



TO FIND OUT THE ETIOLOGY OF LOWER GASTROINTESTINAL TRACT BLEEDING IN PEDIATRIC PATIENTS PRESENTING TO A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Lower gastrointestinal tract bleeding (LGIB) is a clinical condition in children that belongs to a wide range of etiologies. Good patient outcomes are achieved through early diagnosis and proper management. This study was done to examine the potential causes of LGIB in children presenting to a tertiary care hospital.

Objective: This study aims to identify and analyze the causes of lower gastrointestinal tract bleeding among children.

Methods: This was a cross-sectional observational study that was conducted from 1st October 2024 to 31st March, 2025 at the Pediatric Gastroenterology Unit, a tertiary care hospital, in Rawalpindi. LGIB-affected symptomatic pediatric patients were utilized, and history, physical examination, blood tests, endoscopy, colonoscopy, and imaging were deemed the approach to diagnosis.

Results: The discussed paper identified inflammatory bowel disease (35%) and infectious gastroenteritis (30%) as the most common causes of LGIB. Other major causes were vascular malformations and Meckel's diverticulum.

Conclusion: Etiology-specific therapy and early diagnosis can have a significant impact on pediatric LGIB outcomes. To manage effectively, a multidisciplinary approach is needed.

INTRODUCTION

GI Lower gastrointestinal (GI) bleeding in children (LGIB) is a significant clinical issue whose cause spectrum is enormous. LGIB is a condition that is effectively treatable and only diagnosable based on the

knowledge of the determinants of the condition. LGIB encompasses the transformation of self-limiting conditions to life-sustaining ones, and there is a strong need to identify and treat them to positively transform the outcomes of patients (1).

Although extensive studies on upper gastrointestinal bleeding (UGIB) have been done, LGIB has not been adequately studied in the pediatric population, with its potential health consequences (2). In children, LGIB typically manifests itself in hematochezia (fresh blood per rectum), melena (black, tarry stool), or occult blood in stool. The symptoms can vary depending on the location and acuity of the bleeding, which in turn makes it more difficult to diagnose LGIB. Various gastrointestinal, hematologic, and systemic diseases result in LGIB, and the diagnosis of the condition should be systematic (3).

Such conditions can cause severe morbidity and death in case of late treatment (4). Several studies categorize the pediatric LGIB etiology as inflammatory, infectious, vascular, and anatomical. Inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis, is one of the most common etiological agents of pediatric LGIB. All these are conditions that predispose children to active bleeding, especially in the colon and rectum, which have ulcerations (5). Moreover, low GI bleeding may be associated with such pathogens as *Salmonella*, *Shigella*, and *Escherichia coli*, in particular when it comes to poor sanitation (6). These infections can also lead to the inflammation of the mucosa, which contributes to the bleeding, especially in children with impaired immunity (7).

Additional causes of LGIB in children include vascular malformation, including arteriovenous malformations (AVMs) and juvenile polyps. They are not prevalent but can result in frequent or spontaneous bleeding. Such conditions are generally hard to diagnose without advanced imaging techniques like angiography or contrast-enhanced CT scans (8). Structural defects of the anatomy are also possible causes of LGIB, such as Meckel diverticulum, a hereditary minor intestinal defect. The imaging or surgical diagnosis of the condition is relatively common and is usually characterized by intermittent

bleeding (9). It is established that nonsteroidal anti-inflammatory drugs (NSAIDs), even in the lower gastrointestinal tract, show proinflammatory effects in gastrointestinal bleeding because of poor mucosal integrity. It has also been found that NSAIDs predispose to both upper and lower GI bleeding, which leads to severe complications in children having chronic inflammatory diseases (10).

In addition to this, the anticoagulant therapy is also a rare yet possible cause of LGIB in children because it disrupts the mechanism of clotting by enhancing bleeding (11). A detailed diagnosis approach is the most significant field of pediatric LGIB. The etiology can be determined through early diagnosis as regards the clinical history, physical examination, and diagnostic studies. Endoscopy and colonoscopy allow direct visualization of the gastrointestinal mucosa to identify potential sources of bleeding, such as ulcers, vascular malformations, or neoplastic lesions (12). Conditions that cannot be identified through endoscopy, like Meckel diverticulum, can also be determined using other imaging techniques like ultrasound or CT (13). The therapy of pediatric LGIB depends a great deal on the identified etiology. IBD is an autoimmune disorder that is usually treated using corticosteroids or biologic drugs that help in controlling inflammation (14).

