established to specify which patients should undergo UGIT endoscopy. Patients with ulcerative colitis-associated upper gastrointestinal inflammation might require additional specific treatment for such lesions. Therefore, studying and recognizing UGIT lesions is important.[13]

The current study aimed to describe UGIT clinical, endoscopic, and histopathological findings in adult Egyptian patients with UC and explore any potential association between UGIT findings and the severity and extent of UC disease.

Patients and methods

Patients

This descriptive cross-sectional study was conducted on 78 UC patients at the Tropical Medicine Department, Faculty of Medicine, Ain Shams University, over the course of one year, starting in August 2023.

Eligible cases were included consecutively in the study if they met the inclusion criteria. Inclusion criteria were as follows: male or female patients aged 18 years or older, diagnosed with UC as confirmed by colonoscopy and histopathological diagnosis, and who signed the informed consent. Exclusion criteria included patients under 18 years old, those who refused to sign the informed consent, and cases with severe co-morbidities such as exacerbation of chronic obstructive pulmonary disease, end-stage renal disease, decompensated chronic liver disease, or decompensated heart failure (which represents a contraindication to the performance of the endoscopy procedures), as well as patients with a confirmed diagnosis of CD.

Methods

All included patients underwent an assessment, which included a detailed history covering upper and lower GIT complaints, medication history, disease progression, and history of disease-related surgical interventions. A thorough clinical examination was performed on all patients.

Laboratory studies included a complete blood count using the Sysmex XN-1000 machine (Sysmex, Kobe, Japan), erythrocyte sedimentation rate (ESR) using the Westergren method, and quantitative C-reactive protein (CRP) using the Roche Cobas e411 auto analyzer.

UGIT endoscopy and colonoscopy were performed on all participants to assess the mucosa and take biopsies from the colon and UGIT. UGIT endoscopy was conducted using a Pentax (EG-3490K) video endoscope machine, while colonoscopy was performed using a Pentax (EC-3490LK) video endoscope machine. All endoscopy procedures were conducted by the same experienced endoscopist, who performs a high volume of endoscopic procedures. All procedures were carried out under conscious sedation administered by an anesthesia specialist. Documentation of the procedures was done by capturing photos to be included in the endoscopy report.

Histopathological methods

Tissue samples processing: Tissue samples were collected from admitted patients undergoing endoscopic intervention. Subsequently, a histopathological evaluation of the collected specimens was performed. Samples were fixed in formalin and processed in an automated Tissue Processor (Thermo Scientific Excelsior) over a 14-h run. The tissue was then embedded in blocks of paraffin wax.

Histopathologic evaluation: Using a microtome, sections of 5 µm thickness were cut from formalin-fixed, paraffin-embedded tissue blocks and subjected to Hematoxylin and Eosin staining. The slides were examined for histopathological features according to the biopsy site, including surface erosions, ulcers, mucosal architecture, mucosal lymphoplasmacytic inflammation, neutrophilic and eosinophilic components, lymphoid follicles with germinal centers, intraepithelial neutrophils, pit/crypt abscesses, as well as goblet cell population, metaplasia, atrophy, and dysplasia. Further assessment of the degree of chronicity and activity of each lesion was conducted for disease characterization and comparative study.

Evaluating ulcerative colitis activity

All patients included in the study were evaluated for the activity of their ulcerative colitis at the time of the study using the Mayo Endoscopic Score.[14]

Statistical methods

Data were collected and analyzed using the SPSS program for statistical analysis (IBM SPSS for Windows, Version 22.0).[15] Data were entered as numerical or categorical, as appropriate. Quantitative data are presented as mean, standard deviation (SD), and range. Qualitative data are expressed as frequency and percentage. The chi-square test (χ^2) was used to measure the association between qualitative variables. The likelihood ratio test was used for 2x2 qualitative variables when more than 25% of the cells had an expected count of less than 5. A *p*-value of less than 0.05 was considered statistically significant.[16]

Ethical considerations

This clinical research was conducted in accordance with the Helsinki Declaration of Good Clinical Practice, after obtaining approval from the Faculty of Medicine, Ain Shams University Research Ethics Committee (FWA 000017585) before starting the study. The approval number is FMASU MS 431/2023.

