Systematic Review Article

Upper Gastrointestinal Involvement in Pediatric Inflammatory Bowel Disease: A Decade of Evidence from a Systematic Review (2015-2025)

Iraj Shahramian[1], Alireza Aminisefat[2], Masoud Tahani[2], Fateme Ziyaee[1], Ali Mansouri[2], Ramin Niknam[3], Fardad Ejtehadi[3*]

[1] Department of Pediatric Gastroenterology, Shiraz University of Medical Sciences, Shiraz, Iran

[2] Pediatric Digestive and Hepatic Diseases Research Center, Zabol University of Medical Sciences, Zabol, Iran

[3] Gastroenterohepatology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

ABSTRACT

Background:
Upper gastrointestinal (UGI) manifestations of ulcerative colitis (UC) and Crohn's disease (CD) are common in children but are often clinically silent or overshadowed by lower gastrointestinal manifestations. Accordingly, UGI biopsies should be performed at diagnosis in all patients suspected of CD or UC. The present study investigates the frequency of UGI involvement in pediatric inflammatory bowel disease (IBD).

Materials and Methods:
We conducted a comprehensive search to identify relevant English-language studies published between 01.01.2015 and 01.01.2025. Two independent reviewers screened and selected studies involving pediatric patients (<18 years) with IBD. We searched MEDLINE (via PubMed), EMBASE (via Ovid), the Cochrane Library, and the Trip Database. Keywords and MeSH terms used in the strategy included: Inflammatory bowel disease, Ulcerative colitis, Crohn's disease, Phenotype, Upper gastrointestinal, Child, and Infants.

Results:
According to the Paris classification criteria, the most frequent site of involvement in children with CD was the ileum and colon (ileocolonic disease, L3), accounting for 52.8% (1450 patients). Meanwhile, the lowest frequency of involvement was associated with the upper section distally to the ligament of Treitz and proximally to 1/3 of the distal section of ileum (L4b), with a frequency of 7.4%. In this study, the involvement rate of the upper section of the alimentary canal, proximal to the ligament of Treitz (L4a), was 38.5% (1056 patients). Additionally, among patients with UC, 78 patients (5.1%) had evidence of UGI involvement.

Conclusion:
No definitive evidence was reported regarding the relationship between the location of involvement and demographic, genetic, inflammatory, and other factors. However, further studies are required to address this issue.

Keywords: Inflammatory bowel disease; Ulcerative colitis; Crohn's disease; Phenotype; Upper gastrointestinal; Child; Infants

please cite this paper as:
Shahramian I, Aminisefat AR, Tahani M, Ziyaee F, Mansouri A, Niknam R, Ejtehadi F. Upper Gastrointestinal Involvement in Pediatric Inflammatory Bowel Disease: A Decade of Evidence from a Systematic Review (2015-2025). *Govaresh*. 2026; 31: 108-117.

**Corresponding Author:*
Fardad Ejtehadi, MD
Gastroenterohepatology Research Center, Shiraz
University of Medical Sciences, Shiraz, Iran
Tel: +98 71 36474316
Fax: +98 71 36474316
Email: edjtehadif@sums.ac.ir

Received: 22 Oct. 2025
Revised: 10 Feb. 2026
Accepted: 11 Feb. 2026

INTRODUCTION

Inflammatory bowel disease (IBD), which includes Crohn's disease (CD) and ulcerative colitis(UC), continues to increase in children worldwide, and data are emerging from previously unreported areas, particularly in newly industrialized regions such as Asia (1, 2).

In this regard, phenotypic classification of IBD is essential for accurate management and prognosis. According to the guidelines of the Pediatric IBD Group in Porto of the European Society of Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), pediatric IBD is classified into five subtypes: UC, atypical UC, colonic CD, small bowel CD, and CD unclassified (IBDU). This classification is based on endoscopic and pathological findings (3).

Despite the many similarities between pediatric and adult IBD, the disease often presents with unusual features and onset in childhood, making the classification of IBD in children challenging. Accordingly, understanding the extent of IBD is essential for optimal management, and CD can affect the entire gastrointestinal tract.

In contrast, UC is localized to the rectum and colon. However, UGI involvement, previously considered specific to CD, is no longer a suitable criterion for differentiating CD from UC, as it may occur in both diseases (4).

In addition, UGI involvement is more commonly diagnosed in pediatric patients compared with adults, and even if patients with IBD are asymptomatic, UGI endoscopic and histopathological examinations can reveal UGI lesions, which significantly contribute to the comprehensive evaluation and management of IBD (5).

Evidence has shown that UGI manifestations are common in CD and UC but are often clinically silent or overshadowed by lower gastrointestinal manifestations. However, they sometimes present with serious complications, particularly in patients with CD (6). Previous studies evaluating the findings of pediatric IBD have confirmed the high prevalence of macroscopic and microscopic abnormalities in the UGI tract, with abnormal UGI endoscopic findings in 64% of children with CD and 50% of children with UC, and histological abnormalities in 82% and 70% of patients, respectively (7).

Some studies have reported that duodenitis is the most common cause of duodenitis in 12% of children undergoing endoscopy with underlying celiac disease and IBD. The prevalence of duodenitis in childhood CD and UC varies from 33% to 48% and 0% to 29%, respectively. Additionally, more than half of children with biopsy-proven duodenitis have normal duodenal mucosa on endoscopic examination (8).

