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Original Article

Evaluation of Clinico-Demographic Characteristics of Patients with Colorectal Carcinoma: A Multicenter, Observational Study

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Abstract

Colorectal carcinoma (CRC) remains a major contributor to global cancer morbidity and mortality, with incidence rising rapidly in developing nations due to dietary and lifestyle transitions. In Bangladesh, limited epidemiological surveillance and the absence of structured screening programmes lead to delayed diagnosis and poorer outcomes. This study sought to characterize the clinico-demographic, behavioural, and histopathological features of CRC to support early detection and prevention strategies. A hospital-based cross-sectional study was undertaken from January to December 2023 at two tertiary centres in Dhaka: Sheikh Russel National Gastroliver Institute and Hospital (SRNGIH) and the National Institute of Cancer Research and Hospital (NICRH). A total of 252 histologically confirmed CRC patients were consecutively enrolled. Primary variables included age, sex, socioeconomic status, presenting symptoms, tumour location, histologic type, grade, and stage. CRC was more common in males (59.5%), with a mean age of 44.4 ± 13.3 years, and predominated among middle-income patients (90.5%). The rectum was the most common tumour site (46.8%), followed by the ascending colon (18.3%) and sigmoid colon (11.1%), with an overall left-sided predominance (61.9%). Major symptoms included unexplained weight loss (97.2%), loss of appetite (93.3%), per-rectal bleeding (78.6%), constipation (77.8%), and tenesmus (73.4%). Adenocarcinoma constituted 96.4% of cases, with most tumours moderately differentiated (79.8%) and diagnosed at Stage II (65.5%) or Stage III (22.6%). Modifiable risk factors were widespread: low daily fruit intake (15.9%), low vegetable intake (38.1%), high red-meat consumption (75.4% occasional or more), and low dairy intake (96.4% occasional). Common comorbidities included diabetes mellitus (31.0%) and hypertension (25.4%), whereas hereditary risk factors, including family history of CRC (3.17%) and familial adenomatous polyposis (0%), were uncommon. The findings indicate a strong association of CRC in Bangladesh with lifestyle-related and metabolic factors, consistent with trends observed in other rapidly transitioning middle-income countries. The predominance of Stage II and III disease underscores delayed symptom recognition and diagnostic access. Strengthening early evaluation of rectal bleeding and altered bowel habits in primary care and expanding multidisciplinary CRC services and cancer registries remain essential priorities.

Keywords: *Colorectal carcinoma; clinico-demographic characteristics; adenocarcinoma; left-sided colorectal cancer; tumour stage; lifestyle risk factors; dietary factors.*

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INTRODUCTION

Colorectal carcinoma (CRC) is a major global health burden, ranking as the third most common cancer in men and the second in women, and accounting for nearly 10% of all new malignancies worldwide. According to GLOBOCAN 2020, approximately 1.93 million new CRC cases and 0.94 million deaths occurred globally, contributing to 8.5% of all cancer mortality, with lifetime

risks of 4.6% for men and 4.2% for women[1]. Although once considered a cancer of high-income nations, CRC incidence has risen rapidly in low- and middle-income countries (LMICs), including Bangladesh. More than half of global cases (55%) and deaths (52%) now occur in less-developed regions[2], largely driven by urbanization, dietary westernization, and increasingly sedentary lifestyles[3–5].

In South-East Asia, the age-standardized CRC incidence has remained around 6.95 per 100,000 since the 1980s[6], yet total case numbers continue to rise with population ageing. In contrast, rates remain substantially higher in Australia, New Zealand, and North America—44.8 per 100,000 in men and 32.2 per 100,000 in women[1]—reflecting long-standing lifestyle exposures. Evidence from Bangladesh suggests a gradual but steady rise in CRC. A Dhaka-based review of 1,300 cancer cases reported CRC as the third most common malignancy in males (12.5%) and fifth in females (3%) [6], while the WHO 2014 Cancer Mortality Report attributed 3.8% of male cancer deaths to CRC[7]. Several studies now describe a tendency toward earlier onset, with one reporting a mean diagnostic age of 50.8 years[8] and others noting frequent late-stage presentation[9].