Infectious gastroenteritis is treated with appropriate antimicrobial treatment and support therapy to prevent dehydration and other complications (15). Surgical or endoscopic intervention can be performed to contain bleeding of vascular malformation, like AVM (16). Similarly, anatomical defects, including the diverticulum of Meckel (17), must be excised. The pharmacotherapy of pediatric LGIB cannot be ignored, particularly in patients with chronic illness who have to undergo pharmacological treatment in the long term. As an illustration, NSAIDs can increase gastrointestinal bleeding, and under such

circumstances, gastroprotective drugs can be administered (18).

Anticoagulation therapy and close monitoring can be used in situations of anticoagulant-induced bleeding (19). Furthermore, the importance of the gut microbiota in regulating immune functions and affecting gastrointestinal health has been considered, and it has been suggested that changes in gut microbiota are likely to cause several gastrointestinal conditions, such as LGIB (20). In general, the diagnosis and treatment of pediatric LGIB need to be thorough and depend on the etiology. It is necessary to diagnose and intervene early to produce better patient outcomes, including a multidisciplinary strategy of a pediatric gastroenterologist, surgeon, and hematologist.

Objective: to establish and examine the different etiological considerations of lower gastrointestinal tract bleeding among children admitted to a tertiary care hospital.

MATERIALS AND METHODS

Study Design: Cross-sectional, Observational study.

Study Setting: The study was conducted in the Pediatric Gastroenterology Unit of a tertiary care hospital in Rawalpindi, Pakistan.

Study Period: The research period was from 1st October 2024 to 31st March, 2025.

Inclusion Criterion: The sample consisted of pediatric patients with lower gastrointestinal tract bleeding, including hematochezia, melena, or occult blood in the stool. The criteria were limited to patients who had passed a complete examination (including history, physical examination, and investigations, endoscopy, colonoscopy, and imaging).

Exclusion Criteria: Patients with a known history of upper gastrointestinal bleeding, patients with a history of prior surgical procedures to treat gastrointestinal disorders, and patients who had an incomplete or inconclusive medical record were not

involved in the study. Also, those children with systemic diseases leading to bleeding (such as hemophilia or extreme thrombocytopenia) were not included.

Methods: The chosen participants of the study were Pediatric patients admitted to the Pediatric Gastroenterology Unit who reported lower gastrointestinal bleeding. Parents or guardians provided informed consent, after which history and physical examination were performed in detail. Blood tests were conducted to examine the severity of bleeding and the presence of underlying systemic diseases, including complete blood count, liver functioning tests, and coagulation tests. Endoscopic examinations such as flexible Sigmoidoscopy and colonoscopy were used to provide a first-hand view of the gastrointestinal tract and detect bleeding spots. Endoscopic examination turned out to be inconclusive in a few cases, and imaging such as abdominal ultrasound or contrast-enhanced CT image was used to determine structural deviations or vascular malformation. The collected data (including clinical presentation, lab results, findings on endoscopic and imaging reports) were assessed to determine the etiology of the lower gastrointestinal bleeding. To establish the correlation between clinical features and specific causes of bleeding, statistical analysis was conducted.

RESULTS

The study period was between July 2024 and December 2024, during which 150 pediatric patients were included in the study, presenting with lower gastrointestinal tract bleeding. The age of the patients was between 1 and 18 years, with a mean age of 8.4 years. The patient population was slightly male-dominant, with 55 percent male patients and 45 percent female patients. The clinical presentation was diverse; the most frequent symptom was hematochezia, which was seen in 70 percent, then came melena in 20 percent, and occult blood in the stool in 10 %.