Histologically, no specific features reliably distinguish IBD-associated duodenitis from non-IBD causes, except for granulomas in CD. One study also reported that cryptitis is significantly more common in children with IBD compared with patients with celiac disease and other underlying causes (9). Therefore, due to insufficient information on the rate of UGI involvement in children with IBD, the present study examines this issue in children with CD and UC.

MATERIALS AND METHODS

We conducted a systematic literature search according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We used the following search strategy between January 2015 and January 2025 to identify eligible studies.

Two separate investigators searched for relevant articles published between January 2015 and January 2025. For English-language publications, the Cochrane Library databases, Ovid, and Trip were searched in MEDLINE, EMBASETM, and MEDLINE via PubMed. To assess literature saturation, we checked reference lists and relevant reviews. The Health Sciences Librarian website was used to develop unique search techniques for systematic reviews, using MESH and open terms with PRESS criteria (Figure 1).

Eligibility criteria

Articles that met the criteria for systematic review included cross-sectional, cohort, and case-control studies with full-text access. Exclusion criteria included duplicate studies, non-randomized sample sizes, insufficient data, and irrelevance to the topic. Two investigators performed each step separately to avoid bias. Finally, the consistency of the third investigator's findings was assessed.

Study selection and data extraction

After collecting relevant publications, we prepared a list of abstracts and made the full texts available to the researchers after anonymizing the journals and authors' details. Two researchers reviewed each publication independently, and if an article was rejected, they stated the reason. If the two researchers disagreed, a third researcher evaluated the article.

Quality of included studies

We assessed the quality of the included studies using the following six parameters:

sample size, mean age, disease activity (PUCAI/PCDAI), age at diagnosis, luminal disease behavior, and location of lesions (Table 1). A general overview of the study (i.e., first author, country, and year of publication) and study details (i.e., sampling method, data collection method, number of participants, the proportion of females versus males, mean age, and the general population) were extracted (Table 2).

Table 1. The six-item checklist to assess the quality of the collected articles

First author	Year	Country	Sample size	Mean age	Disease activity (PUCAI/ PCDAI)	Age at diagnosis	Luminal disease behavior	Location of lesions	Quality
Buderus	2015		√	√	*	*	√	√	Good
Carroll	2016	Canada	√	√	√	√	√	√	Good
Assa	2017		√	√	*	*	√	√	Good
Sullivana	2017	Canada	√	√	*	*	*	√	Moderate
Więch	2017	Poland	√	√	*	*	*	√	Moderate
Horn	2018	Switzerland	√	√	*	*	*	√	Moderate
Chaparro	2019	Spain	√	√	*	√	√	√	Good
Ziade	2019	Denmark	√	√	*	*	√	√	Good
Arai1	2019	Japan	√	√	*	√	√	√	Good
Olbjørn	2019	norway	√	√	√	*	*	√	Moderate
Park	2021	Korea	√	√	√	√	√	√	Good
Martins	2022	Brazil	√	√	*	*	√	√	Good
Lim	2024	Korea	√	√	√	*	*	√	Moderate
Putnikovi	2024	Serbia	√	√	*	√	√	√	Good
White	2025	UK	√	√	*	√	√	√	Good

