Original Article

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Clinico-Histopathological Analysis of Colorectal Adenocarcinoma Cases in a Tertiary Hospital of Bangladesh

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ABSTRACT

Background: *Colorectal Carcinoma (CRC) demonstrates geographic variations in presentation. Recent data on clinico-pathological characteristics from Bangladesh remains limited. This study aimed to describe the demographic, risk factors and histopathological profile of colorectal adenocarcinoma patients at a tertiary hospital in Bangladesh.*

Materials and methods: *A cross-sectional observational study was conducted in the Department of Pathology, Chittagong Medical College, Bangladesh, from March 2021 to December 2022. Purposive sampling included 49 surgically resected, histopathologically confirmed primary colorectal adenocarcinoma specimens. Data on demographics, risk factors (Smoking, alcohol, family history) and tumor characteristics (Size, site, morphology) were collected through patient interviews using a structured case record form. Histopathological examination (H&E staining) determined subtype, grade, T stage (Tumour stage) and N stage (Involvement of lymph node).*

Results: *The mean age was 46.63 ± 13.4 years, with 79.6% of patients <60 years. Male predominance was observed (63.3%), 49% reported smoking, while alcohol consumption was minimal (4.1%). Only 16.3% had a positive family history. Most tumors were ≤5 cm (61.2%, mean 5.16±2.63 cm), with ulcerative growth (44.9%) being most common. The sigmoid colon was the predominant site (36.7%). Conventional adenocarcinoma comprised 89.8% of cases; most were low-grade (87.7%) and moderately differentiated (67.3%). Pathologically, T3 invasion was most frequent (55%), followed by T2 (28.6%). Most tumors (63.3%) had no nodal involvement (N0).*

Conclusion: *CRC in this Bangladeshi cohort presents at a significantly younger age than in Western populations, with a high smoking prevalence and sigmoid colon predilection. Despite frequent deep mural invasion (T3) a majority showed no nodal metastasis. These findings highlight unique regional trends, underscoring the need for early screening initiatives and focused research into local risk factors like smoking.*

Key words: Adenocarcinoma; Colorectal carcinoma; Histopathological.

Introduction

Colorectal Carcinoma (CRC) remains a major global health challenge, with striking disparities in incidence and mortality across regions. In 2020, an estimated 1.9 million new cases and 930,000 deaths occurred due to CRC, which is projected to increase to 3.2 million new cases and 1.6 million deaths by 2040.[1] These trends demand urgent, targeted interventions to address evolving risk profiles and mitigate the impending surge in global CRC burden.The prevalence of CRC is lower in Asia than in Western countries.[1,2] However, the incidence has been increasing alarmingly in countries of the Asia-Pacific region during the last two decades attributed partly to urbanization and dietary shifts.[3]

Recent estimates indicate that CRC is becoming a significant health concern in Bangladesh. In Bangladesh, 5-year prevalence rates of CRC are 3.28 and 3.1 per 100,000 population, respectively.[4] Another report from GLOBOCAN 2022 states that 5,723 new CRC cases were recorded in Bangladesh, making up 3.4% of all cancer cases.[5] However, comprehensive data on the clinico-pathological characteristics of CRC within the specific demographic and environmental context of Bangladesh remains relatively scarce. Existing studies from neighbouring South Asian countries suggest distinct patterns, notably a trend towards diagnosis at a younger age compared to Western populations.[6-8]

Numerous modifiable risk factors have been associated with the disease, including alcohol consumption,

