Clinicopathological Characteristics of Early-Onset Colorectal Cancer among Young Adults in Northeast Bangladesh: A Hospital-Based Cross-Sectional Study

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Abstract

Background: Colorectal cancer (CRC), historically predominant in older populations, is increasingly identified in individuals below 50 years of age, a subset classified as early-onset colorectal cancer (EOCRC), which frequently presents with advanced-stage disease and distinct clinicopathological features in young adults.

Objective: To observe the demographic, clinical, and pathological characteristics, risk factors, and treatment outcomes of EOCRC in young adults in Northeast Bangladesh.

Methods: A hospital-based cross-sectional study was conducted at the Department of Clinical Oncology, Mount Adora Hospital, Sylhet, from July 2023 to December 2024. Patients were purposively selected, and data were extracted from hospital records. The study included 112 histopathologically confirmed colorectal cancer patients aged 18-40 years, with information on demographics, family history, clinical presentation, tumor characteristics, tumor markers, treatments, and treatment response analyzed.

Results: The mean age of EOCRC patient's was 32.8±3.2 years; 68.0% were male, and 71.0% resided in urban areas. Obesity (34.0%) and smoking (24.0%) were the most common risk factors, while family history (13.0%) and inflammatory bowel disease (9.0%) were less frequent. The leading symptoms were combined per-rectal bleeding and abdominal pain (77.7%), generalized weakness with anorexia and pallor (59.8%), rectal bleeding (50.0%), and altered bowel habits (42.9%). The rectum was the predominant tumor site (51.0%), followed by the distal colon (33.0%). Most tumors were adenocarcinoma NOS/Grade 1–2 (66.0%), and the majority presented at Stage III (58.0%). Total neoadjuvant therapy was the most common treatment (48.0%). Partial and complete responses were observed in 39.0% and 27.0% of patients, respectively, while 13.0% showed disease progression.

Conclusion: Young adults with EOCRC in Sylhet frequently present with advanced-stage, distal tumors and exhibit modifiable lifestyle risk factors such as obesity and smoking. Early recognition and targeted interventions are critical to improve outcomes in this population.

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Introduction

Colorectal cancer (CRC) has traditionally been viewed as a disease of older adults, but over the last few decades, an increasing number of cases have been reported among younger individuals. This shift has drawn attention to what is now termed early-onset colorectal cancer (EOCRC), commonly defined as CRC diagnosed in patients less than 50 years of age. A global analysis based on the Global Burden of Disease Study 2019 revealed that the incidence of EOCRC rose from 4.2 to 6.7 per 100,000 between 1990 and 2019, with corresponding increases in mortality and disability-adjusted life years (DALYs), marking a significant public health concern worldwide.[1,2] Regional trends similarly show rising EOCRC in middle-income and high-middle income countries, where changing lifestyle patterns might contribute to this increase.[3]

While a substantial portion of EOCRC cases have been linked to hereditary cancer syndromes such as Lynch syndrome and familial adenomatous polyposis (FAP), recent data suggest that the majority of EOCRC in young adults are sporadic and not associated with known inherited mutations.[4,5] This observation has spurred investigations into environmental and lifestyle-related risk factors such as obesity, smoking, alcohol consumption, diet low in fiber or calcium, and physical inactivity.[6,7] Among these, obesity has emerged as a particularly important risk factor: a large prospective cohort of young women found that obesity nearly doubled the risk of EOCRC compared to normal-weight counterparts.[8] Epidemiologic data further support a link between rising global prevalence of overweight/obesity and increasing incidence of EOCRC.[9]

Clinically, EOCRC often presents with more aggressive features than CRC in older adults including distal colon or rectal location, advanced stage at diagnosis, and more frequent signet-ring or poorly differentiated histology.[4,10] These features likely contribute to poorer prognosis despite the younger age of onset. Many young patients are diagnosed at advanced stages (stage III or IV), which limits the potential benefits of curative treatment and underscores the need for earlier detection and better awareness.[5,11-13] Nevertheless, there is a dearth of data on EOCRC from South Asia, including Bangladesh, where changing demographics, urbanization, and lifestyle transitions may influence risk. The paucity of locally relevant data poses challenges to formulating screening guidelines or early detection strategies appropriate for those populations.