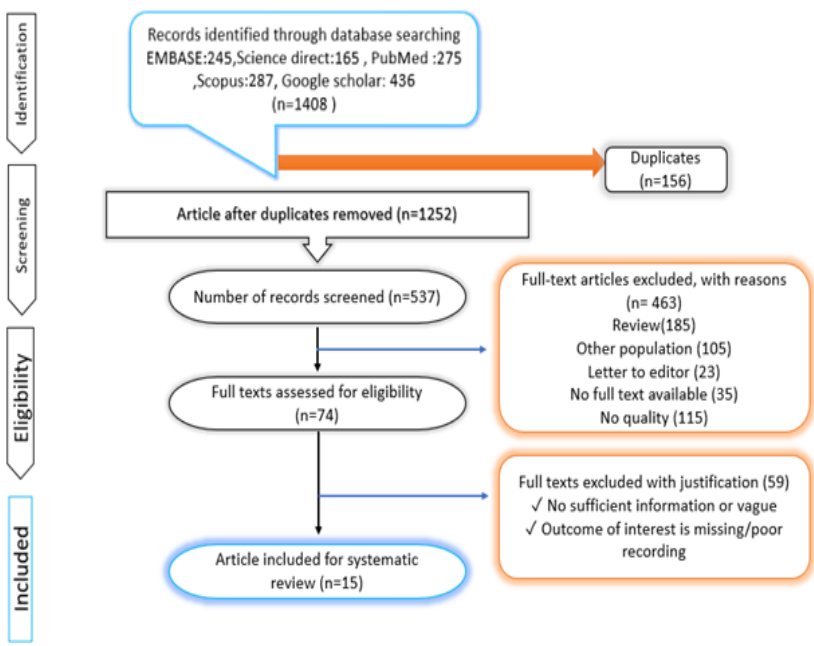


Figure 1. PRISMA flow diagram

Table 2. Summary of the included studies

Author	Year	Country	Sampling method	Study design	Male to female	Sample size	Age Median(range) y	Study population
Buderus (10)	2015		Convenience	Reetrospective		CD: 616 UC: 278 IBD-U: 64	CD: 13 UC: 12.6 IBD-U: 11.9	Children with IBD
Carroll (11)	2016	Canada	Convenience	Reetrospective	1.1	CD: 638 UC: 230 IBD-U: 75	11.7(8.2-14.1)	Children with IBD
Assa (12)	2017		Convenience	Reetrospective	1.2	CD: 235	14.2 ± 2.4	Children with CD
Sullivana et al. (13)	2017	Canada	Convenience	Reetrospective	0.7	UC: 52	13 (11-15) vs 14(12.25-15)	Children with refractory and non-refractory UC
Więch et al. (14)	2017	Poland	Convenience	Reetrospective	1.3	CD: 25 UC: 34	13.5 ± 3.41 (UC) vs 13.8 ± 3.12 (CD)	Children with IBD
Horn (15)	2018	Switzerland	Convenience	Reetrospective	1.1	CD: 28 UC: 33	11.2 ± 7.5	Children with IBD
Chaparro (16)	2019	Spain	Convenience	Reetrospective	1.3	CD: 520 UC: 305	15	Children with IBD
Ziade (17)	2019	Denmark	Convenience	Reetrospective	1.2	CD: 102 UC: 98	13 (0.37-14.98)	Children with IBD
Arai (18)	2019	Japan	Convenience	Reetrospective		CD: 91 UC: 146	11 ± 3.8	Children with IBD
Olbjørn (19)	2019	Norway	Convenience	Reetrospective	1	CD: 80 UC: 27 IBD-U: 3	12.5	Children with IBD
Park (20)	2021	Korea	Convenience	Reetrospective	2	CD: 227 UC: 80	14.4	Children with IBD
Martins (21)	2022	Brazil	Convenience	Reetrospective	0.8	CD: 30 UC: 24	12.2 ± 4.2	Children with IBD
Lim (22)	2024	Korea	Convenience	Reetrospective	1.5	UC: 205	14.7	Children with UC
Putnikovi (23)	2024	Serbia	Convenience	Reetrospective	1.6	CD: 100	13.8	Children with CD
White (24)	2025	UK	Convenience	Reetrospective	1.7	CD: 53 UC: 11	CD: 13.7 UC: 14.6	Children with IBD

RESULTS

In the present study, 2745 children with CD and 1523 children with UC were evaluated. Also, 142 children were classified as IBD-U.

GI involvement and location

According to the Paris classification criteria (Figure 2), the most common involvement in children with CD was in the ileum and colon (ileocolonic disease, L3), accounting for 52.8% (1,450 patients). Meanwhile, the lowest frequency of involvement was associated with the upper section distally to the ligament of Treitz and proximally to 1/3 of the distal section of ileum (L4b), with a frequency of 7.4%. In this study, the rate of involvement of the upper section of the alimentary canal, proximal to the ligament of Treitz (L4a), was 38.5% (1,056 patients). Also, the frequency of involvement of 1/3 of the distal ileum (L1) and colon (L2) in CD was 16.2% (444 patients) and 21.9% (600 patients), respectively. In patients with CD, most (86.4%) had inflammatory (B1) evidence, and 13.4% also had stricturing (B2) findings. Penetrating (B3) was also observed in only 9.4% of patients. The study of the age of diagnosis of the patients indicated that 279 patients (10.2%) were in the A1a (<10 yr.) classification, 1,123 patients (40.9%) in the A1b (10 to < 17) classification, and 83 patients (3%) were in the A2 (≥17) classification.

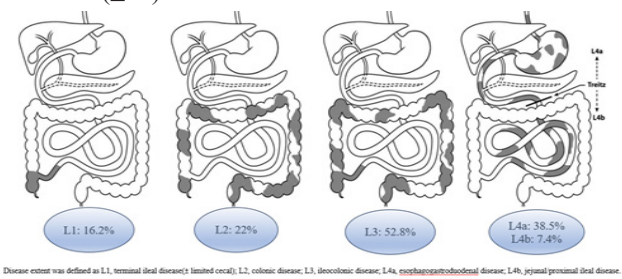


Figure 2. Disease location according to the Paris classification in patients with pediatric CD.

A study of children with UC showed that 55% (844 patients) had pancolitis (proximal to hepatic flexure) (E4). The frequencies of involvement for ulcerative proctitis (E1), left-sided UC (distal to the splenic flexure) (E2), and extensive (hepatic flexure distally) (E3) were 9.1% (138 patients), 21.2% (323 patients), and 9.8% (149 patients), respectively. Many studies have not examined UGI involvement in patients with UC in detail; however, 78 patients (5.1%) with UC had evidence of UGI involvement (Figure 3).

