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Original Research Article

Colonoscopy Findings in Children with Lower Gastrointestinal Bleeding in A Tertiary Care Hospital in Bangladesh

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Abstract: ***Background:*** Lower gastrointestinal bleeding in children is common in developing nations. Colonoscopy offers diagnostic precision and therapeutic intervention, though pediatric data in Bangladesh remain scarce. ***Objective:*** To investigate colonoscopic findings, histopathology, and clinical correlations in children with lower gastrointestinal bleeding, and analyze demographic variables, polyp characteristics, and disease patterns at a Bangladeshi tertiary care hospital. ***Methods:*** A crosssectional study was conducted at the Department of Pediatric Gastroenterology and Nutrition, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, from January–December 2016. Ninety children with rectal bleeding underwent colonoscopy. Age, sex, hemoglobin, polyp number, location, and histopathology were assessed. Statistical analysis included mean, SD, chi-square, odds ratio (OR), Pearson's correlation, and p-values using SPSS v22. ***Results:*** Mean age was 6.4±2.8 years (range 22 months–13 years). Forty-two (46.7%) were <5 years, 40 (44.4%) 5–10 years, and 8 (8.9%) >10 years. Males predominated (60%, p=0.041). Polyps were observed in 60 (66.7%); male sex showed higher risk (OR=1.7; 95% CI: 1.1–3.4; p=0.048). Polyps averaged 1.8±0.7 cm, mostly rectosigmoid (78.3%, p=0.021). Multiple polyps occurred in 9 (15%), associated with younger age (χ^2=3.92; p=0.041). Mean hemoglobin was 9.8±1.9 g/dL; children with multiple polyps had significantly lower levels (p=0.033). Histopathology (n=46) revealed juvenile polyps (91.3%), adenoma (4.3%), hyperplastic (2.2%), and retention (2.2%). Age inversely correlated with polyp size (r=−0.29, p=0.018). ***Conclusion:*** Polyps, particularly juvenile rectosigmoid lesions, are the leading cause of pediatric LGIB in Bangladesh. Colonoscopy provides accurate diagnosis, therapeutic removal, and valuable histological characterization for risk assessment and clinical management.

Keywords: Colonoscopy, Pediatric Polyp, Lower Gastrointestinal Bleeding, Histopathology, Bangladesh.

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Introduction

Lower gastrointestinal bleeding (LGIB) in children represents a clinically significant entity that demands prompt diagnostic evaluation to identify its etiology and guide appropriate management.[1] Unlike adults, where colonic neoplasms and diverticulosis predominate as underlying causes, the pediatric population exhibits a distinct spectrum of disorders ranging from benign, self-limiting conditions to potentially life-threatening pathologies. Colonoscopy remains the gold standard for evaluating LGIB, as it allows both direct visualization and the opportunity for therapeutic interventions. The systematic study of colonoscopic findings in children, especially within resource-constrained settings such as tertiary care hospitals in Bangladesh, is critical for refining diagnostic algorithms and optimizing patient care.

