Section: Pathology

Original Research Article

HISTOMORPHOLOGICAL SPECTRUM OF COLORECTAL LESIONS: AN INSTITUTIONAL STUDY

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ABSTRACT

Background: Lesions of the colon & rectum are one of the leading causes of morbidities. They are a seat for inflammatory, non-neoplastic and neoplastic diseases with some lesions being pre-malignant. Colonoscopy along with accompanying mucosal biopsy with histopathological examination acts as the gold standard in determining the type, extent of the disease, response to therapy and also in detecting complications. Thus, colonoscopic biopsy helps in further management and treatment of the disease. **Aims:** To study the histomorphological spectrum of colorectal lesions on colonoscopic biopsies and to find the age, gender and site distribution of these lesions.

Materials and Methods: This was a 2-year retrospective study carried out in the Department of Pathology, at BGS GIMS, Bangalore. Relevant clinical data like Age, gender, clinical details, and clinical diagnosis were noted along with final histopathological diagnosis in 85 cases.

Results: In the study, out of 85 colorectal biopsies, the female to male ratio was 1.07:1. Second decade was dominated by Inflammatory bowel disease (IBD); 7^{th}-8^{th} decade by adenocarcinoma. 53(62.35%) were non-neoplastic and 32(37.64%) were neoplastic lesions. Amongst non-neoplastic lesions, maximum cases were of IBD. Serrated adenomatous polyp was the most common benign lesion and Adenocarcinoma was the most common histologic type in malignant lesions.

Conclusion: Histomorphological profile of colorectal biopsies has a wide spectrum ranging from infectious diseases, inflammatory bowel disorders to colorectal malignancies. Colonoscopic biopsies thus helps in early diagnosis of diseases which will aid in early and appropriate intervention.

Keywords: Biopsy, Colonoscopy, Colorectal, Neoplastic, Non neoplastic, Adenocarcinoma.

INTRODUCTION

Colon and rectum is the major seat of neoplastic and non-neoplastic lesions which may lead to diverse complications. Wide range of colo-rectal conditions like infections, Inflammatory bowel diseases, benign polyps and malignancies most often require both macroscopic and microscopic evaluation for accurate diagnosis and appropriate treatment. Hence, Colonoscopic evaluation of these lesions has evolved as the most reliable and accurate methods for assessing the wide variety of colonic disease processes.

In India, urban regions have markedly higher incidence in colo-rectal diseases than rural areas. Risk factors include consumption of red and processed meat, fried and sugary food, smoking and alcohol, comorbidities such as obesity, diabetes and

inflammatory bowel disease (IBD).[3] Changing dietary patterns with rapid globalization pose a threat to our young demography.[3]

Colorectal cancer (CRC) is the third most incident type of cancer, worldwide, followed by lung and prostate in males and breast and lung in females.[2] CRC contributes to more than 9% of the world's cancer incidence and mortality.[2] In India, it ranks as the fourth most incident cancer in both sexes, with 64,863 cases and 38,367 deaths in 2022. With such high mortality, CRC survival in India is way lesser than that of developed countries.[3] By histology, about 93% of CRCs seen at Indian hospitals were adenocarcinomas.[4] Over 45% of colon cancers and 55% of rectal cancers were diagnosed at locoregional disease stage.[4]

Hence, colonoscopic biopsy has become the most commonly sought diagnostic procedure and is currently the gold standard for cancer surveillance. Colonoscopic biopsies are also shown to be the most accurate indicator of the pathological diagnosis, extent of involvement of the colon in inflammatory bowel disease, which help in planning proper treatment strategies in affected patients.

Our study focuses on the role of colonoscopic biopsy in early diagnosis of colorectal diseases with varied histomorphological spectrum of lesions.

MATERIALS AND METHODS

Study design: Retrospective study

Study duration: 02 years (January 2023 to December 2024)

Study population: All Colorectal biopsies received from patients of various age groups presenting with Lower gastrointestinal tract symptoms.

Sample size: 85

Inclusion Criteria

- All colonoscopic biopsies taken from the ileocecal junction to anorectal junction, from patients of all ages and genders sent for Histopathological examination to the Department of Pathology.