Globally, CRC incidence increases sharply after age 40, and over 90% of cases occur in individuals older than 50 years[7]. Men consistently demonstrate 30–40% higher incidence and mortality than women[11], likely due to hormonal differences, diet, and behavioral factors such as smoking and alcohol use[12]. Non-modifiable risks include age, family history, and hereditary disorders such as Lynch syndrome and familial adenomatous polyposis (FAP)[13–15], with first-degree relatives facing a 2–4-fold higher risk[14–15]. Modifiable contributors—high consumption of red or processed meat, low fibre intake, obesity, sedentary lifestyles, smoking, and alcohol use—also significantly elevate risk[16–18]. Chronic inflammatory bowel disease and type 2 diabetes mellitus approximately double CRC risk[19–20].

Emerging evidence implicates gut microbiota dysbiosis, which may promote chronic inflammation and genotoxic metabolite production, in CRC pathogenesis[21]. Nutritional deficits such as low vitamin D, inadequate calcium, and reduced fruit and vegetable intake further heighten susceptibility[22–24]. Socioeconomic gradients also shape CRC risk and outcomes, as lower-income groups often face barriers to screening and timely diagnosis, resulting in poorer survival[25]. In Bangladesh, most CRC patients originate from middle and lower socioeconomic groups with limited health literacy and minimal access to preventive services. Rapid urbanization, high consumption of refined carbohydrates, and low dietary fibre intake may further contribute to increasing CRC burden[26–28].

Clinical manifestations vary by tumour location. Right-sided cancers commonly present with anaemia, weight loss, and fatigue, whereas left-sided lesions more frequently cause altered bowel habits, constipation, rectal bleeding, and tenesmus[29–30]. In resource-constrained settings, diagnostic delays contribute to advanced-stage presentation[31]. Histologically, adenocarcinoma accounts for over 90% of CRC[32], and staging follows the AJCC TNM system[33]. Most tumours evolve from adenomatous polyps through the adenoma–carcinoma sequence[34].

While screening strategies such as fecal occult blood testing, fecal immunochemical testing, sigmoidoscopy, and colonoscopy have reduced CRC mortality in high-income countries[35–36], organized screening remains largely absent in Bangladesh and many LMICs[37]. Existing Bangladeshi studies are limited by small sample sizes and insufficient clinical detail, underscoring the need for more comprehensive characterization of CRC patients[38].

MATERIALS AND METHODS

This hospital-based cross-sectional study was conducted from January to December 2023 at two government tertiary referral centres in Dhaka, Bangladesh: Sheikh Russel National Gastroliver Institute and Hospital (SRNGIH) and the National Institute of Cancer Research and Hospital (NICRH), both offering advanced gastrointestinal and oncological care. Ethical approval was obtained from both Institutional Review Boards, and written informed consent was secured in Bengali after explaining the study's purpose, procedures, risks, and benefits. Data were anonymized, and participants could withdraw at any time without affecting their treatment.

Eligible participants included all inpatients and outpatients of any age or sex with histopathologically confirmed colorectal carcinoma (CRC) during the study period. Exclusion criteria were pregnancy; severe cardiovascular, renal, pulmonary, or cerebrovascular disease; other malignancies, significant psychiatric illness; or substance abuse. Although the calculated sample size was 384, 252 consecutive eligible patients were enrolled using non-probability sampling due to logistical constraints.

Data were collected by a pretested semi-structured questionnaire aligned with study objectives. It captured sociodemographic data (age, sex, education, occupation, residence, socioeconomic status); lifestyle factors (smoking, alcohol, betel nut use, physical activity, diet); personal and family medical history (diabetes, hypertension, inflammatory bowel disease, familial adenomatous polyposis, CRC family history); and presenting symptoms (per-rectal bleeding, constipation, diarrhoea, abdominal pain, tenesmus, anaemia, weight loss, anorexia, intestinal obstruction). Colonoscopic and histopathological findings were also recorded, including lesion site, histologic subtype, tumour grade, and clinical stage.