Table 1. Sociodemographic findings of the study cases

		Number (78)	Percent
Age	Mean ± SD	35.26 ± 10.564 years	
	Median (Mini-Max)	34 years (18–65 years)	
Gender	Female	38	48.7
	Male	40	51.3
Residence	Rural	68	87.2
	Urban	10	12.8
Occupation	Non-stressful	19	24.4
	stressful	45	57.7
	Unemployed	14	17.9
	Yes	38	48.8
Special Habits	Smokers	9	11.5
	Non-smokers	69	88.5

SD, standard deviation; Mini, minimum; Max, maximum.

Results

Sociodemographic data results

The mean age of the recruited cases was 35.26 (SD ± 10.564) years, with 51.3% male and 48.7% female participants (Table 1).

Clinical data results

Table 2 shows that 79% of the cases had more than six motions per day. All cases (100%) had a history of mucoid motions, mostly bloody (83.3%), and 25% of the cases had bleeding per rectum. Seventy-nine percent of the cases had more than six motions per day. Only two cases (2.6%) had a history of surgical interventions related to UC. UGIT symptoms were reported in 38 cases (48.8%), while extraintestinal symptoms were reported by only three patients (3.8%).

Table 3 shows that among the 78 cases in the study, only three (3.8%) had extraintestinal manifestations (two cases had joint involvement, and one case showed scratch marks).

Endoscopy findings results

Endoscopy findings of the study cases, presented in Table 4, show that 64% of the cases had oesophagitis/GERD, 93% had gastritis, and 80% had duodenitis. Colonoscopy showed that UC disease involved the entire colon (pancolitis) in 33.3% of the cases and was limited to the left side of the colon in 52.6% of the cases.

Figure 1 shows the Mayo Endoscopic Score index of disease severity among the study cases. Forty-nine (62.8%) had score 3, 17 (21.8%) had score 2, and 12 (15.4%) had score 1.

Histopathology examination results

The histopathology findings in the UGIT and the colon of the study cases are presented in Table 5. In the oesophagus, normal or unremarkable findings were diagnosed in 40% of the cases, while in 60% of the cases, there was an increase in inflammatory cells, basal cell hyperplasia, surface ulcerations, and hyperkeratosis. In the stomach, 51.3% of the cases had chronic non-specific gastritis, 38.5% had chronic gastritis with *Helicobacter pylori (H. pylori*) infection, and 10.3% were normal. Histopathology findings in colonic biopsies revealed that 74% of the samples showed cryptitis and 69% showed extensive surface ulcerations.

Statistical association results

Table 6 shows a highly significant association between the severity of the colonic disease, measured by the Mayo Endoscopic Score, and the endoscopic findings in the oesophagus ($p = 0.0001$) and the stomach ($p = 0.001$), while this association was not found in the duodenum ($p = 0.126$).

Table 7 reveals a highly significant association between the severity of colonic disease, measured by the Mayo Endoscopic Score, and histopathology findings in the oesophagus ($p = 0.004$), the stomach ($p = 0.001$), and with the presence of surface ulceration with distorted architecture in the duodenal biopsies ($p = 0.005$).

Table 8 shows a highly significant association between the extent of UC disease, as diagnosed by colonoscopy, and UGIT symptoms ($p = 0.005$).

Table 9 shows the association between laboratory findings and the disease severity in the colon diagnosed by the Mayo Endoscopic Score.

There was no association between the laboratory findings and the severity of colon disease diagnosed by the Mayo Endoscopic Score.

Discussion

The present work was conducted to study the UGIT manifestations associated with UC in adult Egyptian patients.

The mean age of the patients in the current study was 35.26 years (SD ± 10.88), which is similar to other reports in the literature. Although Cosnes *et al*.[17] reported an increased incidence of UC in different age groups, most patients with UC in recent decades present at diagnosis in the 30–40 years age group. In comparison to Western countries, the mean age at diagnosis of UC was found to be somewhat higher in Asian countries.[18] Ungaro *et al*.[19] indicated that the peak age of disease onset is between 30 and 40 years. Sanat *et al*.[20] reported that the mean age at diagnosis for UC is 32.7 years, based on the results of a systematic review and meta-analysis conducted to study the epidemiologic profile of the inflammatory disease in the Eastern Mediterranean Region.