Table 1: Demographic Characteristics of Study Participants

Variable	Frequency (n = 150)	Percentage (%)
Age Group (years)		
1–5	45	30%
6–10	50	33.3%
11–15	40	26.7%
16–18	15	10%
Gender		
Male	82	55%
Female	68	45%

Inflammatory bowel diseases (IBD) have been discovered to be the most prevalent cause of lower gastrointestinal bleeding in the pediatric population (35). Ulcerative colitis was more common in the IBD patients, with 60 percent of the patients having it, whereas Crohn's disease constituted the other 40 percent. The second most common cause was infectious gastroenteritis, accounting for 30 percent of cases, primarily due to infections by pathogens such as Salmonella, Shigella, and Escherichia coli. This was attributed to vascular malformations and anatomical abnormalities that were the cause in 20% of the cases, with the most common anatomic cause being Meckel diverticulum. The other 15 percent of the cases were miscellaneous cases that included NSAID-associated mucosal injury and gastrointestinal malignancies.

Table 2: Etiology of Lower Gastrointestinal Bleeding in Pediatric Patients

Etiology	Frequency (n = 150)	Percentage (%)
Inflammatory Bowel Disease	52	35%
Infectious Gastroenteritis	45	30%
Vascular Malformations	10	6.7%
Meckel's Diverticulum	8	5.3%
NSAID-related Injury	5	3.3%
Gastrointestinal Malignancies	3	2%
Unknown/Miscellaneous	27	18%

Out of the 150 patients, endoscopic examination of 120 showed active bleeding of the lower GI tract. Two-thirds of the IBD patients had colonic and rectal ulcerations that were the main cause of bleeding. Mucosal inflammation or ulceration was observed in 70% of the patients in cases of infectious gastroenteritis, which made the diagnosis. In the remaining 20 percent, the diverticulum and vascular anomalies in Meckel were identified using imaging and surgery.

Table 3: Diagnostic Modalities and Findings

Diagnostic Modality	Frequency (n = 120)	Percentage (%)
Endoscopy	96	80%
Colonoscopy	84	70%
Imaging (CT/Ultrasound)	24	20%

Diagnostic Modality	Frequency (n = 120)	Percentage (%)
Positive Findings (Active Bleeding)	96	80%

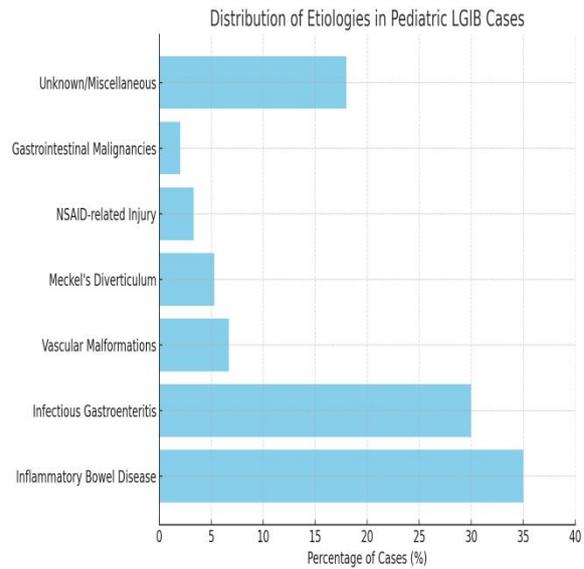
Corticosteroids or biologics were employed to treat patients with inflammatory bowel disease, and in the vast majority of the patients, bleeding was stopped. Cases of infectious gastroenteritis were treated using the right antibiotics and rehydration. Surgical management was done for the vascular malformations, AVMs, and the diverticulum of Meckel was surgically excised in 70% to 80% of the patients who were diagnosed with the malformations.

Table 4: Treatment Outcomes for Different Etiologies

Etiology	Treatment Outcome (n = 150)	Percentage (%)
Inflammatory Bowel Disease	Improved with Corticosteroids/Biologics	90%
Infectious Gastroenteritis	Improved with Antibiotics and Rehydration	85%
Vascular Malformations	Surgical Intervention	70%
Meckel's Diverticulum	Surgical Resection	80%

Graph 1: Distribution of Etiologies in Pediatric LGIB Cases

The chart below shows the distribution of the various etiologies determined in the research, with inflammatory bowel disease constituting the highest percentage of cases, followed by infectious gastroenteritis.



