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HISTOMORPHOLOGICAL SPECTRUM OF LESIONS OF SMALL AND LARGE INTESTINE: AN OBSERVATIONAL STUDY

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ABSTRACT

Introduction:
The gastrointestinal tract is prone to a broad range of pathological conditions, including congenital anomalies, inflammatory diseases, and neoplasms. This study aimed to evaluate the histomorphological patterns of lesions affecting the small and large intestines in a rural tertiary care hospital, correlating them with clinical and radiological findings.

Materials and Methods:
An observational study was conducted in the Department of Pathology, PESIMSR, Kuppam, from January 2021 to February 2024. A total of 115 intestinal specimens (biopsies, polypectomies, and resections) were analysed, excluding appendectomy and inadequate samples. Tissues were processed and stained with haematoxylin and eosin, and special stains (PAS, Alcian blue, ZN) were applied where necessary. Histomorphological features were correlated with clinical data.

Results:
Of the 115 cases, the large intestine was involved in 65.21%, with a slight female predominance (F:M = 1.07:1). Age ranged from 10 to 80 years. Non-neoplastic lesions accounted for 66.08%, with nonspecific colitis being the most common. Neoplastic lesions comprised 33.91%, with adenocarcinomas predominantly affecting the large intestine. Moderately differentiated adenocarcinoma was the most common variant.

Conclusion:
Histopathological evaluation is crucial for accurate diagnosis and classification of intestinal lesions, guiding appropriate clinical management and prognosis. The study highlights the diversity of gastrointestinal lesions and the importance of early detection.

Keywords: Intestine, Histopathology, Neoplastic lesions, Non-neoplastic lesions, Adenocarcinoma

Introduction:

Small intestine is divided in to three sections duodenum, jejunum and ileum and the large intestine consists of 6 parts- cecum (including the appendix), ascending colon, transverse colon, descending colon, sigmoid colon and rectum. Each of this segment have their unique functions [1] [2]. Small intestine primary function is digestion, absorption and nutrition transport [3]. Large intestine functions are extensive reabsorption of water and salt. Its primary role is to dehydrate and store faecal matter [4].

Although the small intestine constitutes more than two-thirds of the total length of the gastrointestinal tract and its mucosal surface area is over 90%, it accounts for small percentage of gastrointestinal neoplasms. Small intestinal lesions are more of infections and inflammatory conditions [5]. Despite this low incidence, small intestinal tumors can pose diagnostic challenges and lead to significant complications when present [6].

In contrast, the large intestine is a common site for Intestinal neoplasms (colorectal cancer). In India, colorectal cancer comprises around 23% of all GI cancers with risk factors like genetic syndromes, inflammatory bowel diseases, and lifestyle factors such as diet and inactivity [7,8]. Malignant lesions of the lower GIT exhibit a broad spectrum of gross and microscopic features [9,10].

Detailed histopathological assessment including examination of surgical margins, adjacent lymph nodes, depth of tissue invasion, and tumor grading and staging is imperative for providing a comprehensive understanding of the disease [11]. Such evaluation is essential in formulating decisions regarding adjuvant therapy, assessing prognosis, and establishing histopathology as the gold standard in the diagnosis of gastrointestinal tumors [11].

Early diagnosis remains challenging, especially in low-resource settings, underscoring the need for improved screening and histopathological documentation. this study sought to offer an in depth analysis of the anatomical distribution of these lesions, enhancing the understanding of their localization, frequency, and potential clinical significance, with the clinical and endoscopic features and correlation with the radiological findings**.**