There are reports in the literature referring to a second incidence peak in an older age group.[21] A study in southeastern Brazil

Table 2. Medical history related to UC

		Number (78)	Percent
Surgical interventions related to UC activities	No	76	97.4
	Yes	2	2.6
Number of motions	4 to 6	15	19.2
	less than 4	1	1.3
	More than 6	62	79.5
Bloody motions	No	13	16.7
	Yes	65	83.3
Mucoid motions	Yes	78	100.0
Bleeding per rectum	No	58	74.4
	Yes	20	25.6
Abdominal pain	Yes	40	52.2
	No	38	48.8
Tenesmus	No	31	39.7
	Yes	47	60.3
UGIT symptoms	No	40	52.2
	Yes	38	48.8
Extra intestinal manifestations	No	75	96.2
	Yes	3	3.8
Constitutional symptoms	No/ Free	60	76.9
	Yes	18	23.1
On 5 ASA medications	Missing	2	2.6
	No	40	51.3
	Yes	36	46.2
On Immuno-suppressive	No	54	69.2
	Yes	24	30.8
On any biologics	No	66	84.6
	Yes	12	15.4
On oral steroids	No	51	65.4
	Yes	27	34.6

ASA, Acetylsalicylic acid; UC, ulcerative colitis; UGIT, upper gastrointestinal tract.

Table 3. Clinical examination findings of the study cases

		Number (78)	Percent
Jaundice	No	78	100.0
Fever	No	78	100.0
Eye affection	No	78	100.0
Oral ulcers	No	78	100.0
Scratch marks	Yes	1	1.3
	No	77	98.7
Erythema nodosum	No	78	100.0
Joint affection	Yes	2	2.6
	No	76	97.4

showed a trend toward a second peak of new hospital admissions due to UC in the age group of 60–69 years.[22] Although there is no consensus in the literature regarding this second peak,[17] the current study reported an age range of 19–65, supporting the theory of a second peak among older UC patients.

In the present study, the male number was 40 (51.3%), and the female number was 38 (48.7%), which aligns with the male and female disease prevalence in the literature. Most UC studies have shown a male predominance or an equal distribution between males and females.[18] Italian investigators suggested that the male predisposition to UC may be related to polymorphisms in an enzyme involved in insulin signal transduction.[23] However, this hypothesis was rejected in a more recent study by a group of Spanish researchers.[24]

Only three cases (3.8%) showed extra-intestinal manifestations

Table 4. Endoscopy findings of the study cases

		Number (78)	Percent
UGIT endoscopy findings			
Findings in the esophagus	Free	28	35.9
	Esophagitis/GERD	50	64.1
Findings in the stomach	Free	5	6.4
	Gastritis	73	93.6
Findings in the duodenum	Free	15	19.2
	Duodenitis	63	80.8
Colonoscopy findings			
Extent of UC in colonoscopy	Left side colitis	41	52.6
	Normal	1	1.3
	Pan-colitis	26	33.3
	post colectomy	1	1.3
	Proctitis	1	1.3
	proctosigmoiditis	8	10.3
Colonic mucosa ulcerations	No	61	78.2
	Yes	17	21.8
Colonic pseudo polyps	No	49	62.8
	Yes	29	37.2
Loss of normal vascular pattern of colonic mucosa	No	29	37.2
	Yes	49	62.8

GERD, Gastroesophageal reflux disease; UC, ulcerative colitis; UGIT, upper gastrointestinal tract.

in the current study (two cases had joint involvement and one case had skin manifestations), which is lower than reports from some previous studies. Recent Saudi Arabian research reported a higher prevalence rate of extra-intestinal manifestations among extensive UC patients (19%), which is higher than the prevalence reported in our study. This may be due to a mixed ethnic background of their cohort or extensive disease in their patients.[25] Rawal *et al*.[26] reported that the prevalence of extraintestinal manifestations in their patients was 7.92%. Joint, skin, liver, eye, and hematologic manifestations were reported in patients with UC. Extraintestinal manifestations are associated with an increased extent of the disease and a poor prognosis.[27,28] In the pediatric population, Gower-Rousseau *et al*.[29] reported that extraintestinal manifestations in pediatric patients with UC increase the risk of colectomy. The low