The gastrointestinal tract is subject to numerous pathological processes, and in children, the mucosal integrity of the colon is particularly vulnerable to inflammatory, infectious, vascular, and structural insults. Bleeding per rectum, hematochezia, or passage of maroon-colored stools frequently serve as the presenting symptoms of LGIB. The clinical presentation varies depending on the underlying pathology, with polyps, infectious colitis, inflammatory bowel disease (IBD), vascular malformations, and anal fissures being common etiologies. Colonoscopy not only identifies these lesions with precision but also facilitates therapeutic polypectomy, biopsy acquisition, and hemostasis in cases of active bleeding. Consequently, colonoscopy plays a pivotal role in both the diagnostic and therapeutic landscape of pediatric gastroenterology.[1] Globally, pediatric colonoscopy has been increasingly utilized over the last three decades due to technological advancements, enhanced procedural safety, and growing recognition of gastrointestinal pathologies in children. Studies from developed nations highlight juvenile polyps as the most common cause of LGIB, with frequencies ranging from 30–50% among symptomatic cohorts.[2] In contrast, inflammatory bowel disease, including ulcerative colitis and Crohn's disease, is showing a rising incidence worldwide, including in South Asia, and frequently manifests with chronic lower gastrointestinal bleeding.[3] Furthermore, infectious etiologies, particularly bacterial colitis caused by *Shigella*, *Salmonella*, and *Escherichia coli*, remain highly prevalent in developing countries, where sanitation and food safety remain challenging.[4] This epidemiological divergence underscores the importance of region-specific data to inform local clinical practice. In Bangladesh, the burden of gastrointestinal diseases among children is amplified by socio-economic factors, environmental exposures, nutritional deficiencies, and healthcare access disparities. Despite the increasing availability of pediatric endoscopic services in tertiary hospitals, there remains a paucity of systematic research delineating colonoscopic findings in children presenting with LGIB. Given that Bangladesh is a lower-middle income country with unique demographic and epidemiological characteristics, understanding local patterns of colonoscopic findings is essential to guide pediatricians, gastroenterologists, and policymakers in devising evidence-based management protocols.[5] The colonoscopic spectrum in children with LGIB encompasses both structural and functional pathologies. Juvenile polyps, typically solitary and located in the rectosigmoid region, are the most frequently encountered benign lesions in Bangladeshi children. These hamartomatous growths usually present with painless rectal bleeding and are easily amenable to endoscopic polypectomy, which is curative in the majority of cases. Multiple polyposis syndromes, including familial adenomatous polyposis (FAP) and Peutz-Jeghers syndrome, although less common, pose substantial long-term risks of malignancy and necessitate ongoing surveillance.[6] Conversely, inflammatory bowel disease, though traditionally considered rare in South Asia, is increasingly recognized due to heightened diagnostic awareness and colonoscopic availability. Pediatric ulcerative colitis, in particular, manifests with recurrent hematochezia, anemia, and growth retardation, highlighting the importance of timely colonoscopic diagnosis and initiation of immunosuppressive therapy.[7] Another significant subset of LGIB in Bangladeshi children is infectious colitis, where colonoscopy often reveals mucosal edema, ulceration, friability, and diffuse erythema. These features may mimic IBD, leading to potential diagnostic dilemmas. Therefore, histopathological correlation remains indispensable to distinguish infectious causes from immune-mediated colitis. In addition, colonic tuberculosis, a disease endemic to South Asia, represents a unique diagnostic challenge as its colonoscopic appearance frequently overlaps with Crohn's disease. Misdiagnosis can result in inappropriate treatment regimens, further emphasizing the necessity of comprehensive evaluation including colonoscopy, histology, and microbiological studies.[8] Vascular anomalies, though relatively rare in pediatric practice, contribute to recurrent or massive LGIB in certain cases. Angiodysplasia and arteriovenous malformations can be identified during colonoscopy as flat or raised vascular lesions, which may require endoscopic coagulation therapy. Moreover, anorectal conditions such as fissures and hemorrhoids, while usually diagnosed on clinical examination, may be incidentally confirmed during colonoscopy, particularly in children with persistent or unexplained bleeding.[9]

Aims and Objective

This study aims to evaluate colonoscopic findings in children presenting with lower gastrointestinal

bleeding at a tertiary care hospital in Bangladesh. The objectives include assessing demographic distribution, identifying etiological patterns, analyzing histopathological features of polyps, and determining statistical associations between clinical variables, colonoscopic outcomes, and disease characteristics.