MATERIALS AND METHODS

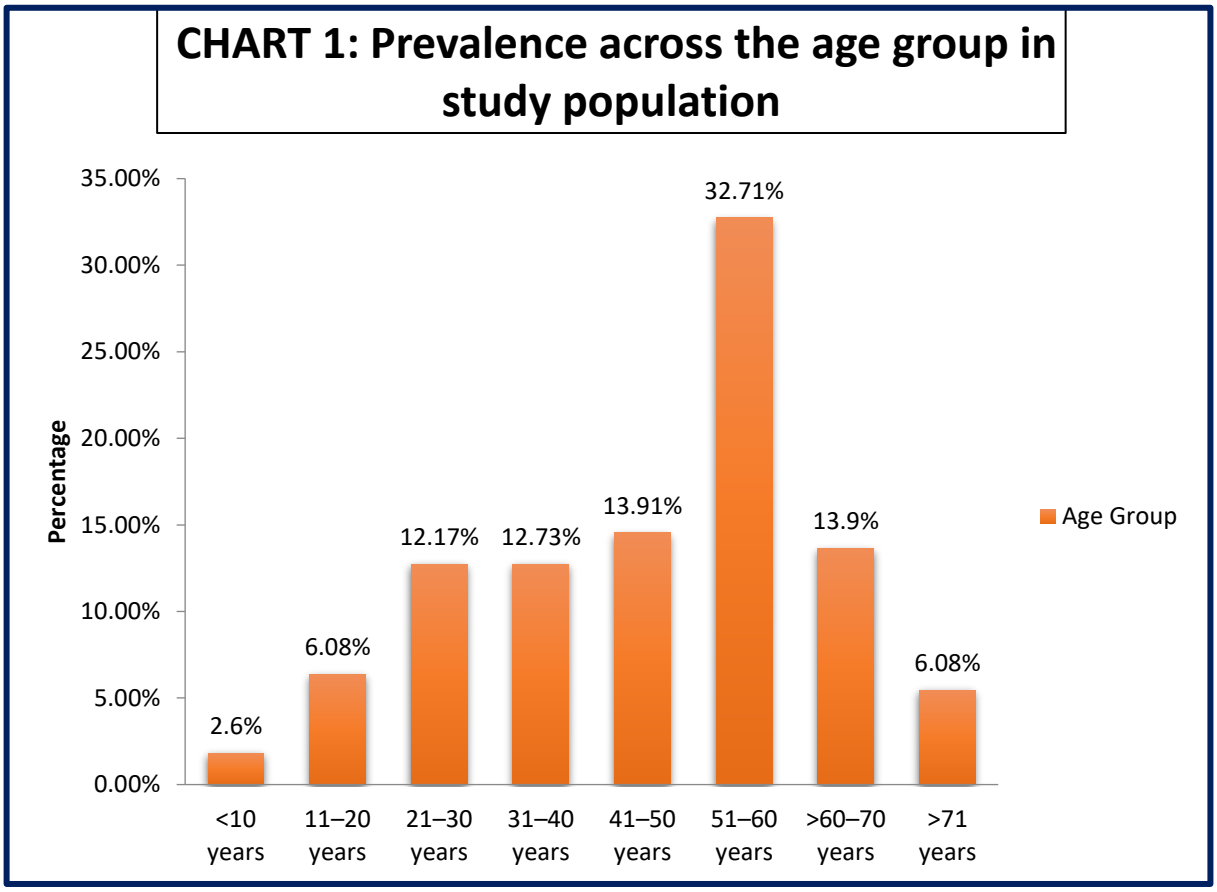
Study Design and Duration

This observational study was conducted at the Department of Pathology, PESIMSR, Kuppam, from January 2021 to February 2024. A total of 115 cases were included, comprising biopsies, polypectomies, and resection specimens of the small and large intestine. Exclusion criteria included appendectomy samples, haemorrhoidectomy specimens, and inadequately preserved or sampled tissues. Specimens were fixed in 10% buffered formalin, processed using standard paraffin embedding techniques, and sectioned at 4–5 µm. Haematoxylin and eosin (H&E) staining was routinely performed. Special stains such as PAS, Alcian blue, and Ziehl–Neelsen (ZN) were employed as indicated. Histological examination was done on all these cases and many lesions like inflammatory, neoplastic, congenital anomalies, infectious diseases, ischemic changes, and malabsorption syndromes were diagnosed. Classification of tumors were done based on WHO guidelines. Grading and staging of malignant lesions were carried out using AJCC TNM criteria. Institutional Ethics Committee clearance was obtained before commencing the study.

RESULTS

Demographic Profile

Among 115 patients, 57 were males and 58 were females, showing a near equal sex distribution (F:M = 1.07:1). Patients ranged from 10 to 80 years of age, with most cases seen in the 4th to 6th decades (CHART 1)



The clinical presentation of patients with intestinal lesions in this study revealed a wide range of symptoms. Abdominal pain was the most common symptom, reported in 104 cases (90.43%), indicating its significance as a primary complaint in intestinal pathology. Loose stools were noted in 49 patients (42.60%), while abdominal distension was reported in 43 cases (37.39%). Weight loss was present in 39 cases (33.90%), reflecting possible chronic disease or malignancy. Vomiting was observed in 34 cases (29.56%), often associated with obstructive or inflammatory conditions. Rectal bleeding was seen in 22 patients (19.13%), typically associated with lower gastrointestinal lesions such as colitis, polyps, or malignancies. These findings emphasize the nonspecific but clinically important nature of gastrointestinal symptoms, underscoring the role of histopathological evaluation in establishing definitive diagnoses (TABLE 1).