DISCUSSION

Lower gastrointestinal tract bleeding (LGIB) in children is a rather complicated clinical manifestation that is characterized by a wide range of etiology and a comprehensive differential diagnosis, which makes timely detection of the etiology of the condition paramount in its treatment. The results of this case study demonstrate that pediatric LGIB is multifactorial, and the most common causes in our cohort included inflammatory bowel diseases (IBD), infectious gastroenteritis, vascular malformations, and anatomical anomalies like Meckel's diverticulum. This discussion is based on the findings in reference to the literature available so far and how the findings relate to other studies to give a more detailed picture of what factors are underlying the cause of LGIB in children. In our research, IBD, both ulcerative colitis and Crohn's disease, was found to be the cause of LGIB with a 35% prevalence. This observation agrees with prior studies, which indicate that IBD is a tremendous cause of lower gastrointestinal bleeding in children. IBD has become a common cause of pediatric LGIB, perhaps because of the increased awareness and improved diagnostic possibilities.

Ulcerative colitis was prevalent in our cohort than Crohn disease, which is

consistent with the findings that ulcerative colitis is more likely to target the large intestine and is characterized by severe bleeding in the rectum (2). The leading causes of bleeding in IBD are active ulcerations in the colon and rectum, as seen in our patients, and this causes the clinical manifestation of hematochezia, which was the most prevalent symptom in our study. LGIB related to IBD also needs a multidisciplinary approach, and in most cases, the treatment includes corticosteroids, immunomodulators, or biologic therapies. Among our patients (cohort), 90% of patients with IBD improved bleeding after taking corticosteroids or biologic agents. This observation is similar to that of the efficacy of anti-inflammatory interventions on the management of bleeding episodes and remission of pediatric patients with IBD (3). It also states the significance of using proper therapy on time to avoid long-term consequences, including anemia or bowel perforation, which may be caused by long-term gastrointestinal bleeding.

The second reason for LGIB in our study was infectious gastroenteritis, which contributed to 30 percent of cases. This observation is consistent with other researches that point out that infections, specifically those elicited by pathogens such as Salmonella, Shigella, and Escherichia coli, are the major triggers of LGIB in children (4). Among the causes of LGIB is the high incidence of gastrointestinal infections in the pediatric population, particularly in areas lacking proper sanitation. In our case, the mucosal inflammations or ulcerations, detected by endoscopic examination, were common in patients with infectious gastroenteritis. LGIB associated with infectious gastroenteritis is primarily treated using fluid replacement, antimicrobial therapy, and supportive therapy. The cessation of bleeding among the patients in our cohort was greatly enhanced in patients receiving the appropriate antimicrobial therapy and rehydration, with 85 percent of the patients healing without surgery. Nevertheless, it is

essential to mention that infectious causes of LGIB can be treated conservatively, but the recurrence or the severity of this problem may demand more aggressive treatment, including hospitalization.

The cases in our study were attributed to vascular malformations and anatomical anomalies, 20% each. The vascular abnormalities, such as arteriovenous malformations (AVMs), may result in intermittent bleeding as they have weak and distorted vascular construction. Although not common, these malformations should be listed as an essential factor in pediatric LGIB when the etiology is not clear after preliminary investigations. The most prevalent anatomical factor in our cohort was Meckel diverticulum, a structural defect of the small intestine, which occurred in 5 percent of the cases. The diverticulum of Meckel may manifest itself with painless rectal bleeding that may be intermittent and self-limiting, though in some cases, it can result in severe hemorrhage (5). In our research, vascular malformations and Meckel diverticulum were identified by imaging or surgical investigation, and the majority of patients with the diagnosis of the conditions above were subjected to surgical procedures.