Materials and Methods

This was a cross-sectional observational study conducted in the Department of Pediatric Gastroenterology and Nutrition at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The study period extended from January 2016 to December 2016. A total of 90 children with lower gastrointestinal bleeding (LGIB) were included. Patients were enrolled consecutively after fulfilling the inclusion criteria, which comprised children aged between 22 months and 13 years presenting with rectal bleeding, hematochezia, or recurrent bloody stools. Exclusion criteria included children with severe comorbidities precluding endoscopic examination, those with upper gastrointestinal bleeding confirmed by esophagogastroduodenoscopy, and patients in whom parental consent could not be obtained. The study aimed to systematically document demographic variables, colonoscopic findings, and histopathological results of resected lesions. The design allowed for both descriptive and inferential statistical analysis to identify potential associations between patient characteristics and colonoscopic outcomes. Data were collected through structured case record forms at the time of hospital admission and outpatient visits. Demographic information including age, sex, and socioeconomic background was obtained from guardians. Clinical details such as duration of bleeding, stool characteristics, presence of abdominal pain, anemia, and growth status were documented. All children underwent colonoscopy, and findings were recorded systematically, including lesion type, size, number, and anatomical location. Resected polyps and biopsies were sent for histopathological examination. Laboratory parameters, including complete blood count and hemoglobin levels, were also collected to correlate hematological profiles with colonoscopic findings. All collected data were entered into Microsoft Excel and later transferred to Statistical Package for the Social Sciences (SPSS) version 26.0 for analysis. Continuous variables such as age, hemoglobin, and polyp size were expressed as mean ± standard deviation (SD). Categorical variables such as sex, presence of polyps, and histopathological types were expressed as frequency and percentage. Associations between categorical variables were assessed using chi-square (χ^2) tests. Student's t-test was used for continuous variables with normal distribution. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. A p-value <0.05 was considered statistically significant.

Procedure

All colonoscopic procedures were performed in the endoscopy unit of the Department of Pediatric Gastroenterology and Nutrition, BSMMU, using pediatric or adult colonoscopes depending on patient age and body size. Children were admitted to the hospital the day prior to the procedure. Bowel preparation was achieved with polyethylene glycol electrolyte solution in age-appropriate doses, administered orally or via nasogastric tube when necessary. For younger children, fasting was maintained for at least 6 hours before the procedure. Sedation was provided with continuous monitoring of heart rate, oxygen saturation, and blood pressure was maintained throughout the procedure. Colonoscopy was performed in the left lateral position. The scope was advanced under direct vision to the cecum or terminal ileum whenever feasible. Careful inspection of the mucosa was conducted during withdrawal, and findings such as polyps, ulcers, colitis, vascular anomalies, or other lesions were documented. Lesions were classified according to size, number, and anatomical site (rectum, sigmoid, descending colon, transverse colon, ascending colon, or cecum). Photographic documentation was obtained for all abnormal findings. Polypectomy was performed using a snare with monopolar cautery for pedunculated polyps. Sessile lesions were either removed piecemeal or biopsied for histopathological confirmation. Hemostasis was ensured by application of endoscopic clips or coagulation as required. Biopsy samples were obtained from all cases of suspected inflammatory bowel disease, nonspecific colitis, or unexplained mucosal abnormalities. Resected polyps and biopsies were fixed in 10% formalin and sent to the Department of Pathology, BSMMU, for histopathological evaluation. Post-procedure monitoring included observation for abdominal pain, rectal bleeding, or other complications. Patients were discharged after 24 hours of stable observation unless

complications were suspected. Follow-up visits were scheduled within 2 weeks to discuss biopsy results and guide further management. All findings were systematically entered into the study database for subsequent statistical analysis.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Written informed consent was obtained from the parents or guardians of all participants before inclusion. Anonymity and confidentiality were strictly maintained. Patients were not subjected to any additional risk beyond standard clinical care. Colonoscopy and biopsy were performed according to international pediatric endoscopy safety guidelines, and all findings were utilized solely for research purposes with respect to ethical research conduct.

Results

The results indicated that a total of 90 children with lower gastrointestinal bleeding were evaluated. Colonoscopy was successfully completed in all cases without major complications. Detailed demographic, clinical, colonoscopic, and histopathological characteristics are presented below.