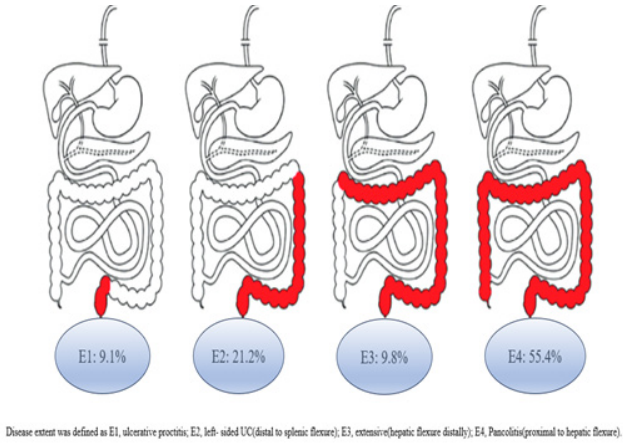


Figure 3. Disease location according to the Paris classification in pediatric patients with UC.

Table 3. Phenotypic characteristics of pediatric inflammatory bowel disease according to the Paris classification in included studies

Author	Age at diagnosis	Disease activity (PUCAI/PCDAI)	Luminal disease behavior	Location of UC lesions (Paris classification)	Location of CD lesions (Paris classification)
Buderus et al. (10)			B1: 586(95.1%) B2: 17(2.8%) B3: 13(2.1%)	E1: 15(5.3%) E2: 52(18.5%) E3:23(8.2%) E4: 178(63.4%)	L1: 64 (13.3) L2: 95 (19.8) L3: 300 (62.5) L4a: 225 (46.9%) L4b: 32 (6.7%)
Carroll et al. (11)	A1a: 194 (22.4%) A1b: 660 (76%) A2: 14 (1.6%)	S0: 156(69.3%) S1: 69(30.7%)	B1: 455(71.3%) B2: 97(15.2%) B3: 23(3.6%) B2B3: 64(1%)	E1: 10(3.3%) E2: 36(11.8%) E3: 37(12.1%) E4: 145(47.5%)	L1: 57(9%) L2: 239(37.5%) L3: 342(53.6%) L4a: 326(51.1%) L4b: 96(10.8%)
Assa et al. (12)			B1: 161(68.8%) B2: 63(26.9%) B3: 10(4.3%)		Perianal (+) L1: 70(40%) L2: 33(18%) L3: 33(57%) L4a: 70(45%) Nonperianal (-) L1: 14(25%) L2: 10(18%) L3: 33(57%) L4a: 28(56%)
Sullivana et al. (13)				Refractory UGI: 11(42%) Non-Refractory UGI: 8(30%)	

Table 3. Phenotypic characteristics of pediatric inflammatory bowel disease according to the Paris classification in included studies

Author	Age at diagnosis	Disease activity (PUCAI/PCDAI)	Luminal disease behavior	Location of UC lesions (Paris classification)	Location of CD lesions (Paris classification)
Więch et al. (14)				E2: 3(8.8%) E3: 4(11.8%) E4: 27(79.4%)	L1: 9(36%) L2: 2(8%) L3: 13(52%) L4a: 16(64%) L4b: 3(12%)
Horn et al. (15)				E2: 6(18%) E3: 5(15%) E4: 22(67%)	L1: 5(19.9%) L2: 8(28.6%) L3: 15(53.6%) L4a: 13(46.4%) L4b: 3(10.7%)
Chaparro et al. (16)			B1: 489 (94%) B2:19 (3.7) B3:12 (2.3)	E1: 40(13.6%) E2: 105(35.6%) E4: 150(50.8%) UGI: 47(15.4%)	L1: 129(26%) L2: 73(14%) L3: 293(59%) L4a:80(15.4%)
Ziade et al. (17)			B1: 86(84%) B2: 7(7%) B3: 9(9%)	E1: 6(3%) E2: 27(13%) E3: 12(6%) E4: 53(25%)	L1: 16(15.7%) L2: 35(34.3%) L3: 50(49%) L4a: 29(28%)
Arai et al. (18)	A1a: 35(14.8%) A1b: 180(75.5%) A2: 22(9.3%)		B1: 76(83.5%) B2: 10(11%) B3: 3(3.3%) B2B3: 2(2.2%)	E1: 10(6.8%) E2: 18(12.3%) E3: 7(4.8%) E4: 111(76.0%)	L1: 17(18.7%) L2: 12(13.2%) L3: 59(64.8%) L4a: 43(47.3%) L4b: 19(20.9%)
Olbjørn et al. (19)		PCDAI: 20 (0–62.5) PUCAI: 40 (0–75)		E1: 5(17%) E2: 8(27%) E3: 17(57%)	L1: 5 (6.2%) L2: 24(30%) L3: 47(58.8%) L4a: 54(67.5%) Perianal: 17(21.2%)
Park et al. (20)	A1a: 18 (7.9%) A1b: 175 (77.1%) A2: 34 (15%)	PCDAI: 37.5 (30–47.5) PUCAI: 40 (25–55)	B1: 168(74%) B2: 11(4.8%) B3: 46(20.3%) B2B3: 2(0.9%)	E1: 22(27.5%) E2: 9(11.3%) E3: 6(7.5%) E4: 43(53.8%) Esophagus: 2(2.5%) Stomach: 10(12.5%) Duodenum: 6(7.5%) Ileal: 16(20%)	L1: 31(13.7) L2: 33(14.5) L3: 153(67.4) L4a: 106(46.7%) L4b: 37(16.3%)
Martins et al. (21)			B1: 200(56.5%) B2: 76(21.5%) B3: 75(21.2%)	E1: 3(12.5%) E2: 6(25%) E3: 15(62.5%)	L1: 6(20%) L2: 10(33.3%) L3: 13(43.3%) L4a: 4(13.3%)
Lim et al. (22)		35(25-55)		E1: 25(12.2%) E2: 51(24.9%) E3: 23(11.2%) E4: 106(51.7%)	
Putnikovi et al. (23)	A1a: 19(19%) A1b: 68(68%) A2: 13(13%)		B1: 98(98%) B2: 2(2%)		L1: 7(17%) L2: 8(8%) L3: 68(68%) L4a:32(32%)
White et al. (24)	A1a: 13(24.1%) A1b: 40(74.1%)		B1: 53(100%)	E2: 2(18.2%) E4: 9(81.8%)	L1: 4(7.5%) L2: 18(34%) L3: 31(58.5%) L4a: 30(56.6%) L4b: 14(26.4%) Perianal: 4(7.5%)