Exclusion Criteria

- Resection specimens
- Inadequate biopsies
- Poorly fixed specimens.
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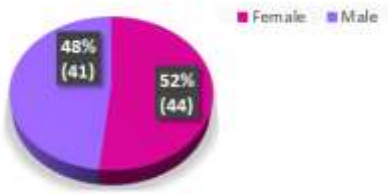
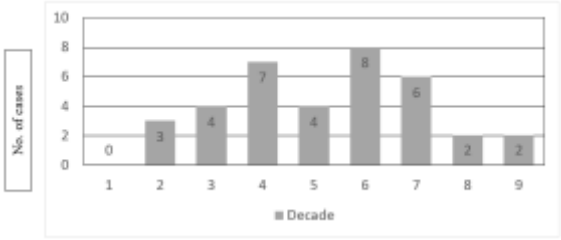
RESULTS

Out of the total 85 study population, 52% (44 individuals) were females, and 48% (41 individuals) were males. The female-to-male ratio was 1.07:1, indicating a nearly equal distribution, with a slight predominance of females, though the difference is minimal.



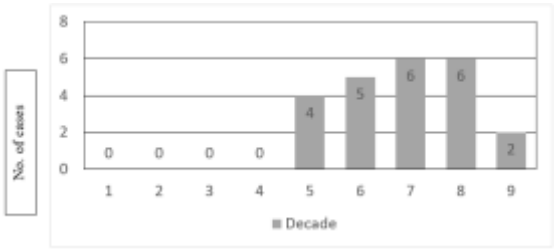
Graph 1: Gender distribution (female to male ratio – 1.07:1)

Samples were obtained from individuals of all age groups, The peak incidence of IBD cases was seen in the 6th decade (50–59 years) followed by 4th decade (30–39 years). Cases were relatively uncommon in childhood (1st decade) and in advanced age (8th and 9th decades). Overall, the distribution showed that IBD most often presents in adulthood and middle age.



Graph 2: Age distribution of Inflammatory bowel disease cases

While adenocarcinoma of the colon is rare in individuals below 40 years. The disease starts appearing from the 5th decade (40–49 years) onwards. The highest incidence was seen in the 7th decade (60–69 years) and 8th decade (70–79 years) decades, with 6 cases each. A decline in cases was noted in the 9th decade (80–89 years). This pattern reflects that adenocarcinoma of the colon is predominantly a disease of older adults, with risk increasing significantly after the age of 40 and peaking in the elderly.



Graph 3: Age distribution of Adenocarcinoma colon

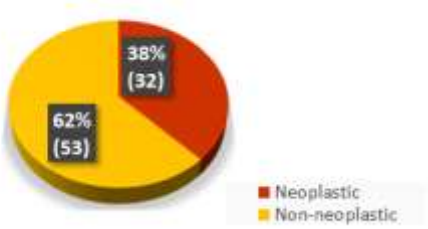
Among all 85 colorectal lesions studied, the ileocecum had 10 non-neoplastic lesions and 3 neoplastic lesions, making a total of 13 cases, which accounted for 15.29% of all colorectal lesions. The colon had 29 non-neoplastic lesions and 15 neoplastic lesions, totalling 44 cases, representing the highest proportion (51.76%) of all lesions. In the rectum, there were 14 non-neoplastic lesions and 14

neoplastic lesions, giving a total of 28 cases, which made up 32.94% of all lesions.

In summary, the colon was the most commonly affected site, followed by the rectum and then the ileocecum.

Among the study group, 38% (32 individuals) were diagnosed with neoplastic diseases, while 62% (53 individuals) had non-neoplastic diseases. The neoplastic-to-non-neoplastic ratio was 0.6:1.

Non-neoplastic diseases constituted the majority of cases, accounting for nearly two-thirds of the study population, while neoplastic diseases made up to just over one-third.



Graph 4: Shows disease distribution with Neoplastic: Non-neoplastic ratio being 0.6:1

A total of 53 cases of non-neoplastic lesions were analysed.

Chronic Active Colitis was the most common non-neoplastic lesion observed in the study (20 cases- 37.73%), accounting for more than one-third of all cases. It indicates long-standing inflammation of the colon with active features (ongoing tissue damage and repair).

Ulcerative Colitis was the second most frequent diagnosis (15 cases- 28.30%), contributing to over one-fourth of cases. Commonest IBD encountered in our study affecting mainly the colon and rectum.

Ulcerative Colitis with Reactive Cellular Changes (4 cases- 7.54%), Crohn's Disease (3 cases- 5.66%) can affect any part of the gastrointestinal tract. Others include Granulomatous Enterocolitis (2 cases -3.7%), Granulomatous Colitis of Mycobacterial Origin (2 cases- 3.7%) where acid fast bacilli was demonstrated, Acute on Chronic Active Colitis (1 case- 1.8%) showed acute exacerbations of chronic conditions, Active Colitis (1 case- 1.8%), Ileocolitis (1 case- 1.8%), Ischemic Ulcerative Colitis (1 case- 1.8%), Volvulus with Ischemic Changes (1 case- 1.8%), Microscopic Colitis (1 case- 1.8%) and Early Colitis (1 case- 1.8%).