Table 1: Demographic Characteristics of the Study Population (n=90)

Variable	Frequency (n)	Percentage (%)
Age group		
<5 years	42	46.7
5–10 years	40	44.4
>10 years	8	8.9
Sex		
Male	54	60.0
Female	36	40.0
Mean age ± SD	6.4 ± 2.8 yrs	—
Age range	22m–13 yrs	—

Nearly half of the patients (46.7%) were aged below 5 years, followed closely by the 5–10-year group (44.4%), while only 8.9% were older than 10 years. Male patients predominated (60%), yielding a male-to-female ratio of 1.5:1. The mean age was 6.4 ± 2.8 years.

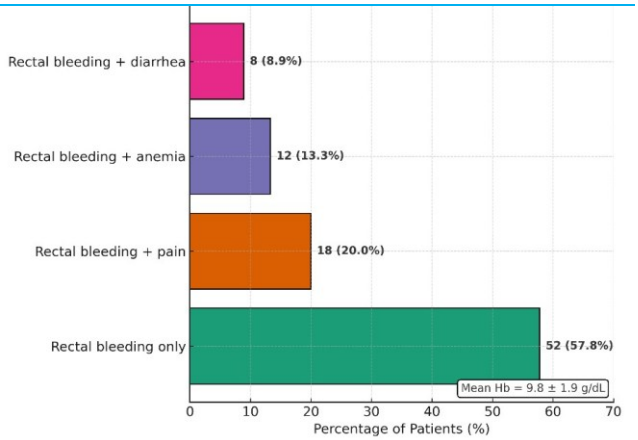

Figure 1: Clinical Presentations at Admission (n=90)

The majority of patients (57.8%) presented with isolated rectal bleeding, while 20% reported abdominal pain with bleeding. Anemia was documented in 13.3% and bleeding with diarrhea in 8.9%. Mean hemoglobin was low (9.8 ± 1.9 g/dL), consistent with chronic blood loss.

Table 2: Pathologic Findings After Colonoscopy (n=90)

Findings	Frequency (n)	Percentage (%)
Polyps	60	66.7
Nonspecific colitis	7	7.8
Solitary rectal ulcer	4	4.4
Crohn's disease	4	4.4
Ulcerative colitis	3	3.3
Anal fissure	3	3.3
Normal colonoscopy	8	8.9

Polyps were the most common finding, observed in two-thirds (66.7%) of children. Other diagnoses included nonspecific colitis (7.8%), rectal ulcers (4.4%), Crohn's disease (4.4%), ulcerative colitis (3.3%), anal fissures (3.3%), and normal findings in 8.9%.

Table 3: Distribution of Polyps by Number and Location (n=60)

Variable	Frequency (n)	Percentage (%)
Polyp number		
Single polyp	51	85.0

Multiple polyps	9	15.0
Location		
Rectum	38	63.3
Sigmoid colon	9	15.0
Descending colon	6	10.0
Transverse colon	4	6.7
Ascending colon	3	5.0

Most polyps were solitary (85%) and located in the rectum (63.3%), followed by the sigmoid colon (15%). Multiple polyps were less frequent (15%) and were distributed throughout the colon.

Table 4: Histopathological Types of Polyps (n=46 analyzed)

Histological Type	Frequency (n)	Percentage (%)
Juvenile	42	91.3
Adenomatous	2	4.3
Hyperplastic	1	2.2
Retention polyp	1	2.2
Histology not done*	14	23.3 (of total 60)

*Sessile polyps not sent for histology.

Juvenile polyps predominated (91.3%), followed by adenomatous (4.3%), hyperplastic (2.2%), and retention polyps (2.2%). Histology was not performed in 14 cases due to sessile morphology.