Upper gastrointestinal endoscopic findings

Seven of the included studies reported detailed upper gastrointestinal endoscopic (UGIE) findings. Gastric lesions were the most frequently described abnormalities. Gastritis was the predominant lesion, with reported frequencies ranging from approximately 20% to 50% among children with CD. Duodenitis was the second most common lesion, reported in 12–48% of patients, while esophageal involvement was less frequent (approximately 9–28%). Other macroscopic abnormalities included gastric erosions, aphthous ulcers, mucosal edema, nodularity, erythema, and duodenal ulceration. Several studies also emphasized that a considerable proportion of children with biopsy-proven upper gastrointestinal inflammation had normal macroscopic endoscopic findings, highlighting the importance of routine biopsy during upper endoscopy regardless of gross mucosal appearance.

Table 4. Summary of upper gastrointestinal endoscopic findings reported in included studies

Study	Esophagus	Stomach	Duodenum	Other findings
Putniković et al. 2024	21% involvement	50% gastric abnormalities	28% duodenal abnormalities	Granulomas/ chronic inflammation
Park et al. 2021	2.5%	12.5%	7.5%	Ileal lesions also reported
Sullivan et al. 2017	NR	Active gastritis	Duodenitis	Associated with refractory UC
Basturk et al. 2018	NR	Chronic and focal enhanced gastritis	NR	Histological gastritis
Other included studies	Occasional esophagitis	Gastritis/ erosions/ nodularity	Duodenitis/ erosions	Some had normal endoscopy despite abnormal biopsy

DISCUSSION

UGI involvement is commonly seen in pediatric IBD, and upper endoscopy is included in the routine workup of children with IBD to help improve the diagnosis and management of these patients. However, despite the common presence of UGI involvement, histological confirmation, especially the presence of epithelioid (non-caseating) granulomas, is required in the diagnosis and classification of IBD (25). In this respect, it is recommended to perform upper GI biopsies at the time of diagnosis in all patients suspected of having CD and UC. In the present study, the most common site of involvement in children with CD was L3, and children with UGI involvement accounted for approximately 38.5% of patients. We found no association between the extent of UGI involvement and inflammatory factors, luminal disease behavior, age at diagnosis, or disease activity (Table 3).

Putniković and colleagues (23) reported that more than one-third of children with CD had abnormal endoscopic and histopathological findings in the UGI, and another 23% had histopathological findings strongly suggestive of CD. In this study, the stomach was the most common site of macroscopic changes in children with CD (50%), followed by the duodenum and esophagus (28% and 21% involvement, respectively, on endoscopy). Diagnostic features of CD also included chronic inflammation with non-caseating granulomas in the stomach (18%), esophagus (9%), and duodenum (12%). Márta and others (26) reported that 1:3 of patients with CD had significant lesions on upper endoscopy. This study reported that the frequency of UGI involvement in children with CD and UC was high, with only 1 in 10 patients receiving a definitive diagnosis from EGD. Another study in Korea showed that 79% of patients with CD had L3 involvement, and 25% had UGI (L4a) involvement (27). Basturk and colleagues (28) also showed that the frequency of chronic active gastritis in patients with CD and UC was 50% and 46%, respectively, in adult patients with IBD. Chronic inactive gastritis was also reported with a frequency of 6% and 7%, and focal enhanced gastritis with a frequency of 12% and 0% in CD and patients with UC, respectively. These findings showed a higher prevalence in adults compared with the present study. In this study, 78 patients (5.1%) with UC had evidence of UGI involvement. It is now well established that UC with onset in children has a distinct disease phenotype and a more aggressive course than UC with onset in adults (29). A previous meta-analysis showed that the most common degree of involvement in adult-onset UC was E2, followed by extensive colitis, with proportions different from those in children (30). As observed in most previous studies on pediatric UC, E4 was the most common disease severity reported at diagnosis (20,31,32). Studies have shown that duodenal and gastric inflammation is common in UC, with histological findings favoring gastritis in 20-94% (33,13) and duodenitis in 9-23% of pediatric patients with UC (13), a significant proportion. Park et al. (20) reported that 12.5% of children with UC had evidence of UGI involvement. Therefore, in line with the above findings, some studies show that UC, when more aggressive and severe, can be associated with UGI involvement, with

pancolitis and extensive colitis requiring proctocolectomy reported as predictors of gastroduodenitis (34).