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obesity, smoking history and a diet rich in processed and red meat.[2] A history of inflammatory bowel disease, a family history of CRC and age are non-modifiable risk factors that have also been associated with CRC.[2] While extensive research has characterized its epidemiology, risk factors and pathological spectrum in high-income Western nations, significant geographic and ethnic variations exist in its presentation.[9] These variations encompass differences in the age of onset, anatomical distribution, histological subtypes and the prevalence of associated risk factors.[1,2,10] Current national screening programs for CRC are absent in Bangladesh and awareness levels among the general population and primary healthcare providers may be suboptimal.[11] Understanding the specific profile of CRC in Bangladesh would inform the development of effective early detection strategies tailored to the local population, guides optimal resource allocation for diagnostic and therapeutic services and help identify potential region-specific etiological factors for targeted prevention.[1,2] A detailed histopathological analysis integrated with demographic and risk factor data is essential for accurate staging, prognostication and treatment planning. Parameters such as tumor location, size, histological subtype, grade, depth of invasion (T stage) and regional lymph node involvement (N stage) are fundamental determinants of patient management and outcomes.[12]

Adenocarcinomas constitute the vast majority, making up over 90% of CRC cases. Specifically, they account for about 93.4% of primary CRC cases.[13] This study aimed to perform a comprehensive clinico-histopathological analysis of surgically resected colorectal adenocarcinoma cases diagnosed at a major tertiary care hospital in Chattogram, Bangladesh. The findings would provide valuable insights into the disease pattern in this region, contributing to improved local diagnostic protocols, clinical management strategies and the foundation for future research into risk factors and prevention.

Materials and methods

This cross-sectional observational study was conducted in the Department of Pathology, Chittagong Medical College, Chattogram, Bangladesh, between March 2021 and December 2022. Surgically resected colorectal specimens received at the department and subsequently diagnosed as primary colorectal adenocarcinoma on histopathological examination were selected using purposive sampling. The final study cohort comprised 49 patients. Patients who had received prior chemotherapy or radiotherapy for colorectal carcinoma were excluded.

Data were collected using a predesigned Case Record Form. After obtaining informed written consent, demographic (Age, sex, socioeconomic status) and clinical variables (Dietary habits, smoking history, alcohol consumption, family history of colorectal cancer, tumor site, tumor size, nodal status) were recorded through patient interviews and a structured questionnaire. Surgically resected specimens (Including total colectomy, hemicolectomies, low anterior resection and abdominoperineal resection) fixed in 10% formalin, underwent standard histopathological processing within the department. Tissue sections were stained with Hematoxylin and Eosin (H&E). Histopathological examination was performed to determine tumor subtype, grade, extent of invasion (T stage) and regional nodal status (N stage). Gross features (Appearance, size, site) were also recorded.

Key variables analyzed included histopathological type, histopathological grade, extent of invasion (T stage), and nodal status (N stage). Tumor grading was performed according to the WHO Classification of Tumors of the Colon and Rectum (2019) where well and moderately differentiated adenocarcinomas were classified as low-grade and poorly differentiated/ undifferentiated carcinomas as high-grade.[14.15] Data were entered into an Excel master sheet and analyzed using SPSS version 23. Descriptive statistics were employed: qualitative variables were expressed as frequency (Percentage) and continuous variables as mean ± Standard Deviation (SD) or median and range. Ethical clearance was obtained from the Ethical Review Committee of Chittagong Medical College prior to study commencement.

Results

Table I Age and sex of the responding patients (n=49)

Age (Years)	Frequency (n)	Percent (%)
<60	39	79.6
60	10	20.4
Sex		
Male	31	63.3
Female	18	36.7

This study included 49 patients with colorectal adenocarcinoma. The cohort was predominantly younger, with 79.6% (n=39) aged <60 years (Mean age: 46.63 ± 13.4 years, range: 18-75). A male predominance was observed (63.3%, n=31) yielding a male-to-female ratio of 1.72:1.

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Table II Smoking status, alcohol drinking habit and family history of the patients (n=49)

Attributes	Frequency (n)	Percent (%)
Smoking tobacco		
No	25	51.0
Yes	24	49.0
Drinking alcohol		
No	47	95.9
Yes	02	04.1
Family history of colorectal carcinoma		
Absent	41	83.7
Present	08	16.3

Among the 49 colorectal carcinoma patients, 24 (49%) reported tobacco smoking and 2 (4.1%) reported alcohol consumption. A positive family history of colorectal carcinoma was present in 8 patients (16.3%) as detailed in Table II.