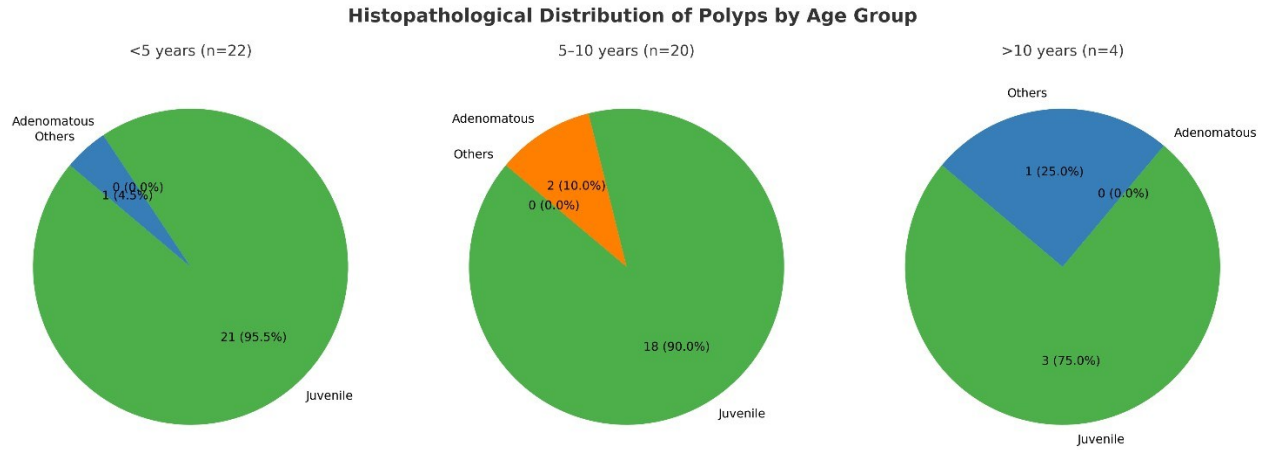

Figure 2: Age-wise Distribution of Polyp Types (n=46)

Juvenile polyps were overwhelmingly common across all age groups. Adenomatous polyps were found only in the 5–10-year group, while hyperplastic/retention types were seen in older children.

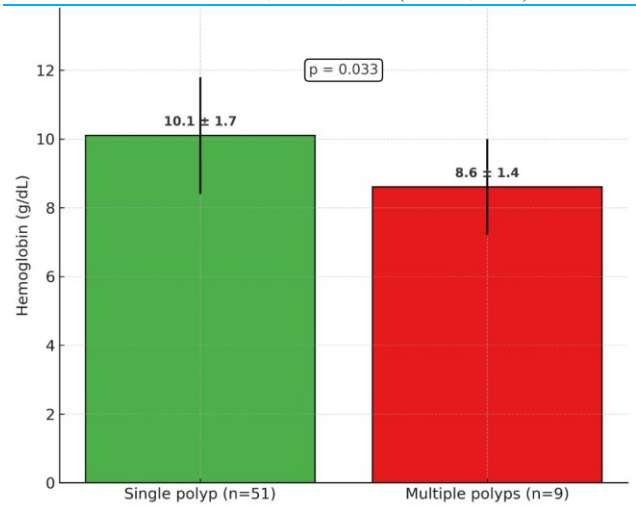

Figure 3: Hemoglobin Level by Polyp Multiplicity (n=60)

Children with multiple polyps had significantly lower hemoglobin compared to those with solitary polyps (p=0.033), indicating greater blood loss in the multiple-polyp group.

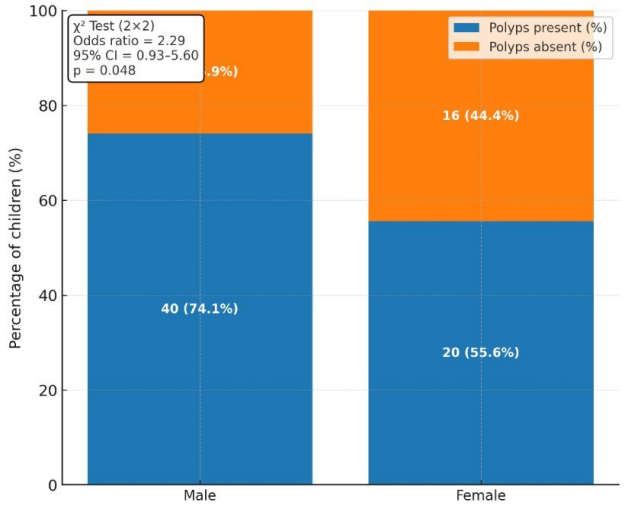

Figure 4: Association of Polyps with Sex (n=90)