Against this background, the present hospital-based cross-sectional study was undertaken at a tertiary care center in Sylhet Division, Northeast Bangladesh. The study aims to document the demographic, clinical and pathological, and risk-factor profile of EOCRC among young adults in this under-studied region. By providing a detailed account of patient characteristics, tumor location and histology, stage at presentation, and treatment outcomes, this study seeks to contribute local evidence to global concerns about rising EOCRC. Such evidence can help shape early detection efforts and inform public health strategies adapted to regional risk factors.

Methods

This hospital-based cross-sectional study was conducted at the Department of Clinical Oncology, Mount Adora Hospital, Sylhet, a tertiary care center in Northeast Bangladesh, from July 2023 to December 2024. It aimed to assess the demographic, clinical, and pathological characteristics, risk factors, and treatment outcomes of early-onset colorectal cancer in young adults.

A total of 112 patients aged 18–40 years with histopathologically confirmed colon or rectal cancer were included using purposive sampling. Patients with incomplete medical records, secondary colorectal cancer, or known hereditary colorectal cancer syndromes were excluded from the study.

Data were extracted from hospital records during the study period. Variables collected included demographic characteristics (age, sex, residence), family history of colorectal cancer in first-degree relatives, clinical presentation (rectal bleeding, abdominal pain, altered bowel habits, generalized weakness, anorexia, pallor, combined per-rectal bleeding and abdominal pain, and palpable abdominal mass), tumor characteristics (site, histopathological type), tumor markers, and treatment modalities and response to therapy.

Data were entered, cleaned, and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were applied to summarize the study variables. Continuous variables, such as age, were presented as mean ± standard deviation (SD) and range, while categorical variables were summarized using frequency and percentage.

All patient data were handled with strict confidentiality, and no identifiable information was used. Data were accessed solely for research purposes, and privacy was ensured throughout the study. This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (revised 2013). Ethical permission for the research was obtained from the Mount Adora Hospital, Sylhet, Bangladesh.

Results

A total of 112 patients with EOCRC were included. Table I shows that the mean age of patients was 32.8±3.2 years (range: 18–40). Males constituted 68.0% of the cohort and females 32.0%, with a male-to-female ratio of 2.1:1. Most patients resided in urban areas (71.0%), while 29.0% were from rural settings.

Table II shows that obesity (34.0%) and smoking (24.0%) were the most prevalent risk factors, highlighting the significant role of modifiable lifestyle factors in disease development. Family history of colorectal cancer and presence of multiple risk factors were observed in 13.0% of patients, while history of inflammatory bowel disease (9.0%) and alcohol consumption (7.0%) were less common.

The most common presenting symptom among young adults with EOCRC was generalized weakness, anorexia, and pallor (59.8%), reflecting the systemic impact of the disease. Per-rectal bleeding combined with abdominal pain was reported in 77.7% of patients, while rectal bleeding (50.0%) and altered bowel habits (42.9%) were also frequent. A palpable abdominal mass was detected in 25.0% of cases, and isolated abdominal pain occurred in 24.1% (Table III).

Figure 1 portrays that the rectum was the most common tumor site (51.0%), followed by the distal colon (33.0%) and right colon (16.0%).

Table IV demonstrate that the majority of tumors were adenocarcinoma NOS/Grade 1–2 (66.0%), followed by poorly differentiated adenocarcinoma (26.0%) and signet ring cell or other rare types (8.0%), indicating that most early-onset colorectal cancers in this cohort were moderately differentiated. At diagnosis, the majority of patients were Stage III (58.0%), with smaller proportions at Stage II (19.0%), Stage I (16.0%), and Stage IV (7.0%).