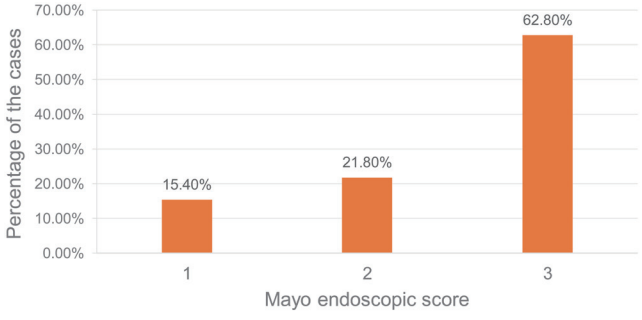

Fig. 1. Mayo Endoscopic Score distribution among the study cases.

number of extraintestinal manifestations in the present study, compared to other studies, may be explained by the low number of recruited patients in the current study.

In the current study, 79% of the cases presented with more than six motions per day, more than 80% had bloody motions, and 100% had mucoid motions. On the other hand, only 25% of the cases reported bleeding per rectum and 50% of the cases reported tenesmus. These findings are consistent with those reported by Ford *et al*.,[30] who concluded that a combination of anemia, weight loss of more than 5 kg in the past year, and more than four bowel movements daily showed a positive likelihood ratio of 14.6 for diagnosing UC. Endoscopy findings in the present study show that 64.1% of the cases had lower esophagitis and/or GERD, which is much higher than the prevalence of GERD in non-ulcerative colitis Egyptians. Teima *et al*.[31] reported that the prevalence of GERD in normal Egyptian subjects diagnosed with UGIT endoscopy was 38%. A recent study (2024) reported the prevalence of GERD in 602 medical students, recruited from 22 Egyptian universities, as 28.4%.[32] At the same time, Baklola *et al*. (2023) reported a prevalence rate of 17% among Egyptian medical students, which is much lower than the rate in UC patients in the current study.[33]

On the other hand, the histopathological examination of the biopsies taken from the esophagus of participants in the current study revealed that 43.6% of the samples showed basal cell hyperplasia, 7.7% showed surface ulceration, 5% showed increased inflammatory cells, and 2.6% showed hyperkeratosis. These findings are consistent with the results of other researchers in this area. Sun *et al*. reported that esophageal lesions in ulcerative colitis are

Table 5. Histopathology findings in the study cases

		Number (78)	Percent
Esophageal biopsy	Free, normal or unremarkable	32	41.0
	Increase in inflammatory cells	4	5.1
	Basal cell hyperplasia	34	43.6
	Surface ulceration	6	7.7
	Hyperkeratosis	2	2.6
Stomach biopsy	Free, normal	8	10.3
	Chronic non-specific gastritis	40	51.3
	Chronic gastritis with *H. pylori* infection	30	38.5
Lamina propria infiltration with chronic inflammatory cells/Stomach	No	8	10.3
	Yes	70	89.7
Surface ulceration or denudation/Stomach	No	61	78.2
	Yes	17	21.8
Duodenum biopsy			
Mixed inflammatory infiltrate	No	31	39.7
	Yes	47	60.3
Surface ulceration with preserved architecture	No	50	64.1
	Yes	28	35.9
Surface ulceration with distorted architecture	No	74	94.9
	Yes	4	5.1
Colon biopsy			
Crypt abscess	No	41	52.6
	Yes	37	47.4
Cryptitis	No	20	25.6
	Yes	58	74.4
Massive surface ulceration	No	24	30.8
	Yes	54	69.2
Focal surface ulceration	No	59	75.6
	Yes	19	24.4

uncommon, nonspecific, and more associated with extraintestinal manifestations.[34] Esophageal ulcers are described as solitary punched-out ulcers, frequently seen in the middle and lower esophagus by endoscopic examination.[35] Microscopically, only non-specific inflammatory cell infiltration was demonstrated in all reported cases of esophageal ulcers associated with UC.[34]

In the current study, UGIT endoscopy revealed that 93.6% of the patients had gastritis, while histopathological examination of

Table 6. The association of endoscopy findings in the UGIT with the severity of colonic disease measured by Mayo Endoscopic Score in the study cases