Table 1: Distribution of Participants by Presenting Symptoms

Symptom	Category	Frequency (n)	Percentage (%)
Abdominal Pain	Present	104	90.43
Abdominal Distension	Present	43	37.39
Vomiting	Present	34	29.56
Loose Stools	Present	49	42.60
Rectal bleeding	Present	22	19.13
Weight Loss	Present	39	33.90

TABLE 2: Distribution of cases according in Small and Large intestine.

Site	No of lesions	Percentage
Small intestine	40	34.78%
Large intestine	75	65.21%
Total	115	100%

Table 3: Anatomical distribution of lesions in Small and Large intestine

Site wise distribution	Frequency (n)	Percentage (%)
Small intestine		
Duodenum	4	3.47
Jejunum	1	0.86
Ileum	35	30.43
Large intestine		
Caecum	6	5.21
Ascending Colon	9	7.82
Transverse Colon	6	5.21
Descending Colon	12	10.43
Sigmoid Colon	24	20.86
Hepatic Flexure - Colon	1	0.86
Rectum	17	14.78
Total	**115**	**100.00**

Table 4: Pattern of Endocopy findings correlating histopathological findings

Colonoscopy Finding	Non specific inflammation	Ulcerative colitis	Colitis	Inflam matory polyp	Adeno matous polyp	Adeno carcinoma
Bleeding mucosa	4	0	0	0	0	0
Erosions	3	3	6	0	0	1
Colitis	21	0	0	0	0	1
Polyps	0	0	0	2	2	0
Growth	0	0	0	0	0	4
carcinoma	0	0	0	0	0	13
Non-specific	6	0		0	0	0

The distribution of intestinal lesions in the present study revealed a predominance of large intestinal involvement. Out of the total 115 cases analysed, 75 cases (65.21%) were located in the large intestine, while 40 cases (34.78%) involved the small intestine (TABLE 2). This indicates that lesions affecting the large intestine were nearly twice as common as those in the small intestine (TABLE 3). The higher incidence of large intestinal lesions may be attributed to the greater likelihood of symptomatic presentation, increased screening through colonoscopy, and the higher prevalence of neoplastic changes in the colon and rectum compared to the small bowel.

The lesions encountered in the study were broadly categorized into non-neoplastic and neoplastic groups (TABLE 5)**.** Non -neoplastic lesions accounted for the majority, comprising 66.08% of the total cases. Among these, non-specific colitis was the most frequently observed entity, noted in 41.73% of cases.

In the present study, non-neoplastic lesions constituted a total of 76 cases, displaying a diverse histomorphological spectrum. Among the congenital anomalies, Meckel's diverticulum was identified in 3 cases (3.94%), while omphalocele was noted in 1 case (1.31%). The majority of non-neoplastic lesions were of inflammatory or infectious etiology. Acute colitis was the most frequently encountered lesion, observed in 29 cases (38.15%), followed by ischemic bowel changes in 11 cases (14.47%) and intestinal perforations in 10 cases (15.15%). Both chronic non-specific ileitis and non-specific inflammation were recorded in 6 cases each (7.89%). Granulomatous inflammation and ulcerative colitis were found in 3 cases each (3.94%), indicating the presence of chronic inflammatory bowel disease. Additionally, there were 2 cases of inflammatory polyps, and isolated instances of gangrenous intestine (1 case; 1.31%) and parasitic infection (1 case; 1.31%) (FIGURE 3). This data underscores the predominance of acute and chronic inflammatory conditions among non-neoplastic intestinal lesions.