Many reports describe the influence of various factors on disease location; however, no definitive conclusion has emerged. In a population of children with CD in Japan, the colon was less involved, although the UGI and perianal area were more involved. This study reported that environmental and genetic factors may contribute to the CD phenotype (21). Some evidence also describes an ethnically unique clinical phenotype, in which South Asian children have a higher proportion of UC, shorter duration of symptoms, more extensive colonic disease, and are more likely to require more aggressive and early treatment. In fact, South Asian patients with UC were more likely to have colonic disease (E4), whereas those from other regions had more limited colonic disease (E2) and ulcerative proctitis (E1) (11). While in the EUROKIDS subgroup analysis on ethnicity, Asian children did not show a significant prevalence in the L4a group. However, other Asian cohort studies have reported more frequent UGI involvement. These data suggest that environmental factors, such as dietary culture, combined with similar genetic predisposition, may influence the location of the disease (20).

With data from the European pediatric registry EUROKIDS, it has been shown that extensive inflammatory involvement is present in children and adolescents before the onset of IBD (35). Only a few pediatric studies have investigated the usefulness of biochemical markers in predicting disease course, and their significance remains unclear. Müller and others (36) found that higher CRP was associated with ileal and UGI involvement in pediatric patients with celiac disease at the time of diagnosis. In addition, patients with celiac disease and the stricture and/or infiltrative phenotype (B2 and B3) had higher CRP. Some studies have also found that the presence of active gastritis and duodenitis in biopsies of children with confirmed CD and UC is associated with drug resistance, predicting drug resistance in these patients (23). However, more extensive studies are needed to draw definitive conclusions about the relationship between UGI inflammation and drug resistance. Hsu et al. (37) also showed that patients with CD and UGI involvement had higher disease activity and were independent predictors of intestinal strictures. In fact, in this study, patients with L4 involvement had higher CDAI scores and hospitalization rates, higher C-reactive protein levels and lower albumin concentrations, a higher incidence of intestinal strictures, and more frequent use of biologics and proton pump inhibitors than other patients. Sullivana et al. (13) reported UGI involvement in about 42% of children with refractory UC, but about 30% in non-refractory patients. This study found that children with refractory UC were more likely to have active UGI inflammation, suggesting it could predict treatment response.

Many reports describe disease site changes over the long course of the disease, as well as the environmental and genetic factors that influence it. A study in Japan showed greater ileocolic (L3) and UGI tract (L4) involvement, and less colonic (L2) involvement, in CD compared with European children (18). Another study showed that only 6.5% of patients had a change in disease extent and location between onset and the observation of maximum extent (38). In South Korea, the disease location did not change in any patient from initial diagnosis to the last follow-up assessment (39). In contrast, LO and others (40) reported that 24% of patients experienced changes in disease location. In fact, the distribution of the disease across different locations appears to be influenced by familial and genetic factors. Mutations in the NOD2 or CARD15 genes in patients with CD predispose individuals to ileal disease. At the same time, the HLA-DRB1 allele is associated with pure colonic disease; there is a high concordance for intestinal location and clinical type of disease within families (41).

Limitations

Among the limitations of this study, UGI tract involvement, especially in patients with UC, has been less frequently considered and investigated in most studies. Also, the factors influencing disease progression and the relationship between UGI involvement and demographic information, inflammatory factors, luminal disease behavior, age at diagnosis, and disease activity (PUCAI/PCDAI) in patients were not discussed or investigated. Although the number of endoscopies and biopsies is increasing, it is still insufficient, and future studies with larger sample sizes are needed to investigate relationships between risk factors and predictors of UGI involvement in pediatric IBD.

CONCLUSION

This study showed that UGI involvement is significant in children with CD and UC, underscoring the importance of upper endoscopy and biopsy in pediatric IBD. Limited evidence has examined the relationship between the disease phenotype and the location of digestive system involvement in children with genetic and inflammatory factors, as well as between the location of involvement and disease severity and drug resistance. However, given the limited data in this field, future studies with larger sample sizes are needed to confirm the above.

CONFLICT OF INTEREST

The authors declare no conflict of interest related to this work.

REFERENCES:

1. Aniwan S, Santiago P, Loftus Jr EV, Park SH. The epidemiology of inflammatory bowel disease in Asia and Asian immigrants to Western countries. *United European Gastroenterol J*. 2022;10(10):1063-1076.
2. Kuenzig ME, Fung SG, Marderfeld L, Mak JW, Kaplan GG, Ng SC, et al. Twenty-first century trends in the global epidemiology of pediatric-onset inflammatory bowel disease: systematic review. *Gastroenterology*. 2022 1;162(4):1147-59.
3. Birimberg-Schwartz L, Zucker DM, Akriv A, Cucchiara S, Cameron FL, Wilson DC, et al. Development and validation of diagnostic criteria for IBD subtypes including IBD-unclassified in children: a multicentre study from the pediatric IBD Porto Group of ESPGHAN. *J Crohns Colitis*. 2017;11(9):1078-1084.
4. Levine A, Koletzko S, Turner D, Escher JC, Cucchiara S, de Ridder L, et al. ESPGHAN revised Porto criteria for the diagnosis of inflammatory bowel disease in children and adolescents. *J Pediatr Gastroenterol Nutr*. 2014;58(6):795-806.
5. Koulali H, Zazour A, Elmqaddem O, Ismaili Z, Ghizlane K. Should upper gastrointestinal endoscopy be systematically performed in patients with Inflammatory Bowel Disease?. *Endoscopy*. 2024;56(S 02):eP411.
6. Harpaz N, Polydorides AD. Upper gastrointestinal manifestations of inflammatory bowel disease. *Surg Pathol Clin*. 2020;13(3):413-430.
7. Chen BB, Hamilton Z, Hasosah M, Zetler P, Popescu O, Bush J, et al. The role of upper gastrointestinal endoscopy in the diagnosis of pediatric inflammatory bowel disease. *Am J Clin Pathol*. 2024;162(6):597-603.
8. Abuqteish D, Putra J. Upper gastrointestinal tract involvement of pediatric inflammatory bowel disease: a pathological review. *World J Gastroenterol*. 2019;25(16):1928.
9. Hardee S, Alper A, Pashankar DS, Morotti RA. Histopathology of duodenal mucosal lesions in pediatric patients with inflammatory bowel disease: statistical analysis to identify distinctive features. *Pediatr Dev Pathol*. 2014;17(6):450-4.
10. Buderus S, Scholz D, Behrens R, Classen M, De Laffolie J, Keller KM, et al. Inflammatory bowel disease in pediatric patients: characteristics of newly diagnosed patients from the CEDATA-GPGE Registry. *Dtsch Arztebl Int*. 2015;112(8):121-7.
11. Carroll MW, Hamilton Z, Gill H, Simkin J, Smyth M, Espinosa V, et al. Pediatric inflammatory bowel disease among South Asians living in British Columbia, Canada: a distinct clinical phenotype. *Inflamm Bowel Dis*. 2016;22(2):387-96.
12. Assa A, Amitai M, Greer ML, Castro DA, Kuint RC, Martínez-León M, et al. Perianal pediatric Crohn disease is associated with a distinct phenotype and greater inflammatory burden. *J Pediatr Gastroenterol Nutr*. 2017;65(3):293-298.
13. Sullivan KJ, Wei M, Chernetsova E, Hallani S, de Nanassy J, Benchimol EI, et al. Value of upper endoscopic biopsies in predicting medical refractoriness in pediatric patients with ulcerative colitis. *Hum Pathol*. 2017:66:167-176.
14. Więch P, Binkowska-Bury M, Korczowski B. Body composition as an indicator of the nutritional status in children with newly diagnosed ulcerative colitis and Crohn's disease–a prospective study. *Prz Gastroenterol*. 2017;12(1):55-59.
15. Horn MP, Peter AM, Righini Grunder F, Leichtle AB, Spalinger J, Schibli S, et al. PR3-ANCA and panel diagnostics in pediatric inflammatory bowel disease to distinguish ulcerative colitis from Crohn's disease. *PLoS One*. 2018;13(12):e0208974.
16. Chaparro M, Garre A, Ricart E, Iglesias-Flores E, Taxonera C, Domènech E, et al. Differences between childhood-and adulthood-onset inflammatory bowel disease: the CAROUSEL study from GETECCU. *Aliment Pharmacol Ther*. 2019;49(4):419-428.
17. Ziade F, Rungoe C, Kallemose T, Paerregaard A, Wewer AV, Jakobsen C. Biochemical markers, genotype, and inflammation in pediatric inflammatory bowel disease: a Danish population-based study. *Dig Dis*. 2019;37(2):140-6.
18. Arai K, Kunisaki R, Kakuta F, Hagiwara SI, Murakoshi T, Yanagi T, et al. Phenotypic characteristics of pediatric inflammatory bowel disease in Japan: results from a multicenter registry. *Int Res*. 2020;18(4):412-20.
19. Olbjørn C, Cvancarova Småstuen M, Thiis-Evensen E, Nakstad B, Vatn MH, Jahnsen J, et al. Fecal microbiota profiles in treatment-naïve pediatric inflammatory bowel disease–associations with disease phenotype, treatment, and outcome. *Clin Exp Gastroenterol*. 2019 Jan 31:12:37-49.
20. Park S, Kang B, Kim S, Choi S, Suh HR, Kim ES, et al. Comparison between pediatric Crohn's disease and ulcerative colitis at diagnosis in Korea: results from a multicenter, registry-based, inception cohort study. *Gut Liver*. 2022;16(6):921.
21. Martins AL, Fróes RD, da Penha Zago-Gomes M. Prevalence, phenotype, and medication for the pediatric inflammatory bowel disease population of a state in Southeastern Brazil. *World J Clin Pediatr*. 2022;11(4):341-350.
22. Lim JG, Kang B, Oh SH, Ryoo E, Kim YB, Choe YH, et al. Characteristics of pediatric ulcerative colitis at diagnosis in Korea: Results from a multicenter, registry-based, inception cohort study. *J Korean Med Sci*. 2024;39(49):e303.
23. Putniković D, Jevtić J, Ristić N, Milovanovich ID, Đuknić M, Radusinović M, et al. Pediatric Crohn's Disease in the Upper Gastrointestinal Tract: Clinical, Laboratory, Endoscopic, and Histopathological Analysis. *Diagnostics*. 2024;14(9):877.
24. White B, Svolos V, Gervais L, Jatkowska A, Nichols B, MacDonald J, et al. Inflammation-related proteins support diagnosis of inflammatory bowel disease and are modified by Exclusive Enteral Nutrition in Children with Crohn's Disease, especially of Ileal phenotype. *Inflamm Bowel Dis*. 2025;31(3):733-45.
25. Abuqteish D, Putra J. Upper gastrointestinal tract involvement of pediatric inflammatory bowel disease: a pathological review. *World J Gastroenterol*. 2019;25(16):1928-1935.
26. Márta K, Eszter MK, András A, László LP, Kovacs Judit B, Ágnes HV, et al. Diagnostic yield of upper endoscopy in paediatric patients with Crohn's disease and ulcerative colitis. Subanalysis of the HUPIR registry. *J Crohns Colitis*.