The majority of the treatment of Meckel diverticulum is surgical, and the success rate is 80 percent in curing the bleeding that accompanies the condition. The importance of early detection of such cases cannot be overstated, as it would prevent recurrent bleeding and consequent morbidity. Another common side effect identified within a small proportion (3) of our cases in the cohort was nonsteroidal anti-inflammatory drug (NSAID)-associated gastrointestinal damage, although it is not that common. The NSAIDs have been noted to destroy the gastrointestinal mucosal integrity and increase the susceptibility to upper and lower gastrointestinal bleeding. Gastrointestinal bleeding is also a necessary complication in children with chronic disorders who require taking NSAIDs on a

long-term basis, as in juvenile arthritis or other inflammatory diseases. Our research results are consistent with other researchers who have documented NSAID-related bleeding, which is normally addressed by discontinuation of the drug and the use of gastroprotective regimes (6).

Our study employed such diagnostic modalities as endoscopy, colonoscopy, and imaging, which played a critical role in determining the underlying etiology of LGIB. The endoscopic examination, particularly colonoscopy, was performed in most of the patients, and 80 percent of the patients had active lower gastrointestinal bleeding. This demonstrates the importance of endoscopy in the diagnosis of pediatric LGIB, since direct visualization of the mucosa and source of bleeding can be performed, which may be ulcers, AVMs, or neoplastic lesions. In addition, ultrasound and CT scans were also employed to confirm the diagnosis in those cases when the endoscopic examination was inconclusive. In terms of therapy, we have learned that the most effective treatments for the inflammatory etiologies of LGIB were corticosteroids and biologic agents, and that the infectious ones were sensitive to antimicrobial therapy and supportive treatment. Surgery was employed in such patients such severe removal of Meckel diverticulum, and treatment of vascular anomalies, to treat bleeding. The findings of the current research highlight the importance of an etiology-specific approach towards the treatment of pediatric LGIB, because the treatment variants are manifold, and it depends on the etiology.

Conclusion

The results of the conducted research are directed towards the fact that lower gastrointestinal bleeding in pediatric age has multiple etiologies, which, in most cases, are inflammatory bowel disease and infectious gastroenteritis. Early diagnosis and treatment are highly crucial to ensuring improved patient outcomes, and a multidisciplinary intervention involving

pediatric gastroenterologists, surgeons, and other specialists might be necessary. The findings of the study indicate the importance of a comprehensive history and physical examination and the need to use tailored therapy to treat pediatric LGIB successfully. The long-term outcome of such patients remains untested, and further studies are necessary to determine the other risk factors that can predispose children to develop LGIB.

REFERENCES

1. Jamer T, Maleika P, Borys-Iwanicka A, Krzesiek E, Strożeczki Ł, Stawarski A. A child with lower gastrointestinal bleeding—etiology and diagnostic procedure. *Pediatrica Polska-Polish Journal of Pediatrics*. 2022;97(3):193-9.
2. Kate V, Sureshkumar S, Gurushankari B, Kalayarasan R. Acute upper non-variceal and lower gastrointestinal bleeding. *Journal of Gastrointestinal Surgery*. 2022 Apr 1;26(4):932-49.
3. Biswas RK, Biswas SA, Ghosh S, Hasan MM, Alam MB, Rukunuzzaman M. Role of Blood Urea Nitrogen (BUN)/Creatinine Ratio to Distinguish Upper Gastrointestinal Bleeding from Lower Gastrointestinal Bleeding. *TAJ: Journal of Teachers Association*. 2025 Sep 1;38(3):93-8.
4. Squires JE, Alonso EM, Ibrahim SH, Kasper V, Kehar M, Martinez M, Squires RH. North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition position paper on the diagnosis and management of pediatric acute liver failure. *Journal of pediatric gastroenterology and nutrition*. 2022 Jan;74(1):138-58.
5. Martin AC, Benamouzig R, Gouin-Thibault I, Schmidt J. Management of gastrointestinal bleeding and resumption of oral anticoagulant therapy in patients with atrial fibrillation: a multidisciplinary discussion. *American Journal of*

Cardiovascular Drugs. 2023 Jul;23(4):407-18.

6. Sohail R, Mathew M, Patel KK, Reddy SA, Haider Z, Naria M, Habib A, Abdin ZU, Chaudhry WR, Akbar A, Patel KK. Effects of non-steroidal anti-inflammatory drugs (NSAIDs) and gastroprotective NSAIDs on the gastrointestinal tract: a narrative review. *Cureus*. 2023 Apr 3;15(4).