		Mayo score			Test	*p*-value
		1	2	3		
Findings in the esophagus	Free/Normal	10(37.0%)	6 (22.2%)	11 (40.7%)	χ^2 15.792	0.0001*
	Esophagitis/GERD	2 (3.9%)	11 (21.6%)	38 (74.5%)		
Findings in the stomach	Free/Normal	4(80.0%)	1 (20.0%)	0 (0.0%)	LH 14.262	0.001*
	Gastritis	8 (11.0%)	16 (21.9%)	49(67.1%)		
Findings in the duodenum	Free/Normal	5 (33.3%)	2 (13.3%)	8 (53.3%)	LH 4.140	0.126
	Duodenitis	7 (11.1%)	15 (23.8%)	41 (65.1%)		

χ^2, Chi-Square Test; LH, likelihood ratio test (G-Test); *, statistically significant. GERD, Gastroesophageal reflux disease; UGIT, upper gastrointestinal tract.

Table 7. The association of histopathology findings in the UGIT with the severity of colonic disease measured by Mayo Score in the study cases

		Mayo score			Test	*p*-value
		1	2	3		
Oesophagus	Free/normal	10 (31.2%)	6 (18.8%)	16 (50.0%)	LH 22.334	0.004*
	Increase in inflammatory cells	0 (0.0%)	0 (0.0%)	4(100.0%)		
	Basal cell hyperplasia	2 (5.9%)	6 (17.6%)	26 (76.5%)		
	Surface ulceration	0 (0.0%)	3 (50.0%)	3 (50.0%)		
	Hyperkeratosis	0 (0.0%)	2 (100.0%)	0 (0.0%)		
Stomach						
	Free/normal	5 (62.5%)	2 (25.0%)	1 (12.5%)	LH 19.053	0.001*
	Chronic non-specific gastritis	3 (7.5%)	5 (12.5%)	32 (80.0%)		
	Chronic gastritis with *H. pylori* infection	4 (13.3%)	10 (33.3%)	16(53.3%)		
lamina propria infiltration with chronic inflammatory cells/stomach	No	5 (62.5%)	2 (25.0%)	1 (12.5%)	LH 13.207	0.001*
	Yes	7(10.0%)	15 (21.4%)	48 (68.6%)		
Surface ulceration or denudation/stomach	No	12 (19.7%)	10 (16.4%)	39 (63.9%)	LH 9.167	0.010*
	Yes	0 (0.0%)	7 (41.2%)	10 (58.8%)		
Duodenum						
Mixed inflammatory infiltrate/duodenum	No	7 (22.6%)	7 (22.6%)	17 (54.8%)	χ^2 2.268	0.322
	Yes	5 (10.6%)	10 (21.3%)	32 (68.1%)		
Surface ulceration with preserved architecture/duodenum	No	11 (22.0%)	11 (22.0%)	28 (56.0%)	χ^2 4.996	0.082
	Yes	1 (3.6%)	6 (21.4%)	21 (75.0%)		
Surface ulceration with distorted architecture/duodenum	No	9 (12.2%)	16 (21.6%)	49 (66.2%)	LH 10.452	0.005*
	Yes	3 (75.0%)	1 (25.0%)	0 (0.0%)		

χ^2, Chi-Square Test; LH, Likelihood Ratio Test (G-Test); *, statistically significant. UGIT, upper gastrointestinal tract.

Table 8. The association of the extent of UC disease diagnosed by colonoscopy with UGIT symptoms

	UGIT symptoms?		Test	*p*-value
	No	Yes		
Extent of the disease in colonoscopy				
Left side colitis	27 (65.9%)	14 (34.1%)	LH 16.760	0.005*
Pan-colitis	6 (23.1%)	20 (76.9%)		
Post colectomy	0 (0.0%)	1(100.0%)		
Proctitis	1 (100.0%)	0 (0.0%)		
Proctosigmoiditis	5(62.5%)	3 (37.5%)		

UC, ulcerative colitis; GIT, gastrointestinal tract; LH, likelihood ratio test; UGIT, upper gastrointestinal tract.