In contrast, neoplastic lesions were identified in 33.91% of the total cases and were further subcategorized into benign and malignant types. Benign tumors, constituting 4.34%**,** included tubular adenomas, which were the most common benign neoplasm observed, followed by juvenile polyps and hyperplastic polyps. Malignant tumors **(**29.56%), with adenocarcinomas being the most prevalent malignancy (23 cases**).** Among these, moderately differentiated adenocarcinoma was the most frequent histological grade (13 cases), followed by well-differentiated **(**6 cases**)** (FIGURE 5) and poorly differentiated types **(**4 cases). Less common histological variants such as mucinous adenocarcinoma **(**2 cases**)** and signet ring cell carcinoma **(**1 case**)** (FIGURE 6) were also documented. Additionally, a single case of gastrointestinal stromal tumor (GIST) was identified (TABLE 6).
The anatomical distribution of neoplastic lesions in this study showed a clear predilection for the rectosigmoid region, which accounted for 60% of all neoplastic cases. This was followed by the ascending and transverse colon, comprising 25% of cases. The small intestine was involved in only 15% of neoplasms, highlighting its relatively lower susceptibility to tumor development compared to the large intestine. The predominance of neoplasms in the rectosigmoid area aligns with global epidemiological trends, as this region is a common site for colorectal cancers due to factors such as prolonged transit time, increased exposure to carcinogens, and mucosal susceptibility.

Table 5: Distribution of non-neoplastic lesions in study population

Non neoplastic lesions		**No of cases**	**Percentage**
Congenital diverticula/ Defects	Meckel's diverticulum	3	3.94
	Omphalocele	1	1.31
Inflammatory / Infections	Acute colitis	29	38.15
	Ischemic bowel changes	11	14.47
	Intestinal perforation	10	15.15
	Chronic non-specific ileitis	6	7.89
	Non-specific inflammation	6	7.89
	Granulomatous inflammation	3	3.94
	Ulcerative colitis	3	3.94
	Inflammatory polyp	2	
	Gangrenous intestine	1	1.31
	Parasite infection	1	1.31
TOTAL		**76**	100.00

Table 6: Distribution of Neoplastic lesions in study population

Neoplastic lesion		**No of cases**	**Percentage (%)**
Benign	Villous Adenoma	2	5.12
	Adenomatous Polyp	2	5.12
	Inflammatory fibroid polyp	1	2.56
Malignant	Adenocarcinoma	32	82.05
	Squamous cell carcinoma	1	2.56
	GIST	1	2.56
Total		**39**	**100.00**

FIGURE 1: Gross image of Adenocarcinoma of transverse colon - with circumferential growth with luminal narrowing