2012;6(1):86-94.
27. Kim HJ, Oh SH, Kim DY, Lee HS , Park SH , Yang SK, et al. Clinical characteristics and long-term outcomes of paediatric Crohn's disease: a single centre experience. *J Crohns Colitis*. 2017;11:157-164.
28. Basturk A, Artan R, Yılmaz A, Gelen MT. Gastritis associated with initially pediatric Crohn's Disease and ulcerative colitis. *Pediatr Gastroenterol Hepatol Nutr*. 2018;21(3):163-169.
29. Ruemmele FM, Turner D. Differences in the management of pediatric and adult-onset ulcerative colitis—lessons from the joint ECCO and ESPGHAN consensus guidelines for the management of pediatric ulcerative colitis. *J Crohns Colitis*. 2014;8(1):1-4.
30. Fumery M, Singh S, Dulai PS, Gower-Rousseau C, Peyrin-Biroulet L, Sandborn WJ. Natural history of adult ulcerative colitis in population-based cohorts: a systematic review. *Clin Gastroenterol Hepatol*. 2018;16(3):343-356.e3.
31. Lee HA, Suk JY, Choi SY, Kim ER, Kim YH, Lee CK, et al. Characteristics of pediatric inflammatory bowel disease in Korea: comparison with EUROKIDS data. *Gut Liver* 2015;9(6):756-60.
32. Levine A, De Bie CI, Turner D, Cucchiara S, Sladek M, Murphy MS, et al. Atypical disease phenotypes in pediatric ulcerative colitis: 5-year analyses of the EUROKIDS Registry. *Inflamm Bowel Dis*. 2013;19(2):370-7.
33. Roka K, Roma E, Stefanaki K, Panayotou I, Kopsidas G, Chouliaras G. The value of focally enhanced gastritis in the diagnosis of pediatric inflammatory bowel diseases. *J Crohns Colitis*. 7:797-802, 2013.
34. Hori K, Ikeuchi H, Nakano H, Uchino M, Tomita T, Ohda Y, et al. Gastroduodenitis associated with ulcerative colitis. *J Gastroenterol*.2008; 43:193-201.
35. De Bie CI, Paerregaard A, Kolaček S, Ruemmele FM, Koletzko S, Fell JM, et al. Disease phenotype at diagnosis in pediatric Crohn's disease: 5-year analyses of the EUROKIDS Registry. *Inflamm Bowel Dis*. 2013;19(2):378-85.
36. Muller KE, Lakatos PL, Kovacs JB, Arato A, Varkonyi A, Nemes E, et al. Baseline characteristics and disease phenotype in inflammatory bowel disease. *J Pediatr Gastroenterol Nutr*. 2016;62:50–55.
37. Hsu WC, Chen CM, Kuo CJ, Tsou YK, Yeh PJ, Lai MW, et al. Upper Gastrointestinal Involvement in Crohn's Disease as an Independent Predictor of New-Onset Strictures: Insights from an Extensive Retrospective Cohort Analysis. *Dige Dis Sci*. 2024;69(9):3382-91.
38. Thia KT, Sandborn WJ, Harmsen WS, Zinsmeister AR, Loftus EV Jr. Risk factors associated with progression to intestinal complications of Crohn's disease in a population-based cohort. *Gastroenterology*. 2010;139:1147-1155.
39. Ye BD, Yang SK, Cho YK, Park SH, Yang DH, Yoon SM,et al. Clinical features and long-term prognosis of Crohn's disease in Korea. *Scand J Gastroenterol*. 2010;45:1178-1185.
40. Lo B, Vester-Andersen MK, Vind I, Prosberg M , Dubinsky M , Siegel CA ,et al. Changes in disease behaviour and location in patients with Crohn's disease after 7 years of follow-up: a Danish population-based inception cohort. *J Crohns Colitis*. 2018;12:265-272.
41. Cho CW, You MW, Oh CH, Lee CK, Moon SK. Long-term disease course of Crohn's disease: changes in disease location, phenotype, activities, and predictive factors. *Gut Liver*. 2021;16(2):157-70.