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Surgery Section

# Comparison of Clinicopathological Characteristics of Patients with Early and Late-onset Colorectal Adenocarcinoma: A Cross-sectional Study

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## ABSTRACT

**Introduction:** Colorectal Cancer (CRC) has been primarily considered a disease of the elderly, but recent data have shown an alarming rise among young people. It has also been suggested that young age is associated with aggressive histopathological characteristics and advanced stages of the disease at diagnosis.

**Aim:** To assess and compare the clinical and pathological characteristics of patients with rectal cancer diagnosed at ages over and below 45 years.

**Materials and Method:** This prospective cross-sectional study was conducted between January 2020 and August 2022 in the Departments of Surgical, Medical, Radiation Oncology, Surgical Gastroenterology, and General Surgery at All India Institute of Medical Sciences (AIIMS) Rishikesh, Uttarakand, India. All patients underwent a biopsy from the representative site for histological documentation of the disease. They then underwent treatment (surgery/chemotherapy/radiotherapy) as required. All the data were categorised into two groups: an early-onset group (age <45 years) and a late-onset group (≥45 years). A comparison of the clinicopathological characteristics (age, gender, co-morbidities, tumour subsite, clinical presentation, clinical stage, etc.), pathological data (grade and differentiation of tumour, as per World Health Organisation (WHO) grading system), and serum Carcinoembryonic Antigen (CEA) levels between the two groups was performed. The association between categorical variables was investigated using the Chi-square test. The mean difference was assessed using an independent t-test. A p-value of 0.05 or below was considered statistically significant.

**Results:** A total of 51 patients with rectal cancer, 35 males and 16 females, were included in the study. The mean age was 44.73±16.47 years. Out of the total of 51 (100%) patients, lower rectum involvement was seen in 22 (43.1%) patients, followed by 7 (13.7%) patients each with ascending colon and sigmoid involvement resepectively. However, the Chi-square test showed no statistically significant association of location involved with age groups ($\chi^2$=9.09; p=0.16). Out of 51 (100%) adenocarcinoma patients in total, three patients each under 45 years of age had signet cell adenocarcinoma and mucinous adenocarcinoma ($\chi^2$=7.07; p=0.029). Among the total of 51 (100%) patients, moderately differentiated lesions were seen in 17 (33.3%) patients, poorly differentiated lesions were seen in 15 (29.4%) patients, and well-differentiated lesions were seen in 10 (19.6%) patients ($\chi^2$=13.01; p=0.005).

**Conclusion:** Younger patients tended to have larger tumours that were of a higher grade and had signet ring or mucinous histopathology. The social and clinical implications of these findings are to be explored.

**Keywords:** Age, Colorectal cancer, Signet cell, Treatment, Tumour

## INTRODUCTION

Colorectal Cancer (CRC) is the third most common cancer in the world [1]. It is the most common gastrointestinal tract malignancy and the third leading cause of cancer-related death globally [2]. While CRC typically affects elderly patients, current research indicates a rising incidence of CRC in individuals under 45 years of age [3].

In developed nations, it is hypothesised that improved screening procedures and greater awareness have led to higher detection rates among younger individuals. In developing nations, there may be an association between these trends and changes in dietary patterns and westernised food habits, leading to an increase in obesity among younger generations. Whether CRC in young people has distinct biology or if clinical expression and treatment response differ from late-onset CRC remains unknown, with previous studies yielding conflicting results [4].

Most studies on sporadic early-onset CRC have focused on Western populations. There is a lack of studies on the clinicopathological presentation of sporadic early-onset CRC from India. The findings of present study indicate a significant proportion of early-onset CRC cases among Indian patients [4]. The present research is crucial for understanding the pathological and clinical presentation of early-onset CRC and determining if they differ from late-onset tumours. The study hypothesised that patients with early-onset CRCs exhibit different clinical and pathological characteristics compared to those with late-onset CRC. There are few studies, evaluating the clinicopathological profile of early-onset versus late onset rectal cancer patients. The study was conducted to assess and compare the clinical and pathological characteristics of patients diagnosed with rectal cancer at ages over and under 45 years.

## MATERIALS AND METHODS

This prospective cross-sectional study was conducted from January 2020 to August 2022, and included 51 CRC patients from the Departments of Surgical, Medical and Radiation Oncology at All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India. Prior to commencing the study, Institutional Ethical Committee (IEC) approval was obtained vide letter no. (50/IEC/PGM/2021). Given the time constraints and exploratory nature of the study, a convenient sampling method was utilised. The aim was to collect data from a minimum of 25 patients with early-onset CRC. As there is no universal definition for “early onset” CRCs, 45 years of age