Data collection involved face-to-face interviews, review of medical records, colonoscopy, and histopathology reports. CRC diagnosis was confirmed via histopathological examination of biopsy or resected specimens. The questionnaire was piloted on 20 CRC patients at SRNGIH to assess clarity and feasibility, with revisions made accordingly. Data were reviewed daily for completeness and consistency by the investigator, with periodic supervisory oversight; incomplete records were excluded.

Data were analyzed using SPSS version 27.0 (IBM Corp., Chicago, USA). Continuous variables (e.g., age) were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Associations were tested using chi-square or Fisher's exact test, with significance set at $p<0.05$.

Operational Definitions

Socioeconomic class: Categorized according to monthly family income in Bangladeshi Taka (BDT): Lower class: <12,500 BDT, Middle class: 12,500–21,500 BDT, and Upper class: >21,500 BDT.

Dietary habit: Healthy diet: Rich in vegetables, fruits, and whole grains; low in red or processed meat; Unhealthy diet: Predominantly refined foods, low-fibre, and high-fat intake.

RESULTS

A total of 252 patients with histopathologically confirmed colorectal carcinoma were included in the study. The results highlight the predominant age group, gender pattern, common presenting complaints, and tumour characteristics among the study population, offering insight into the prevailing clinico-demographic profile of colorectal carcinoma in the Bangladeshi context.

Table I summarizes the sociodemographic characteristics of the participants. The mean age was 44.4 ± 13.3 years (range 14–78), with most aged 41–50 years (27.8%), followed by 31–40 years (24.2%) and 21–30 years (17.1%). Males comprised 59.5% (male: female ratio-3:2). Educational levels were predominantly primary (45.1%) and secondary (42.5%). Most participants (90.5%) belonged to the middle-income group. Occupationally, 41.7% were service holders, 36.9% homemakers, 8.3% businessmen, 5.2% students, and 7.9% others.

Table I: Sociodemographic Characteristics of Study Participants (n=252)

Variables	Frequency (n)	Percentage (%)
Age group (years)		
<20	5	2.0
21–30	43	17.1
31–40	61	24.2
41–50	70	27.8
51–60	40	15.9
61–70	30	11.8
>70	3	1.2
Sex		
Male	150	59.5
Female	102	40.5
Educational level		
No institutional education	18	7.1
Primary	115	45.1
Secondary	107	42.5
Graduation	9	3.6
Post-Graduation	3	1.3
Monthly family income (BDT)		
<12,500	3	1.2
12,500–21,500	228	90.5
>21,500	21	8.3
Occupation		
Service	105	41.7
Homemaker	93	36.9
Business	21	8.3
Student	13	5.2
Others	20	7.9

Table II focuses on the distribution of participants according to the predisposing and background characteristics. Non-smokers were 75.8% and non-alcoholic 99.2%, while current smokers were 22.6% and ex-smokers 1.6%. Family history was present in 3.17%, and 1.6% reported other malignancies in first-degree relatives. Regarding comorbidities, 31% of patients had diabetes mellitus, 25.4% had hypertension, and 2% had dyslipidaemia. No participant reported a history of IBD or FAP.

Table II: Distribution of participants according to predisposing factors (n=252)

Variables	Frequency (n)	Percentage (%)
Smoking status		
Smoker	57	22.6
Ex-smoker	4	1.6
Non-smoker	191	75.8
Alcohol consumption		
Alcoholic	1	0.4
Ex-alcoholic	1	0.4
Non-alcoholic	250	99.2
CRC in 1st degree relative		
Yes	8	3.17
No	244	96.83
Family history of other cancers		
Yes	4	1.6
No	248	98.4
History of DM	78	31
History of HTN	64	25.4
History of Dyslipidemia	5	2
History of IBD		
Yes	0	0.0
No	252	100
Family history of FAP		
Present	0	0.0
Absent	252	100

Table III presents the dietary pattern; here, vegetables were consumed daily by 38.1%, weekly by 42.8%, and occasionally by 16.3%. Occasional fruit consumption was 62.7% and 15.9% daily. Occasionally consumed dairy products by 96.4% and weekly by 1.2%, whereas red meat was occasionally consumed by 75.4%, and weekly by 3.2%.