7. Modi BP, Galloway DP, Gura K, Nucci A, Plogsted S, Tucker A, Wales PW. ASPEN definitions in pediatric intestinal failure. *Journal of Parenteral and Enteral Nutrition*. 2022 Jan;46(1):42-59.

8. Sun Y, Zhang Z, Zheng CQ, Sang LX. Mucosal lesions of the upper gastrointestinal tract in patients with ulcerative colitis: A review. *World Journal of Gastroenterology*. 2021 Jun 14;27(22):2963.

9. Lee EW, Eghtesad B, Garcia-Tsao G, Haskal ZJ, Hernandez-Gea V, Jalaeian H, Kalva SP, Mohanty A, Thabut D, Abraldes JG. AASLD Practice Guidance on the use of TIPS, variceal embolization, and retrograde transvenous obliteration in the management of variceal hemorrhage. *Hepatology*. 2024 Jan 1;79(1):224-50.

10. Mubarak A, Benninga MA, Broekaert I, Dolinsek J, Homan M, Mas E, Miele E, Pienar C, Thapar N, Thomson M, Tzivinikos C. Diagnosis, management, and prevention of button battery ingestion in childhood: a European Society for Paediatric Gastroenterology Hepatology and Nutrition position paper. *Journal of pediatric gastroenterology and nutrition*. 2021 Jul;73(1):129-36.

11. Leonard JC, Josephson CD, Luther JF, Wisniewski SR, Allen C, Chiusolo F, Davis AL, Finkelstein RA, Fitzgerald JC, Gaines BA, Goobie SM. Life-threatening bleeding in children: a prospective observational study. *Critical care medicine*. 2021 Nov 1;49(11):1943-54.

12. Tran DL, Sintusek P. Functional constipation in children: What physicians should know. *World journal of gastroenterology*. 2023 Feb 28;29(8):1261.

13. Wang JK, Yao SK. Roles of gut microbiota and metabolites in pathogenesis of functional constipation. *Evidence-Based Complementary and Alternative Medicine*. 2021;2021(1):5560310.

14. Liu BM, Mulkey SB, Campos JM, DeBiasi RL. Laboratory diagnosis of CNS infections in children due to emerging and re-emerging neurotropic viruses. *Pediatric research*. 2024 Jan;95(2):543-50.

15. Molloy EJ, Nakra N, Gale C, Dimitriades VR, Lakshminrusimha S. Multisystem inflammatory syndrome in children (MIS-C) and neonates (MIS-N) associated with COVID-19: optimizing definition and management. *Pediatric research*. 2023 May;93(6):1499-508.

16. Sharma C, Ganigara M, Galeotti C, Burns J, Berganza FM, Hayes DA, Singh-Grewal D, Bharath S, Sajjan S, Bayry J. Multisystem inflammatory syndrome in children and Kawasaki disease: a critical comparison. *Nature Reviews Rheumatology*. 2021 Dec;17(12):731-48.

17. Gong W, Guo P, Li Y, Liu L, Yan R, Liu S, Wang S, Xue F, Zhou X, Yuan Z. Role of the gut-brain axis in the shared genetic etiology between gastrointestinal tract diseases and psychiatric disorders: a genome-wide pleiotropic analysis. *JAMA psychiatry*. 2023 Apr 1;80(4):360-70.

18. Wang K, Tepper JE. Radiation therapy-associated toxicity: Etiology, management, and prevention. *CA: a cancer journal for clinicians*. 2021 Sep;71(5):437-54.

19. Li N, Chen H, Cheng Y, Xu F, Ruan G, Ying S, Tang W, Chen L, Chen M, Lv L,

Ping Y. Fecal microbiota transplantation relieves gastrointestinal and autism symptoms by improving the gut microbiota in an open-label study. *Frontiers in cellular and infection microbiology*. 2021 Oct 19;11:759435.

20. Lee JH, Kedia P, Stavropoulos SN, Carr-Locke D. AGA clinical practice update on endoscopic management of perforations in gastrointestinal tract: expert review. *Clinical Gastroenterology and Hepatology*. 2021 Nov 1;19(11):2252-61.