Table 1: Summarized table of Non Neoplastic Lesions

Diagnosis	Number of Cases	Percentage
Chronic Active Colitis	20	37.73 %
Ulcerative colitis	15	28.30 %
Crohn's disease	3	5.66 %
Granulomatous enterocolitis	2	3.7 %
Acute on chronic active colitis	1	1.8 %
Active Colitis	1	1.8 %
Ileocolitis	1	1.8 %
Ulcerative colitis with reactive cellular changes	4	7.54 %
Granulomatous colitis of mycobacterial origin	2	3.7 %
Ischemic Ulcerative colitis	1	1.8%
Volvulus with ischemic change	1	1.8 %
Microscopic colitis	1	1.8 %
Early colitis	1	1.8 %
Total	53	100

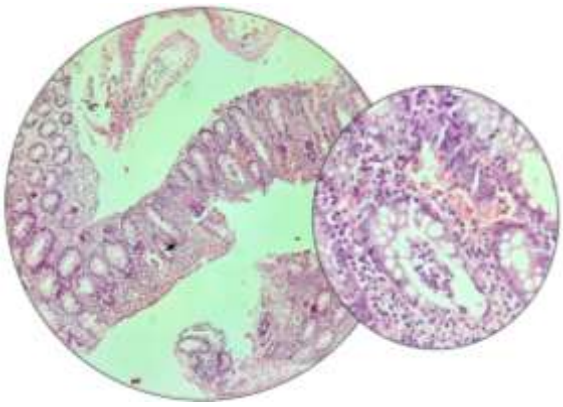


Figure 1: Microphotograph of Ulcerative colitis (H&E 4X); Inset - Cryptitis with crypt abscess H&E 40X)

To summarize, the most common lesion was Chronic Active Colitis (37.73%), followed by Ulcerative Colitis (28.30%). Together, these two conditions made up 66% of all non-neoplastic lesions. In IBD, Crohn's was less commonly seen compared to ulcerative colitis. Other conditions such as granulomatous enterocolitis, and reactive ulcerative colitis were relatively less frequent. Rare entities included ischemic ulcerative colitis, volvulus with ischemic change, microscopic colitis, and early colitis, each representing only 1.8% of cases.

Among 7 Benign neoplastic lesions, Serrated adenomatous inflammatory polyps were the most common in this dataset, accounting for nearly 43% of cases (3 cases). They show serrated (saw-tooth) crypts with dilated glands, along with inflammatory cell infiltration in the lamina propria.

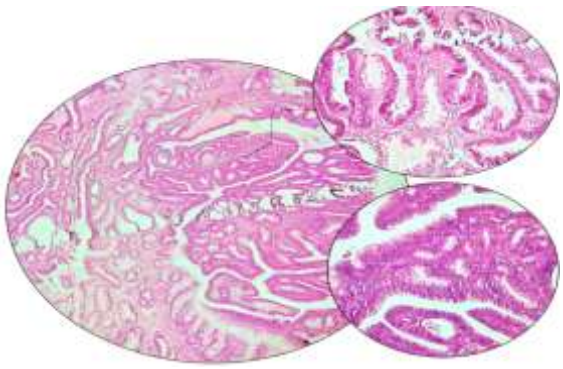


Figure 2: Microphotograph of Serrated adenomatous polyp with low grade dysplasia (H&E 4X); Inset – showing dysplasia (H&E 40X)

All other categories (adenomatous polyp with low-grade dysplasia, hyperplastic polyp, polypoidal reactive cellular change, and filiform serrated adenomatous lesion with dysplasia) are represented equally, each contributing 14.28% (1 case each).

Adenomatous polyp, tubular type with low-grade dysplasia is composed of tubular glands lined by dysplastic epithelium, showing mild nuclear atypia but preserved architecture.

Hyperplastic polyps show elongated crypts with surface serration, hyperplasia and abundant goblet cells, and no evidence of dysplasia. Few lesions show Polypoidal Reactive cellular changes with inflammation demonstrating epithelial cells with nuclear enlargement and hyperchromatic, changes that are reactive to inflammation rather than true dysplasia. Filiform serrated adenomatous lesion with dysplasia displays thin, finger-like projections with a serrated glandular pattern, lined by dysplastic epithelium.

The overall distribution highlights the predominance of serrated lesions in benign neoplastic, while other types appear less frequent but remain clinically important due to their potential progression.