FIGURE 2: Gross image of exophytic growth Ascending colon

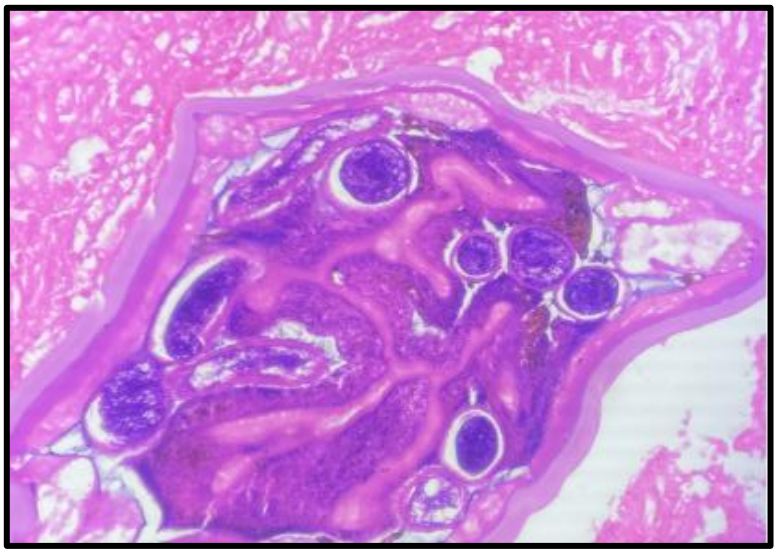


FIGURE 3: H&E stain 40x- Lumen of small intestine shows parasite

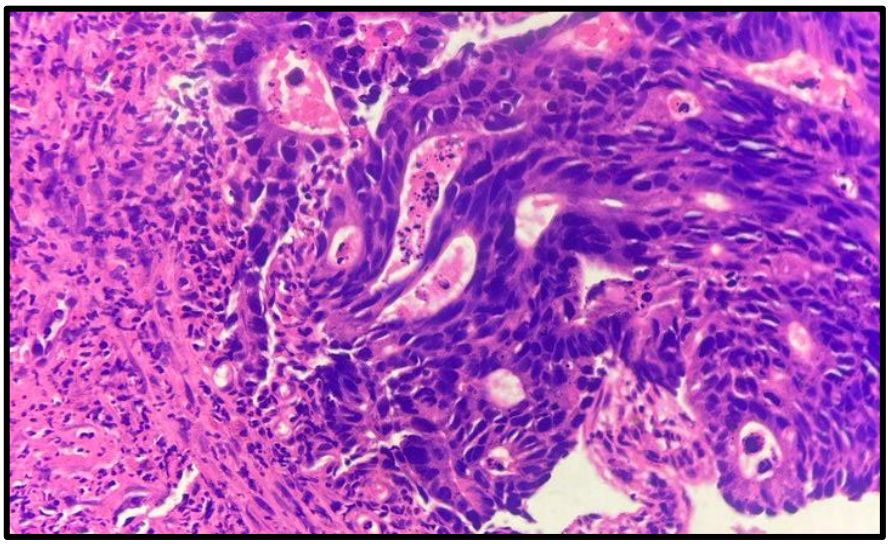


FIGURE 4: H&E stain 40x ADENOCARCINOMA (CASE OF RECTAL BIOPSY)