the biopsy samples revealed that 51.3% of the cases had chronic non-specific gastritis and 38.5% showed chronic gastritis with *H. pylori* infection. Comparison of these findings with results reported by other studies showed that the presence of gastritis in an adult Egyptian group of patients presenting with dyspepsia (113 patients) was found to be 53.1%, which is similar to our results.[36] Other studies reported gastritis in 5–19% of patients with UC.[9,37,38] Focal enhanced gastritis (FEG) has been considered the most frequent UGI inflammatory form in patients with UC, followed by gastric basal mixed inflammation and superficial plasmacytosis. FEG is characterized by localized accumulation of lymphocytes, neutrophils, and macrophages in at least one pit, neck, or gland of the adjacent lamina propria.[39]

FEG can be seen in up to 20.8% of children with UC.[40] Basal and patchy inflammation, which includes a loose mixture of lymphocytes, eosinophils, mast cells, and plasma cells, were found in the lamina propria.[39] Superficial plasmacytosis is a diffuse band of plasma cells in the superficial lamina propria. Notably, erosions or ulcers complicated by UC are infrequent, and granulomas are always absent. Ulcerative colitis-related gastritis is characterized by diffuse granular or brittle mucosa, as well as aphthous lesions.[41] The infiltration of inflammatory cells observed in *H. pylori*-related gastritis and gastric CD-related chronic gastritis is denser and more diffuse than in UC.[34]

H. pylori was present in 33.93% of the gastric biopsy samples in the current study, which is quite low compared to the prevalence of *H. pylori* reported by other researchers in gastric biopsies of Egyptian patients. Metwally *et al*. reported that *H. pylori* was detected in gastric biopsies of 90.3% of their dyspeptic patients.[42] Other studies reported that the prevalence of *H. pylori* in Egypt was 88.7% and 84.9%.[43,44] The cause of the difference between our results and those of other Egyptian researchers may be explained by the small number of patients examined in the current study. Metwally *et al*. studied 134 patients, Enany *et al*. studied 134 patients, while Gad *et al*. studied 365 subjects, compared to the 78 patients studied in the current study.[42–44] Gad *et al*.[44] diagnosed *H. pylori* in their cases using serological tests, while *H. pylori* was diagnosed in the current study through histopathological examination.

On the other hand, Emara *et al*.[45] reported that the prevalence of *H. pylori* in gastric biopsies in an Egyptian cohort of patients presenting with dyspepsia was 47.9%, which is not much higher than that reported in UC cases in the current study.

In the current study, 78.8% showed duodenitis on duodenoscopy, while histopathological examination of biopsies taken from the duodenal mucosa showed chronic non-specific duodenitis in 85.7%. These results align with several studies that reported the occurrence of chronic duodenitis associated with UC.[9,12,37,41,46]

Diffuse chronic duodenitis was reported in 10% of duodenal biopsies from UC patients. The reported endoscopic findings in UC cases presenting with UGIT symptoms are diverse and include diffuse edema, granular mucosa, and fragile ulcers. The microscopic characteristics of duodenitis associated with UC include diffuse inflammatory infiltration of monocytes and neutrophilic inflammation, glandular deformation, and erosion or ulceration.[47]

Statistical analysis of the findings of the current study showed a highly significant association between the severity of colonic disease, measured by the Mayo Endoscopic Score, and the endoscopic findings in the esophagus ($p = 0.0001$) and the endoscopic findings in the stomach ($p = 0.001$). In contrast, this association was not found in the duodenum ($p = 0.126$). At the same time, statistical analysis showed a highly significant association between the severity of colonic disease, measured by the Mayo Endoscop-

Table 9. Correlation between laboratory findings and colonic disease severity based on the Mayo Endoscopic Score

	Mayo endoscopic score						ANOVA	
	1 (12)		2 (17)		3 (48)			
	Mean	SD	Mean	SD	Mean	SD	F-ratio	*p*-value
Hgb% (gm/dL)	9.83	1.59	10.47	2.32	10.19	1.94	0.364	0.696
PLT count Per microliter	329.330	38.91	266.65	74.73	287.53	88.96	1.570	0.215
TLC Per microliter	8.225/mL	1.98	7.353	2.67	7.696	3.01	0.341	0.712
CRP (mg/L)	29.08	8.294	28.47	4.439	27.48	3.330	0.29	0.972
ESR mm/h	24.08 cm	5.117	27.12	3.978	30.58	3.192	0.563	0.572