Table III Distribution of the patients according to tumor size, appearance, site and type (n=49)

Attributes	Frequency (n)	Percent (%)
Tumor size (cm)		
≤5	30	61.2
>5	19	38.8
Tumor appearance		
Ulcerative	22	44.9
Exophytic	15	30.6
Polypoid	05	10.2
Infiltrative	03	6.1
Annular	04	8.2
Tumor site		
Ascending colon	05	10.2
Transverse colon	10	20.4
Sigmoid colon	18	36.7
Rectosigmoid junction	02	4.1
Rectum	14	28.6
Histopathological type		
Conventional adenocarcinoma	44	89.8
Mucinous	04	8.2
Signet ring	01	2.0

The cohort exhibited distinct clinicopathological features (Table III). Most tumors measured ≤5 cm (61.2%), with a mean size of 5.16 ± 2.63 cm (Range: 1.5-16 cm). Gross appearances were predominantly ulcerative (44.9%) followed by exophytic (30.6%) polypoid (10.2%) annular (8.2%) and infiltrative (6.1%). Anatomically, tumors occurred most frequently in the sigmoid colon (36.7%) then rectum (28.6%), transverse colon (20.4%) ascending colon (10.2%) and rectosigmoid junction (4.1%). Histopathologically, conventional adenocarcinoma predominated (89.8%) while mucinous and signet ring subtypes constituted 8.2% and 2.0%, respectively.

Table IV Histological grade of the tumor among the patients (n=49)

	Tumor grade	Frequency (n)	Percent (%)
Low grade	Well differentiated (Grade I)	10	20.4
	Moderately differentiated (Grade II)	33	67.4
High Grade	Poorly differentiated (Grade III)	06	12.2

Table IV demonstrates that low-grade adenocarcinoma predominated (87.8%) comprising well-differentiated (20.4%) and moderately differentiated (67.4%) subtypes. The remainder (12.2%) were poorly differentiated adenocarcinomas; no Grade IV cases were identified.

Table V Distribution of the patients according to the tumor invasiveness and nodal status (n=49)

Attributes	Frequency (n)	Percent (%)
Tumor invasiveness		
T1	04	08.2
T2	14	28.6
T3	27	55.0
T4	04	08.2
Nodal status		
N0	31	63.3
N1	08	16.3
N2	09	18.4
Nx	01	02.0

Tumor staging characteristics are detailed in Table V. Depth of invasion (T-stage) was predominantly T3 (55.0%) followed by T2 (28.6%), T1 (8.2%) and T4 (8.2%). Most tumors showed no regional nodal involvement (N0: 63.3%, n=31) while N1 and N2 spread occurred in 18.4% (n=9) and 16.3% (n=8) of cases, respectively.

[N1: Ipsilateral peribronchial/and or hilar nodes and intrapulmonary lymph nodes involvement.

N2: Ipsilateral mediastinal and or subcarinal nodes involvement.]

Discussion

In this study of 49 colorectal adenocarcinoma patients revealed a mean age of 46.63 ± 13.4 years, with 79.6% aged <60 years. Generally, incidences of CRC ascended

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sharply after the age of 45 years and 90% of cases occurred in persons over the age of 50 years.[16,17] But the reported incidence had increased among patients of 20–40 years of age by 17–20% now a days.[18] Several studies in neighbouring Asian countries also reported that incidences of CRC in younger individuals escalated in recent years.[7,8] This study clearly indicates that the percentage of younger colorectal adenocarcinoma patients is rising at the southeastern part of Bangladesh. The exact reasons behind these outcomes are still not clear. However, it is assumed that the early onset CRC may be the consequence of genetic mutation. Besides, several other factors like intake of junk foods, tobacco use, lack of exercise etc. are potential risk factors for such observation. A male predominance (63.3%, M:F ratio 1.72:1) was observed in the present study, consistent with previous findings from Bangladesh, India and Nepal.[6-8,19,20] These data suggest that females contribute less to suffered CRC than male. This could be associated with smoking, alcohol consumption or a more Westernized lifestyle among males.