Table III: Distribution of the study population according to dietary pattern (n=252)

Dietary pattern	Number of patients	Percentage
Vegetable consumption		
Occasional	41	16.3
Monthly	7	2.8
Weekly	108	42.8
Daily	96	38.1
Fruit consumption		
Rare	1	0.4
Occasional	158	62.7
Monthly	3	1.2
Weekly	50	19.8
Daily	40	15.9
Dairy consumption		
Rare	3	1.2
Occasional	243	96.4
Monthly	1	0.4
Weekly	3	1.2
Daily	2	0.8
Red meat consumption		
Rare	50	19.8
Occasional	190	75.4
Monthly	3	1.2
Weekly	8	3.2
Daily	1	0.4

Table IV outlines the clinical presentations of colorectal carcinoma in multiple responses. Unexplained weight loss had 97.2%, loss of appetite 93.3%, per-rectal bleeding 78.6%, constipation 77.8%, and tenesmus 73.4%. Cramping abdominal discomfort was observed in 51.2%, and altered bowel habit in 36.1%. Anaemia, dark or black stools, and abdominal lump were found in 19.8%, 38.9%, and 10.7% of participants.

Table- IV: Distribution of the participants according to clinical presentation (n=252)

Clinical Variables	Frequency (n)	Percentage (%)
Per rectal bleeding	198	78.6
Dark or black stools	98	38.9
Tenesmus	185	73.4
Cramping discomfort in the lower abdomen	129	51.2
Decreased appetite	235	93.3
Diarrhea	27	10.7
Constipation	196	77.8
Unexplained weight loss	245	97.2
Features anemia	50	19.84
Altered bowel habit	91	36.1
Presence of a lump in the abdomen	27	10.7

Table V compares clinical symptoms between right- and left-sided colorectal carcinomas. Left-sided tumours more frequently presented with rectal bleeding (55.57% vs 11.46%; p=0.000), blood in stool (92.95% vs 53.13%; p=0.006), cramping discomfort (82.69% vs 58.33%; p=0.022), and lower abdominal pain (80.77% vs 58.33%; p=0.018). Right-sided cancers showed higher rates of constipation (89.58% vs 71.79%) and anaemia (54.17% vs 7.69%; p=0.000). Weight loss and intestinal obstruction did not differ significantly.

Table V: Clinical features according to site of colorectal cancer (n=252)

Clinical Profile	Right colon(n=96) n (%)	Left colon(n=156) n (%)	P value
Rectal Bleeding	11(11.46)	87(55.57)	0.000*
Blood in Stool	51(53.13)	145(92.95)	0.006*
Cramping Discomfort in Lower Abdomen	56(58.33)	129(82.69)	0.022*
Tenesmus	6(10.53)	51(89.47)	0.131
Decreased Appetite	93(96.88)	142(91.03)	0.853
Diarrhoea	7(7.29)	20(12.82)	0.0116*
Constipation	86(89.58)	112(71.79)	0.850
Weight Loss	96(100)	149(95.51)	0.268
Lower Abdominal Pain	56(58.33)	126(80.77)	0.018*
Altered Bowel Habit	61(63.54)	30(19.23)	0.238
Features of Intestinal Obstruction	21(21.85)	19(12.18)	0.443
Features of Anemia	52(54.17)	12(7.69)	0.000*
Presence of Lump	11(11.46)	16(10.26)	0.443

Figure 1 displays the anatomical site distribution of colorectal cancer. The rectum was the most frequent site (46.8%), followed by the ascending colon (18.3%), sigmoid colon (11.1%), caecum (8.7%), transverse colon (5.6%), and hepatic flexure (5.6%). A small proportion occurred in the rectosigmoid (2.4%) and splenic flexure (0.3%).