Table VI depicts that among patients with EOCRC; total neoadjuvant therapy was the most commonly employed treatment (48.0%), followed by surgery followed by chemotherapy (17.0%) and surgery alone (11.0%). Palliative care was provided to 22.0% of patients, and 12.0% required treatment for disease progression (Table V). Following initial therapy, partial response was observed in the largest proportion of patients (39.0%), while complete response was achieved in 27.0%. Stable disease was noted in 21.0%, and progressive disease occurred in 13.0% of patients (Table VI).

Table I: Demographic characteristics of the patients (n= 112)

Variables	Category	n (%)
Age (years)	Mean ± SD	32.8±3.2
	Range	18-40
Sex	Male	76 (68.0)
	Female	36 (32.0)
	Ratio (M:F)	2.1:1
Residence	Urban	80 (71.0)
	Rural	32 (29.0)

Table II: Risk factors of early-onset colorectal cancer (n= 112)

Risk factors	Frequency (n)	Percentage (%)
Family history of colorectal cancer	15	13.0
History of inflammatory bowel disease	10	9.0
Smoking	27	24.0
Alcohol consumption	8	7.0
Obesity (High BMI)	38	34.0
More than one risk factor	15	13.0

Table III: Clinical presentation of patients (n= 112)

Clinical feature	Frequency (n)	Percentage (%)
Rectal bleeding	56	50.0
Abdominal pain	27	24.1
Altered bowel habits	48	42.9
Generalized weakness, anorexia, and pallor	67	59.8
Per-rectal bleeding & abdominal pain	87	77.7
Palpable abdominal mass	28	25.0

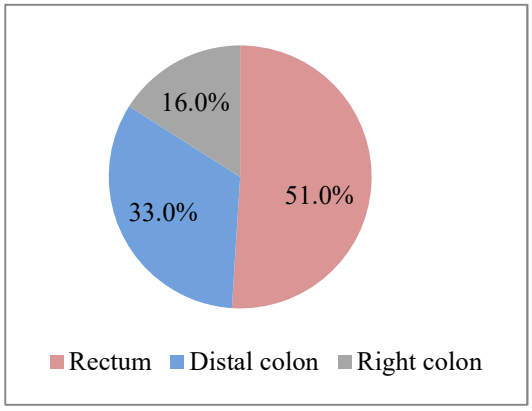

Figure 1. Tumor site distribution (n= 112)

Table IV: Histopathological types and stages at diagnosis (AJCC/UICC stages) (n= 112)

Histopathological type	Frequency (n)	Percentage (%)
Adenocarcinoma NOS / Grade 1–2	74	66.0
Poorly differentiated adenocarcinoma	29	26.0
Signet ring cell type and others	9	8.0
Stage		
Stage I	18	16.0
Stage II	21	19.0
Stage III	65	58.0
Stage IV	8	7.0

Table V: Treatment modality (n= 112)

Treatment modality	Frequency (n)	Percentage (%)
Surgery only	12	11.0
Surgery followed by chemotherapy	19	17.0
Total Neoadjuvant therapy	54	48.0
Palliative care	25	22.0
Treatment for progression	13	12.0

Table VI: Response to initial therapy (n= 112)

Response Category	Frequency (n)	Percentage (%)
Complete response	30	27.0
Partial response	44	39.0
Stable disease	24	21.0
Progressive disease	15	13.0

Discussion

In this study, the mean age was 32.8±3.2 years, with a male predominance (68.0%) and a male-to-female ratio of 2.1:1. Most patients resided in urban areas (71.0%). These demographic findings are comparable to a U.S. population-based study reported male predominance ranging from 55–65% among patients aged <40 years.[14] Similarly, studies from Korea and Spain also documented higher male incidence in EOCRC cohorts, suggesting that male may be a consistent risk factor across diverse populations.[15,16]