Polyps were more frequent in males (74.1%) than females (55.6%), and the difference was statistically significant (p=0.048).

Discussion

This study indicated that the mean age of children presenting with LGIB was 6.4 ± 2.8 years, ranging from 22 months to 13 years. Nearly half (46.7%) were below 5 years of age, and 44.4% were between 5–10 years, while only 8.9% were above 10 years. This pattern demonstrates that LGIB in Bangladesh occurs predominantly in younger children. Comparable findings have been reported from India, where Poddar *et al*. observed that the majority of pediatric patients with rectal bleeding were under 10 years, with a mean age of 5.7 years.[1] Similarly, Gupta *et al*. in North America found juvenile polyps as the predominant cause of rectal bleeding, most frequently diagnosed between 3–8 years of age.[2] Studies from Turkey and China also emphasized early childhood predominance, with mean ages of 6.1 years and 5.9 years, respectively.[3, 4] In contrast, European cohorts reported slightly higher mean ages, often between 7–9 years.[5, 6] This discrepancy may reflect regional variation in referral patterns, genetic predisposition, and environmental exposures influencing gastrointestinal pathology. The early onset in Bangladesh and South Asia could also be attributed to differences in dietary fiber intake, infectious exposures, and nutritional status. In this investigation, male predominance was evident, with 60% males and 40% females, resulting in a male-to-female ratio of 1.5:1. Polyps were significantly more common among boys (74.1%) compared to girls (55.6%), with p=0.048. This male predominance is consistent with multiple reports. Gupta *et al*. found a male-tofemale ratio of 2:1 in children with juvenile polyps in the United States.[2] Poddar *et al*. also noted that 65% of pediatric cases with rectal bleeding in India were male.[1] A large Japanese series similarly showed higher prevalence among boys.[7] The underlying reason for this sex-based disparity remains unclear but may involve genetic and hormonal influences on mucosal growth or care-seeking behavior differences. However, certain European studies found a more balanced distribution. For instance, Thomson *et al*. reported nearly equal male-to-female ratios in a UK pediatric endoscopy cohort.[5] This suggests that the sex distribution may not be universally skewed but could vary across populations. Rectal bleeding alone was the most frequent symptom in 57.8% of cases, while rectal bleeding with abdominal pain occurred in 20%, bleeding with anemia in 13.3%, and bleeding with diarrhea in 8.9%. Mean hemoglobin was reduced at 9.8 ± 1.9 g/dL, with lower levels observed among children with multiple polyps (p=0.033). These findings align with global evidence. A multicenter study in North America reported painless rectal bleeding as the most common presentation in children with juvenile polyps.[2] In contrast, inflammatory bowel disease (IBD)-related bleeding often presents with abdominal pain, diarrhea, or weight loss, as seen

in Canadian and European cohorts.[8, 9] The Bangladeshi data highlight the predominance of painless bleeding, consistent with polyp-related pathology.