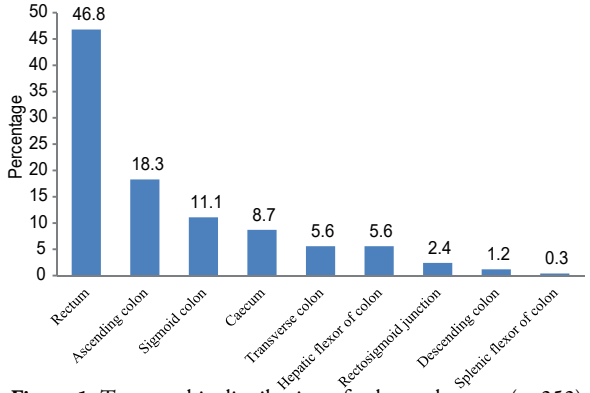

Figure 1: Topographic distribution of colorectal cancer (n=252)

Figure 2 illustrated the site distribution of colorectal cancer by laterality, left-sided tumors accounted for 61.9%, whereas right-sided tumours represented 38.1% of all cases.

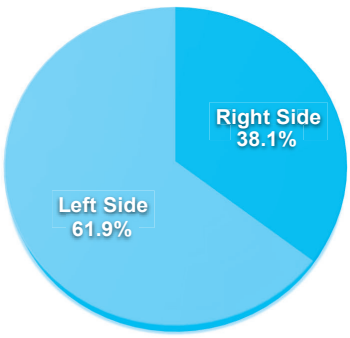

Figure 2: Site distribution of colorectal cancer by laterality (n=252)

Table VI shows that males predominated in both right- and left-sided colon cancers, comprising 62.5% and 57.7% of cases, respectively. Females accounted for 37.5% of right-sided and 42.3% of left-sided cases. The male-to-female ratio was about 3:2.

Table VI: Gender distribution by site of colorectal cancer involvement (n=252)

Gender	Site of involvement	
	Right Colon (n=96) n (%)	Left Colon (n=156) n (%)
Male	60 (62.50)	90 (57.69)
Female	36 (37.50)	66 (42.31)
Total	96(100)	156(100)

Figure 3 is a pie chart illustrating the distribution of participants according to the histopathology of the tumor; most study subjects (96.4%) had adenocarcinoma, while 3.6% had squamous cell carcinoma.

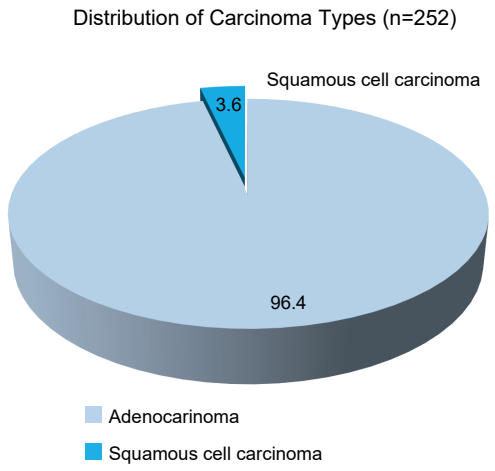

Figure 3: Distribution of the participants according to histopathology of tumor (n=252)

Table VII presents the distribution of participants according to histopathological grade and stage. Regarding tumor differentiation, moderately differentiated colorectal carcinoma accounted for 79.7%, followed by poorly differentiated (14.7%) and well-differentiated (5.6%) tumors. According to histopathological staging, Stage II was the most common (65.5%), followed by Stage III (22.6%), Stage IV (7.5%), and Stage I (4.4%).

Table VII: Distribution of the participants according to histopathological grade and stage (n=252)

Variables	Frequency (n)	Percentage (%)
Histopathological grade		
Poorly differentiated	37	14.7
Moderately differentiated	201	79.7
Well differentiated	14	5.6
Total	252	100.0
Histopathological stage		
Stage I	11	4.4
Stage II	165	65.5
Stage III	57	22.6
Stage IV	19	7.5
Total	252	100.0

Discussion

The demographic profile identified in this study is consistent with previous research from Bangladesh and neighboring South Asian countries, where colorectal carcinoma (CRC) is characterized by male predominance and diagnosis in middle age[1–3]. The higher proportion of males (nearly 60%) parallels findings from other developing regions and may reflect differential exposure to established risk factors—such as smoking, alcohol consumption, and higher red-meat intake—as well as gendered patterns in health-seeking behavior and potential hormonal protection in women[4–6]. The mean age at diagnosis, clustered in the fifth decade, remains considerably younger than in Western populations, where CRC typically presents after 60 years of age[7–8]. This earlier onset, widely reported across South Asia, may be attributable to rapid lifestyle transitions, increasing prevalence of metabolic comorbidities, and the absence of structured screening programs, resulting in symptomatic rather than pre-symptomatic detection[9–10].