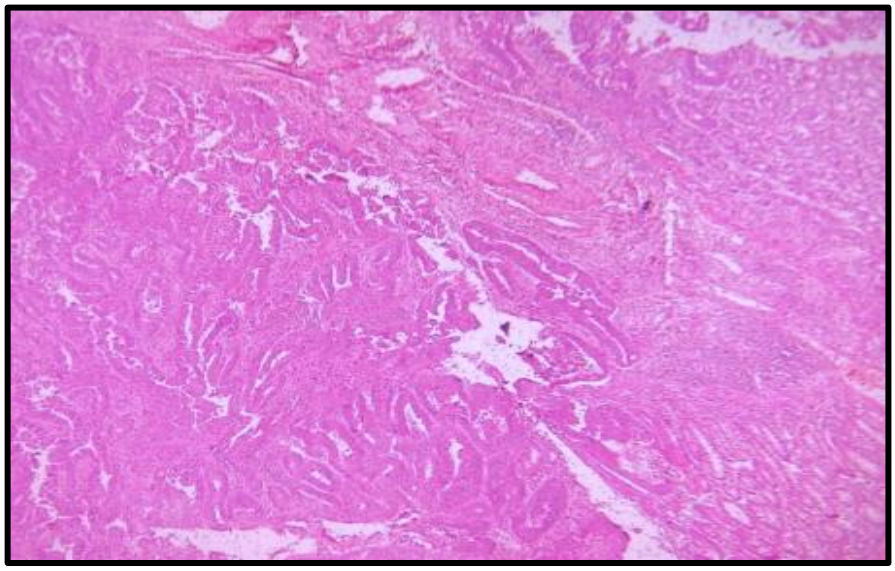


FIGURE 5: H&E stain 10x showing Well-differentiated adenocarcinoma colon

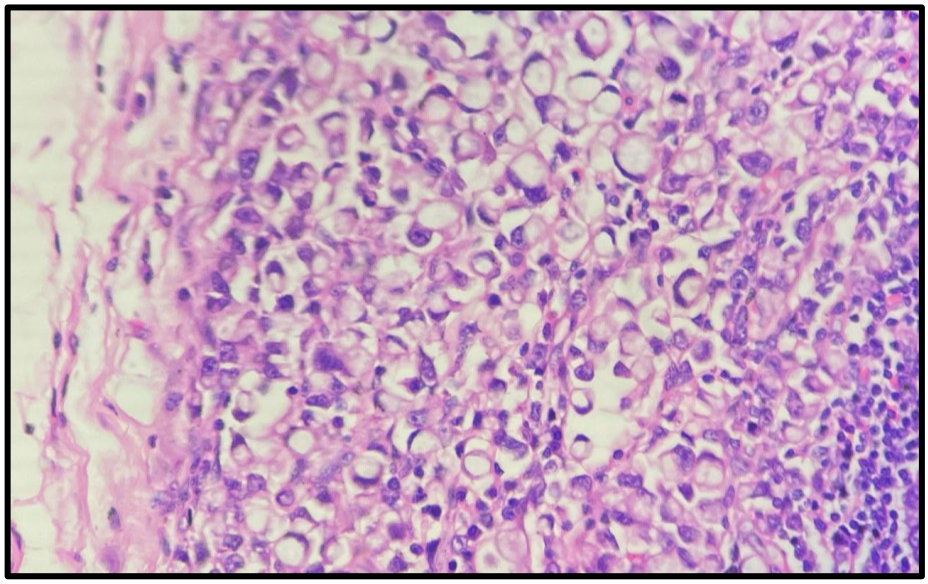


FIGURE 6: H&E stain 40x Signet ring cell carcinoma

DISCUSSION

The present study highlights a broad spectrum of small and large intestinal pathologies in a rural tertiary care center. The findings reaffirm the predominance of non-neoplastic lesions, with non-specific colitis being the most frequent. Congenital anomalies such as Meckel's diverticulum and Hirschsprung's disease, though rare, were identified and are consistent with literature.

Inflammatory lesions including tuberculosis and ischemic colitis were prevalent, reflecting the burden of infectious and vascular diseases in rural populations. Tuberculosis remains an important differential diagnosis in developing regions.

In the study by Masgal M et al. [5], non-neoplastic lesions were the predominant finding, comprising 71.87% of the total cases, with neoplastic lesions accounting for a relatively modest 18.75%. This trend was further reflected in Pandya P D et al. [3] research, where non-neoplastic lesions represented an overwhelming 94.31%, and neoplastic lesions were observed in only 5.68% of the cases.

However, the present study deviates significantly from these findings, with nonneoplastic lesions constituting 66.08% and neoplastic lesions comprising a much larger proportion, specifically 39.91%. The marked increase in the prevalence of neoplastic lesions observed in the present cohort may reflect a shifting epidemiological landscape in the spectrum of intestinal pathologies. This trend could be influenced by a range of contributing factors, including regional demographic variations, advancements in diagnostic modalities, increased screening efforts, and the possible emergence of novel or previously underrecognized etiological agents.

In the current study, adenocarcinoma was identified in 82.05% of neoplastic cases (32 out of 39), demonstrating a high prevalence comparable to findings reported by Manthini P et al. [51] who observed an incidence of 85.71% (48 out of 56 cases). This trend underscores the predominance of adenocarcinoma as the most frequent histological subtype among neoplastic lesions, particularly within the gastrointestinal tract. In contrast, Shah M et al. [11] reported a relatively lower incidence of 62.61% (46 out of 74 cases), which may be attributed to variations in study demographics, tumor site distribution, diagnostic approaches, or regional epidemiological patterns. Collectively, these findings highlight the consistent predominance of adenocarcinoma across multiple studies, reinforcing its clinical and pathological significance. Such data underscore the importance of accurate histopathological diagnosis and early detection strategies to improve patient outcomes.

Among neoplastic lesions, adenocarcinomas were the most common, particularly in the rectosigmoid area. This finding is in line with several studies including those by Khan Z et al. [17], and Malhotra SA et al.,[10] who also observed a predominance of colorectal adenocarcinoma in males over 50 years.

Histological variants such as mucinous and signet ring carcinomas were infrequent but carry poorer prognoses. Grading and TNM staging provided crucial insights for prognosis and therapeutic planning.

Furthermore, histopathological approach of diagnosis emphasizes the role of pathology not only in confirming malignancy but also in subclassifying tumors for precision oncology approaches, especially as molecular profiling and targeted therapies become increasingly integral to colorectal cancer management.

Ongoing surveillance and research into the epidemiology, pathogenesis, and morphological diversity of adenocarcinoma remain essential for improving patient outcomes and guiding.

Gastrointestinal stromal tumors (GISTs) were rare in this cohort. Immunohistochemistry (IHC), though not routinely employed, played a key role in tumor subtyping in suspected GIST and poorly differentiated carcinomas.

Radiological and endoscopic findings correlated well with histopathology, particularly in cases of obstruction, perforation, or mass lesions. Colonoscopy remains invaluable for early detection, particularly of premalignant polyps

CONCLUSION

This study underscores the heterogeneity of small and large intestinal lesions, ranging from benign to malignant, and congenital to inflammatory. Non-neoplastic lesions continue to outnumber neoplasms; however, adenocarcinoma remains the predominant malignant tumor, especially in the large intestine. Histopathological evaluation remains indispensable for definitive diagnosis, appropriate clinical management, and prognosis prediction. Early biopsy and accurate reporting of intestinal lesions are vital, especially in rural settings where diagnostic resources may be limited.

Regular screening, patient education, and improved access to endoscopic services could significantly reduce the burden of intestinal malignancies.

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