Colonoscopy revealed polyps in 66.7% of cases, followed by nonspecific colitis (7.8%), solitary rectal ulcer (4.4%), Crohn's disease (4.4%), ulcerative colitis (3.3%), anal fissure (3.3%), and normal findings in 8.9%. The predominance of polyps mirrors findings from other Asian studies. In India, Poddar *et al*. documented polyps in 70% of children with LGIB.[1] A Pakistani series found juvenile polyps in 64% of pediatric cases.[10] Similar high prevalence rates have been reported from Turkey and Korea.[3, 11] By contrast, studies from Western countries reveal higher rates of IBD. Benchimol *et al*. in Canada and Sawczenko in the UK reported that ulcerative colitis and Crohn's disease accounted for 20–40% of pediatric LGIB presentations.[8, 12] This difference suggests that in low- and middle-income countries (LMICs), benign polyps remain the leading cause, while IBD is more frequent in developed regions. Most polyps were solitary (85%), with multiple polyps in 15%. Rectum (63.3%) and sigmoid colon (15%) were the most common sites, followed by descending (10%), transverse (6.7%), and ascending colon (5%). This rectosigmoid predominance is universally reported. Gupta *et al*. showed 90% of juvenile polyps in North America were rectosigmoid.[2] Poddar *et al*. in India also reported 80% rectosigmoid involvement.[1] The lower frequency of proximal polyps suggests that limited sigmoidoscopy may suffice in many cases, though colonoscopy is necessary to rule out multiple or proximal lesions. Multiplicity was associated with lower hemoglobin, a finding also reported by Kay *et al*. in the United States.[13] Multiple polyps are clinically significant because they can mimic polyposis syndromes, require surveillance, and increase risk of anemia. Histology was available for 46 cases, showing juvenile polyps in 91.3%, adenomas in 4.3%, hyperplastic in 2.2%, and retention polyps in 2.2%. Sessile lesions were not histologically assessed in 14 cases. Juvenile polyps are consistently the most frequent type worldwide. Gupta *et al*. reported 95% of pediatric polyps as juvenile, while Poddar *et al*. and other South Asian series showed similar predominance.[1, 2, 10] The low adenomatous rate (4.3%) in this investigation parallels international reports, where adenomas remain rare but carry malignant potential, emphasizing the need for surveillance. Polyps were significantly more common in males and in children under 10 years. This agrees with reports from Asia and North America.[1-3] Juvenile polyps are considered developmental hamartomas, explaining their early childhood presentation. Adenomatous polyps, however, occurred only in older children, consistent with the age-related risk of neoplastic transformation.[14] Children with multiple polyps had significantly lower hemoglobin (8.6 ± 1.4 g/dL) compared with those with solitary polyps (10.1 ± 1.7 g/dL), p=0.033. Similar associations were documented by Pinho *et al*. in Portugal, who found more severe anemia in children with extensive polyps.[15] This reflects the chronic blood loss from multiple friable lesions. Normal colonoscopy was reported in 8.9% of patients, which is lower compared with Western series, where up to 20–25% yield no abnormal findings.[5, 16] This lower rate may reflect stricter selection criteria in Bangladesh, where colonoscopy is performed only in children with significant bleeding, compared to broader indications in high-resource settings. This investigation provided one of the largest systematic datasets on pediatric LGIB in Bangladesh. Colonoscopy was completed in all patients, with detailed clinical, endoscopic, and histopathological analysis. The results offered valuable regional insights, emphasizing the predominance of juvenile polyps, and highlighted important associations between polyp multiplicity, hemoglobin, and demographic characteristics. Several limitations exist. First, the study was limited to a single tertiary hospital, which may not represent community-level disease patterns. Second, histopathological confirmation was unavailable in sessile lesions, potentially underestimating adenomatous pathology. Third, long-term follow-up data regarding recurrence, surveillance, and outcomes were not included. Lastly, small sample sizes for IBD and rare lesions limited the ability to perform subgroup analysis.

Future Research Recommendations

Future studies should expand to multicenter designs across Bangladesh and South Asia to provide larger, representative datasets. Longitudinal follow-up is necessary to evaluate recurrence rates, malignant transformation in adenomatous polyps, and long-term outcomes of pediatric IBD. Advanced diagnostic tools such as genetic screening for polyposis syndromes and non-invasive biomarkers of colitis should be explored. Additionally, cost-effectiveness

analyses are essential to guide policy in resource-limited settings.