The predominance of rectal and left-sided tumours (61.9%) aligns with studies from India, Pakistan, Nepal, and Sri Lanka, all reporting a distal localization pattern in Asian CRC cases[11–13]. Conversely, a higher proportion of proximal tumours is documented in Europe, North America, and Australia[14–15]. These differences may be influenced by regional variation in dietary composition-particularly fibre, dairy, refined carbohydrates, and processed meats-as well as by availability and utilization of endoscopic screening. Colonoscopy is widely accessible in developed nations, enabling identification of asymptomatic proximal polyps and early right-sided

cancers, whereas in Bangladesh, limited endoscopic access results in detection of symptomatic, predominantly distal disease[16]. The rectal predominance (46.8%) observed here echoes earlier Bangladeshi reports showing 40–50% rectal involvement[17–18], suggesting that sigmoidoscopy could serve as a feasible, cost-effective screening tool in resource-constrained settings.

Histopathologically, the predominance of adenocarcinoma (96.4%) and moderately differentiated tumours is consistent with both regional and international data[19–21]. Previous Bangladeshi studies and reports from India similarly document adenocarcinoma proportions exceeding 90%[22–23], indicating broadly shared carcinogenic pathways influenced primarily by environmental and dietary exposures rather than significant genetic diversity[24]. With respect to stage, the predominance of Stage II disease (65.5%) differs slightly from earlier Bangladeshi literature that reported a majority of patients presenting at Stages III and IV[25–26]. This relative improvement may reflect better access to tertiary care and increased clinical vigilance in urban settings. However, nearly one-third of patients still presented with advanced disease, reinforcing the impact of diagnostic delay and the absence of national screening initiatives[27]. In contrast, Western populations—supported by structured screening—frequently observe diagnosis at Stage I or II[28].

Symptom patterns in this cohort, including per-rectal bleeding, altered bowel habits, constipation, tenesmus, weight loss, and anorexia, align with those reported in regional literature[29–30]. These symptoms, although common in CRC, are often overlooked by both patients and primary-care providers, resulting in delayed referral for colonoscopy. Right-sided tumours, as documented elsewhere, more frequently presented with anaemia and occult bleeding, whereas left-sided lesions were associated with obstructive symptoms[31].

The high prevalence of metabolic comorbidities—diabetes mellitus (31%) and hypertension (25%)—highlights the growing interaction between metabolic syndrome and CRC risk, a relationship well established in global and regional studies[32–34]. Hereditary contributions were minimal, with very low frequencies of familial adenomatous polyposis (FAP) and family history of CRC, consistent with findings from other Asian populations[35].

Lifestyle-related factors were prominent, with most patients reporting unhealthy diets characterized by low fruit and vegetable consumption, minimal dairy intake, and high red-meat consumption. These patterns strongly align with evidence linking low fibre, high saturated fat intake, and altered gut microbiota to colorectal neoplasia[36–37]. Physical inactivity, present in two-thirds of the cohort, is also a recognized independent risk factor[38].

Overall, the findings of this study reinforce previously documented trends while deepening contextual understanding of CRC in Bangladesh. They reflect a transitional epidemiological pattern shaped by urbanization, behavioral risk factors, and insufficient screening coverage.

CONCLUSION

Colorectal carcinoma in Bangladesh predominantly affects middle-aged males, with a high prevalence of left-sided, moderately differentiated adenocarcinomas and a strong association with lifestyle and metabolic risk factors. The predominance of Stage II and III cancers at presentation underscores delayed detection. Strengthened awareness, screening, and lifestyle modification initiatives are urgently needed to address this rising public health challenge.

LIMITATIONS

The use of consecutive sampling could introduce selection bias, as only patients attending tertiary care centres were included. Information on lifestyle factors, such as diet, smoking, and physical activity, was obtained directly from participants, reflecting their personal accounts and experiences, which may be subject to recall bias. The study focused on clinico-demographic and histopathological aspects; molecular and genetic parameters were beyond its defined scope.

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