Regarding risk factors, 49% of patients reported smoking, closely matching Poynter et al.'s observation (42.3%), though the precise role of smoking in CRC pathogenesis warrants further investigation.[21] Alcohol consumption was minimal (4.1%). A positive family history was noted in only 16.3% of patients, similar to Slattery et al.'s report (10.82%).[22] This relatively low rate may reflect limited family medical history awareness and the absence of national CRC screening programs in Bangladesh.

Tumor characteristics showed most lesions were ≤5 cm (61.2%, mean size 5.16 ± 2.63 cm), comparable to Sultana et al.'s findings (Mean 4.8 cm).[23] Ulcerative growth was the predominant gross morphology (44.9%), followed by exophytic (30.6%). Anatomically, the sigmoid colon was the most frequent site (36.7%), consistent with Patil et al. contrasting studies by Al Temimi and Miya et al. where rectal location predominated.[24-26] Histopathologically, conventional adenocarcinoma comprised 89.8% of cases, with mucinous (8.2%) and signet ring (2.0%) subtypes observed at rates comparable to Patil et al. and lower than some Western series (Bhardwaj et al., 28% mucinous).[24,27] Most tumors were low-grade (87.7%) predominantly moderately differentiated (67.3%) aligning closely with the findings of Rahman et al. Patil et al. and Abdul et al.[19,24,28] Pathological staging revealed T3 as the most common depth of invasion (55%) followed by T2 (28.6%) and most tumors (63.3%) exhibited no regional nodal involvement (N0) while N1 and N2 spread were observed in 18.4% and 16.3% of cases, respectively. Stage pT3 (61.4%) was the most common tumor stage, followed by pN0 (55.9%) for lymph node involvement in a previous study from Bangladesh.[19]

Limitations

This study had several important limitations. The primary constraint was the relatively small sample size, which reduced statistical power and limits the generalizability of the findings across the broader Bangladeshi population. Secondly, the single-center design introduced potential selection bias, as the patient cohort may not fully represent the demographic and clinical diversity of CRC cases throughout Bangladesh. Furthermore, the lack of detailed molecular profiling and longitudinal survival data restricted the analysis of potential biological drivers and prognostic implications of the observed clinico-pathological patterns.

Conclusion

The study concludes that colorectal adenocarcinoma in this Bangladeshi cohort presents with distinct characteristics. A notably younger age at diagnosis and male predominance were key demographic features, aligning with some regional studies.But differing from typical Western profiles. Pathologically, tumors were frequently ≤ 5 cm, most commonly located in the sigmoid colon and overwhelmingly conventional adenocarcinoma of low grade and moderate differentiation. While smoking prevalence was high, reported alcohol use and positive family history were low. Pathological staging revealed T3 invasion as most common, but a majority had no nodal involvement, suggesting differences in tumor aggressiveness or the timing of detection.

Recommendation

Larger, multi-center, prospective studies incorporating molecular subtyping and survival analysis are essential to validate the present study findings, explore underlying biological factors and assess prognostic significance. Given the high smoking rate and young presentation, public health initiatives focused on smoking cessation and increasing awareness of early CRC symptoms in younger adults are crucial in Bangladesh. Finally, establishing national cancer registry standards and developing pilot screening programs, particularly for high-risk groups or younger individuals with symptoms, should be prioritized to improve early detection and understand the true burden and risk factors, including the potential impact of limited family history awareness.

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Disclosure
The authors declare no conflict of interest.

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