Regarding risk factors, obesity (34.0%) and smoking (24.0%) were the most prevalent, while family history (13.0%) and inflammatory bowel disease (9.0%) were less common. This aligns with global evidence that lifestyle-related modifiable factors, particularly obesity, contribute substantially to EOCRC pathogenesis.[17,18] For instance, meta-analyses and cohort studies indicate that obesity is related with a 1.5–2-fold increased risk of EOCRC,[19] and smoking has also been related to early-onset disease.[20] In contrast, the relatively low proportion of patients with family history or IBD in our cohort supports the observation that the majority of EOCRC cases in low- and middle-income countries are sporadic rather than hereditary.[21]

Clinically, generalized weakness, anorexia, and pallor were the most common presenting symptoms (59.8%), with combined per-rectal bleeding and abdominal pain reported in 77.7% of patients. Rectal bleeding and altered bowel habits were observed in 50.0% and 42.9%, respectively, while a palpable abdominal mass was detected in 25.0%. These findings are consistent with prior reports showing that distal symptoms, particularly rectal bleeding, are the predominant presentation in EOCRC, often leading to delayed diagnosis due to misattribution of symptoms to benign conditions.[22,23]

The anatomical distribution in our study showed a predominance of rectal tumors (51.0%), followed by distal colon (33.0%) and right colon (16.0%), which mirrors patterns reported in Europe, Asia, and the U.S., where EOCRC is more frequently left-sided or rectal in location.[14,24] Histopathologically, most tumors were adenocarcinoma NOS/Grade 1–2 (66.0%), with 26.0% poorly differentiated and 8.0% signet ring cell or other rare types. This pattern is in agreement with studies suggesting that EOCRC often exhibits aggressive histological features, including poor differentiation and mucinous or signet ring morphology, which may contribute to more advanced disease at diagnosis.[25,26]

Stage at diagnosis was predominantly Stage III (58.0%), with smaller proportions at Stage II (19.0%), Stage I (16.0%), and Stage IV (7.0%). The high rate of advanced-stage presentation is consistent with other studies showing that younger patients often present with advanced disease due to delayed recognition of symptoms.[27,28]

Treatment patterns reflected aggressive management strategies, with total neoadjuvant therapy used in 48.0%, surgery followed by chemotherapy in 17.0%, and surgery alone in 11.0% of patients. Palliative care was required in 22.0%, and 12.0% underwent treatment for disease progression. Response to initial therapy was highest for partial response (39.0%), followed by complete response (27.0%), stable disease (21.0%), and progressive disease (13.0%). Comparable studies have reported similar treatment modalities, emphasizing neoadjuvant approaches and multimodal therapy to improve outcomes in EOCRC.[29-32]

Overall, our findings are highlighting male predominance, distal tumor predilection, advanced stage at presentation, aggressive histopathology, and the growing influence of modifiable lifestyle factors such as obesity and smoking. However, the urban predominance in this study group may reflect local demographic patterns, access to tertiary care, or referral bias. These results underscore the need for increased awareness, early symptom recognition, and targeted prevention strategies in young adults in Bangladesh and similar low- and middle-income settings.

Conclusion

The study revealed that among the young adults with EOCRC from Sylhet, most patients were male. Obesity and smoking were the most common risk factors, while family history and inflammatory bowel disease were less frequent. The predominant clinical features included generalized weakness, anorexia, pallor, and combined per-rectal bleeding with abdominal pain. Tumors were most often located in the rectum and were moderately differentiated adenocarcinomas. Advanced-stage disease at diagnosis was common, and neoadjuvant therapy was the primary treatment approach. These findings emphasize the impact of lifestyle-related risk factors, advanced presentation, and distal tumor predominance, highlighting the need for increased awareness, early detection, and targeted interventions in young adults.

*Conflict of interest***:** No competing interests.

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