Hgb, Hemoglobin; gm/dL, grams per deciliter; PLT, platelet; TLC, total leucocytic count; CRP, C-reactive protein; mg/L, milligrams per liter; ESR, erythrocyte sedimentation rate; mm/h, millimeters per hour. ANOVA, Analysis of Variance.

ic Score, and the histopathology findings in the esophagus (p = 0.004), the stomach (p = 0.001), and with the presence of surface ulceration with distorted architecture in the duodenal biopsies (p = 0.005). These findings are similar to those reported by other studies, which found that severe gastroduodenitis is usually seen in subjects with extensive colitis, ileoanal pouchitis, or pancolitis.[37]

Further analysis of the results of the current study revealed a highly significant association between the extent of the disease diagnosed in the colon by colonoscopy and the presence of reported UGIT symptoms by the patients. Seventy-six percent of the patients with pancolitis and 100% of the patients with a history of colectomy reported UGIT symptoms (p = 0.005), with a likelihood ratio of 17.6. These results are consistent with those reported by Hori *et al*.,[9] who found that the presence of pancolitis was a significant risk factor for developing gastroduodenitis associated with UC. The authors concluded that more severe UC, such as active pancolitis, may be related to the presence of gastroduodenitis associated with UC.

On the other hand, there was no association between the laboratory findings (Hgb%, TLC, CRP, and ESR) and the severity of the disease in the colon, as measured by the Mayo Endoscopic Score. This finding differs from the results of Turner *et al*.,[48] who found a correlation between endoscopic appearance and CRP and ESR in severe cases. Both CRP and ESR may be completely normal in 34% and 5–10% of those with mild and moderate-severe disease activity, respectively. Elevated CRP in the presence of normal ESR, or vice versa, was noted in 32%, 38%, 30%, and 17% of those with quiescent, mild, moderate, and severe disease activity. The discrepancy between the results of the current study and those of Turner *et al*. may be due to the difference in age between the two studies, as Turner *et al*.'s study included pediatric patients, while our study included adult patients.

The results of the current study provide a rationale for conducting a UGIT endoscopy for all UC patients to diagnose any findings related to medications used for treatment or specific findings related to the UC disease. Therefore, the results of the current study may have a potential to modify clinical practice in UC cases.

The strength of the present study lies in being the first research to study UGIT manifestations in Egyptian UC patients. The results proved an association between UC and the presence of endoscopic and histopathological changes in the UGIT. The limitation of the current study is that it is a descriptive uncontrolled study. Additionally, it is a single-center study with a small number of cases, and it does not include a subgroup analysis or statistical adjustments for medications that could independently contribute to UGIT findings. Among the limitations of this study is that all endoscopic procedures were performed by a single endoscopist, which could introduce potential observer bias and affect the generalizability of the findings.[49]

Conclusions

The current study concluded that endoscopic and histopathological changes in the esophagus, stomach, and duodenal mucosa are common in Egyptian UC patients. The study has established an association between UC and the endoscopic and histopathological findings in the esophagus, stomach, and duodenum. We recommend conducting a UGIT endoscopy examination for UC patients to diagnose any present UGIT lesions. The results of this study provide a rationale for conducting multicenter controlled studies with a larger number of Egyptian UC patients to confirm these findings.

Acknowledgments

All authors acknowledge Reda Elwakil Charitable Endoscopy Center for providing free endoscopy procedures for some of the study cases.

Funding

This research did not receive any financial support. Some endoscopy procedures were conducted free of charge for underprivileged participants at Reda Elwakil Charitable Endoscopy Center.

Conflict of interest

There is no conflict of interest to declare by any of the authors.

Author contributions

Contributed to the study concept and design (RE, WAAH, OE), obtained the data and performed endoscopy procedures (RE, OE), shared in the acquisition and analysis of the data (EMB, DG), examined histopathology samples (OHN), and reviewed the statistical analysis of the study (ASH). All authors participated in writing the final manuscript and approved it.

Ethical statement

This clinical research was conducted in accordance with the Helsinki Declaration of Good Clinical Practice, after obtaining approval from the Faculty of Medicine, Ain Shams University Research Ethics Committee (FWA 000017585) before starting the study. The approval number is FMASU MS 431/2023. The informed consent was obtained from patients.

Data sharing statement

The dataset used in this study is not publicly available but can be obtained from the corresponding author at elwakilreda@gmail.com.

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