Table 2: Summarized table of Benign Neoplastic Lesions

Diagnosis	Number of Cases	Percentage
Serrated adenomatous inflammatory polyp	3	42.8 %
Adenomatous polyp tubular type with low grade dysplasia	1	14.28%
Hyperplastic polyp	1	14.28%
Polypoidal Reactive cellular change associated with inflammation	1	14.28%
Filiform serrated adenomatous lesion with dysplasia	1	14.28%
Total	7	100%

Among all the 25 malignant neoplastic lesions studied, the anatomical site distribution within the colon and rectum were as follows; The ascending colon and ileocecal area (right colon), had 6 cases, accounting for 24% of all malignant neoplastic lesions. In the transverse colon, only 1 case was recorded, which represents 4% of the total. The descending colon, rectum, and sigmoid colon (left colon) showed the highest number of cases 18, making up 72% of all malignant lesions.

This suggests a clear predominance of malignant lesions on the left side of the colon.

Among the 25 malignant lesions studied, Adenocarcinoma (well, moderately, and poorly differentiated combined) constitutes the bulk of malignant cases, reflecting its dominance as the primary type of colon cancer. The most common type is well-differentiated adenocarcinoma (10 cases- 40%) (shows gland-like structures lined by malignant cells that closely resemble normal epithelium, with mild to moderate nuclear atypia), followed by moderately differentiated (5 cases 20%) (displaying irregular and partially preserved glandular architecture with more pronounced nuclear atypia and mitotic activity) and poorly differentiated (4 cases- 16%) (shows solid sheets or nests of malignant cells with little to no gland formation, marked pleomorphism, and high mitotic rate).

Mucinous adenocarcinoma (3 cases- 12%) (shows abundant extracellular mucin, with malignant cells floating in large mucin pools). Pre-invasive and early neoplastic changes includes conditions like low-grade dysplasia (shows epithelial cells with mild nuclear enlargement, hyperchromasia, and preserved overall architecture), high-grade intraepithelial lesion (shows epithelial cells with marked nuclear atypia, loss of polarity, and stratification confined to the mucosal lining without invasion), and carcinoma in situ (shows severe dysplasia involving the full thickness of the epithelium, with atypical cells but no basement membrane breach/invasion), which make upto 4% of cases each (1 case each), emphasizing their significance in the cancer development spectrum.

Table 3: Summarized table of Malignant Neoplastic Lesions

Diagnosis	Number of Cases	Percentage
Well differentiated adenocarcinoma	10	40 %
Moderately differentiated adenocarcinoma	5	20%
Adenocarcinoma poorly differentiated	4	16 %
Mucinous Adenocarcinoma	3	12 %
Glandular intraepithelial lesion–High Grade	1	4 %
High Grade dysplasia/carcinoma in situ	1	4 %
Low Grade dysplasia	1	4 %
Total	25	100

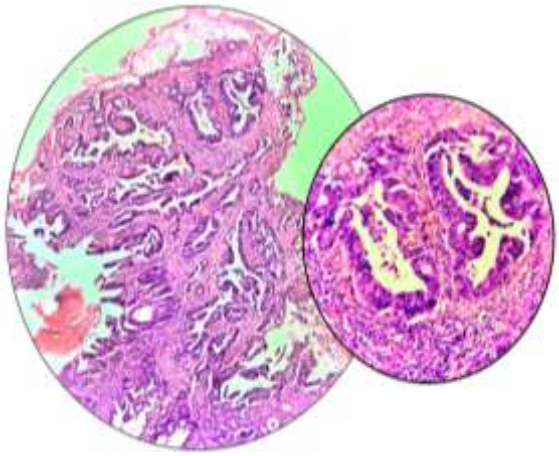


Figure 3: Microphotograph of Well differentiated Adenocarcinoma (H&E 4X); Inset – showing malignant glands (H&E 40X)

DISCUSSION

Though colonoscopy helps in complete visualization of the lesion proper, histopathological examination is a must for definitive diagnosis, further treatment and prognosis of the disease.

The spectrum of colonic lesions span from idiopathic, infectious, inflammatory diseases, obstructive, motility disorders, polyps and neoplastic lesions.

In this study, 85 colorectal biopsies were obtained, from January 2023 to January 2025. Of these female to male ratio was 1.07:1 with 44 females and 41 males, which was contradictory to that of Karve S H, et al 5 and Geetha et al 9. However, malignant neoplastic lesions mostly affected males(15) than females(9) with the ratio being 1.6:1. Various studies attributed etiopathogenesis of colo-rectal lesions to westernized diet, tobacco and alcohol consumption which are more common in males than females.