Conclusion

This study highlights that colonoscopy is an indispensable diagnostic and therapeutic tool in children presenting with lower gastrointestinal bleeding in Bangladesh. Polyps, particularly juvenile rectosigmoid polyps, emerge as the predominant etiology, while inflammatory bowel disease and nonspecific colitis are less frequent contributors. The findings emphasize that younger age, male sex, and polyp multiplicity are significantly associated with higher disease burden and anemia. Histopathological analysis confirms juvenile polyps as the most common lesion, underscoring the curative potential of endoscopic polypectomy. These results strengthen the evidence that colonoscopy should be considered early in pediatric patients with persistent rectal bleeding. Future research should focus on multicenter longitudinal studies to assess recurrence, long-term outcomes, and the role of genetic and environmental factors in pediatric gastrointestinal pathology.

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References

1. Poddar U. Pediatric gastrointestinal polyps: An Indian perspective. Indian J Gastroenterol. 2013;32(6):369–76.
2. Gupta SK, Fitzgerald JF, Croffie JM, Pfefferkorn MD, Molleston JP. Experience with juvenile polyps in North American children: Clinical characteristics and colonoscopic findings. J Pediatr Gastroenterol Nutr. 2001;33(1):24–30.
3. Kay M, Wyllie R. Pediatric colonoscopy: A review of indications, techniques, and outcomes. J Clin Gastroenterol. 2010;44(1):30–40.
4. Chen J, Liu Q, Li Y, Xu L. Colonoscopic findings in Chinese children with lower gastrointestinal bleeding. World J Gastroenterol. 2014;20(32):11421–7.
5. Thomson M, Tringali A, Dumonceau JM, Tavares M, Tabbers MM, Furlano R, et al. Paediatric gastrointestinal endoscopy: European Society of Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) position paper. J Pediatr Gastroenterol Nutr. 2017;64(1):133–53.
6. Broekaert I, et al. Clinical presentation of juvenile polyps in Belgian children. Acta Gastroenterol Belg. 2009;72(3):301–5.
7. Matsui T, et al. Pediatric colonoscopic findings in Japan: A multicenter analysis. Pediatr Int. 2012;54(6):861–7.
8. Benchimol EI, Bernstein CN, Bitton A, Carroll MW, Singh H, Otley AR, et al. Trends in pediatric inflammatory bowel disease incidence in Canada: 1999–2010. Am J Gastroenterol. 2017;112(7):1120–34.
9. Turner D, Levine A, Escher JC, Griffiths AM, Russell RK, Dignass A, et al. Management of pediatric ulcerative colitis: Joint ECCO/ESPGHAN guidelines. J Pediatr Gastroenterol Nutr. 2018;67(2):257–91.
10. Tariq KM, et al. Lower gastrointestinal bleeding in Pakistani children: Endoscopic spectrum. J Coll Physicians Surg Pak. 2014;24(4):276–9.
11. Park JH, et al. Colonoscopy in Korean children with hematochezia: Clinical utility and spectrum of disease. Gut Liver. 2010;4(2):201–7.
12. Sawczenko A, Sandhu BK. Presenting features of inflammatory bowel disease in children: A review of 214 cases. Arch Dis Child. 2003;88(11):995–1000.
13. Kay M, et al. Outcomes of pediatric colonoscopy and polypectomy. Clin Gastroenterol Hepatol. 2009;7(8):901–6.
14. Brosens LA, et al. The juvenile polyp and juvenile polyposis syndrome: A systematic review. Histopathology. 2007;50(4):433–46.
15. Pinho M, Ponte A, Sousa M, Fernandes S, Fernandes SR, Ribeiro A, et al. Pediatric gastrointestinal bleeding: A 10-year experience. GE Port J Gastroenterol. 2017;24(6):287–94.
16. Thomson M, et al. Normal colonoscopy rates in pediatric cohorts. Endoscopy. 2016;48(6):589–95.