The Present study shows maximum cases in the sixth and seventh decades, aligning more closely with Geetha et al9, though with some representation across nearly all age ranges. In our study, IBD peak was seen in the 6th decade and adenocarcinoma peak seen at 7th and 8th decade. Mean age of presentation in adenomas was 45 years which is less than malignant cases. This explains the long natural history of malignancies which present at a later stage. Adenomas if detected early are resected and hence prevents the progression to malignancy.

Table 4: Comparison of age distribution of all cases with other studies

Age distribution	Karve et al[5]	Geetha et al[9]	Present study
0-10	04 (2.5%)	01 (0.5%)	01(1.17%)
11-20	06 (3.7%)	09 (4.5%)	04(4.70%)
21-30	29 (18.2%)	23 (11.7%)	10(11.76%)
31-40	33(20.7%)	24(12.2%)	13(15.29%)
41-50	24(15.1 %)	32(16.3 %)	11(12.94%)
51-60	25(15.7%)	48(24.5%)	18(21.17%)
61-70	05(3.1%)	37(18.9%)	18(21.17%)
71-80	-	16 (8.2%)	07(8.23%)
81-90	-	06 (3.1%)	03(3.52%)

In this study, 62% (53 individuals) presented with non-neoplastic lesions which were more in number compared to neoplastic lesions being 38% (32 individuals) with a ratio of 0.6:1. Our findings were comparable with studies conducted by Geetha et al,[9] and Pingle et al.[6]

Chronic colitis remained the most frequent finding (37.7%), and Ulcerative colitis is the most common (28.3%) IBD, while Crohn's disease accounted for 5.6% of cases. This was in concordance with studies done by Pingle et al,[6] and Karve et al.[5] IBD is rampantly emerging in India. It is a challenging disease to treat because of the remissions and relapses; requiring early accurate diagnosis and treatment with lifestyle modifications. Accurate diagnosis requires knowledge of the classic morphological features of UC, as well as a number of atypical pathological presentations that may cause mis-classification of the disease process. Periodic surveillance of these patients helps in reducing the risk of developing colorectal carcinoma.

Among the 32 neoplastic lesions studied, 7(21.9%) were benign and 25(78.1%) were malignant indicating a clear predominance of malignant neoplasms in colorectal neoplastic lesions. Across other studies compared, malignant lesions were consistently more common than benign lesions. The proportion of malignant cases is highest in the present study (78.1%), slightly higher than Karve et al5 (74.7%) and Geetha et al,[9] (70.7%), indicating a clear accordance with other studies.

Adenomatous inflammatory polyps are the most commonly seen lesions in our study.

Although colorectal carcinoma is distributed worldwide, incidence is higher in industrialized and western countries. Adenocarcinoma is the commonest malignant tumor of the colon and rectum. The rising trend in incidence and mortality from colorectal cancer is more striking in affluent than in poorer societies and differs substantially among ethnic groups. Although, changes in lifestyle and dietary habits are believed to be the reasons underlying the increase, the interaction between these factors and genetic characteristics might also have a pivotal role.

Adenocarcinomas predominated malignant lesions in the present study, with majority of cases falling in the age group of 7th and 8th decade of life, representing how carcinomas present later on in life and adenomas or adenomatous polyps occur early on in life,

explaining the significance of adenoma–carcinoma sequence.

Well differentiated adenocarcinoma being the most common histological grade in our study 10 cases (40 %), followed by moderately differentiated adenocarcinoma 05 cases (20%), poorly differentiated carcinoma 04 cases (16%), Mucinous adenocarcinoma 03 cases (12%) and others. All these findings are in good accordance with studies of Karve et al,[5] and Geetha et al.[9]

CONCLUSION

Histomorphological profile of colorectal biopsies has a wide spectrum ranging from Infectious diseases, Inflammatory bowel disorders to Colorectal malignancies.

Colonoscopy supported by biopsy provides valuable insights into both the gross and microscopic features of the disease process. Colonic lesions were most common than rectum, whether neoplastic or non-neoplastic. Therefore, a biopsy is recommended for any colonoscopically visible lesions, as well as in patients presenting with chronic altered bowel habits. Colonoscopy also permits therapeutic removal of polyps. Most common carcinoma is Adenocarcinoma. Correlation of colonoscopic imaging, histopathological examination of biopsies along with clinical history helps in early diagnosis of the disease which will aid in early and appropriate intervention and help in halting any further progression of the disease process.

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