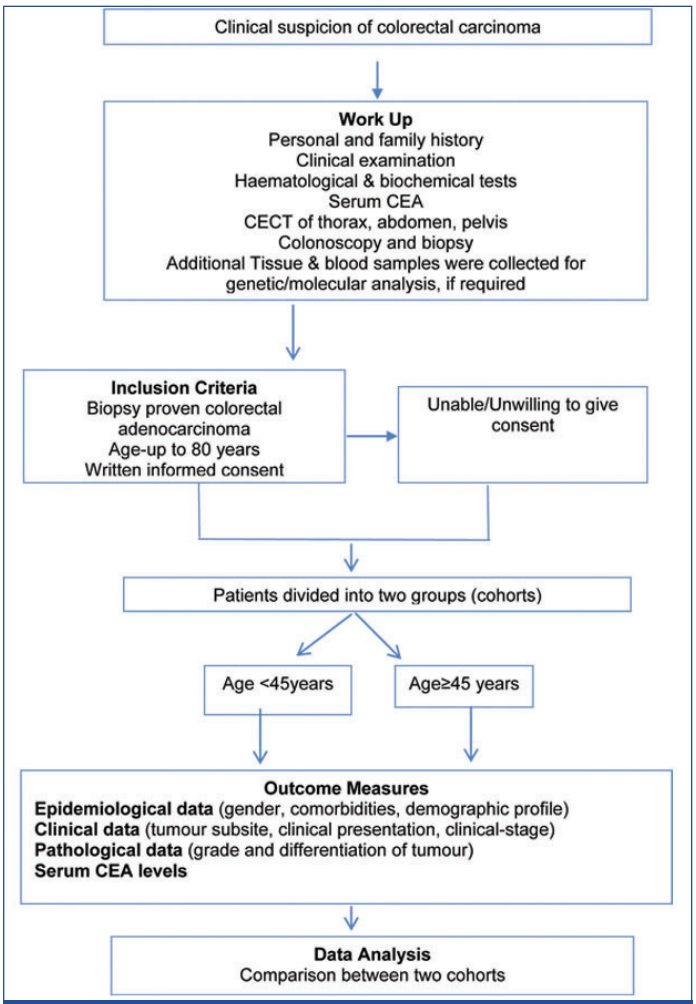
was taken as the cut-off in the present study, which is close to median age of 47 years in our country. With the median age of CRC presentation in India being around 45 years, it was estimated that 50 patients would be needed to meet this target.

**Inclusion and Exclusion criteria:** Comprised biopsy-proven colorectal adenocarcinoma, individuals aged ≤80 years, and those willing to participate in the research (with written informed consent). Exclusion criteria included individuals unable or unwilling to provide consent, as well as patients with a personal or family history of CRC.

### Study Procedure

The research was entirely observational and had no bearing on the clinical care provided to patients during their treatment. All clinical decisions were made by the treating professionals overseeing the patients.

Patients underwent proper staging, clinical evaluations, and other necessary examinations. Staging was done according to American Joint Committee on Cancer (AJCC) 8th edition [5]. Subsequently, patients received treatment (surgery/chemotherapy/radiotherapy) and other necessary therapy as per multidisciplinary tumour board guidelines and decisions [Table/Fig-1].




**[Table/Fig-1]:** Study flowchart of patients.
CECT: Contrast enchanced computed tomography

Data collected included epidemiological information (age, gender, co-morbidities and assessment according to Charlson co-morbidity index [6], and demographic profile), clinical data (tumour subsite, clinical presentation, clinical stage, etc.), pathological data (tumour grade and differentiation as per the WHO grading system), and serum CEA levels at presentation (following diagnosis confirmation).

## STATISTICAL ANALYSIS

The windows version of IBM Statistical Package for Social Sciences (SPSS) version 23.0 was employed for data analysis. Categorical variables were presented as proportions, while continuous variables were expressed as mean±Standard Deviation (SD) or median±interquartile range, depending on their distribution. The association between categorical variables was analysed using the Chi-square test, and the mean difference was evaluated using an independent t-test. A p-value of 0.05 or below was considered statistically significant.

## RESULTS

The mean age of the patients was 44.73±16.47 years. The proportion of males in the early onset cohort was proportionately higher than in the late onset cohort: 19 (76%) versus (vs) 16 (61.5%) male patients, respectively. However, no statistically significant link between gender and age groups was discovered when the Chi-square test was used to examine this relationship ($\chi^2$=1.23; p=0.26). In the present study, alcohol was consumed by 10 (19.6%) patients in total, out of which 8 (30.8%) patients were aged ≥45 years. Tobacco was consumed by seven patients in each group. A Chi-square test revealed a statistically significant association between age groups and alcohol drinking habits ($\chi^2$=4.19; p=0.041). Contrarily, there was no significant relationship between tobacco use and age groups ($\chi^2$=0.007; p=0.93) [Table/Fig-2] [6].

Out of the total of 51 (100%) patients, lower rectum involvement was seen in 22 (43.1%) patients followed by 7

| Patient demographics | | Patient cohorts <45 years n (%) | Patient cohorts ≥45 years n (%) | Total N (%) | p-value |
|---|---|---|---|---|---|
| No. of patients | | 25 | 26 | 51 | |
| Mean age (years)±SD | | 30.76±8.1 | 58.15± 10.4 | 44.73± 16.47 | 0.001* |
| Gender | Male | 19 (76.0%) | 16 (61.5%) | 35 (68.6)% | 0.26 |
| | Female | 6 (24.0%) | 10 (38.5%) | 16 (31.4%) | |
| BMI (kg/m2)±SD | | 20.88± 4.19 | 22.29± 3.86 | 21.60± 4.00 | 0.216* |
| Residence | Delhi | 1 (4.0%) | 0 | 1 (2.0%) | 0.53 |
| | Haryana | 1 (4.0%) | 0 | 1 (2.0%) | |
| | Uttarakhand | 10 (40.0%) | 12 (46.2%) | 22 (43.1%) | |
| | Uttar Pradesh | 13 (52.0%) | 14 (53.8%) | 27 (52.9%) | |
| Socioeconomic Status (Modified Kuppuswamy socioeconomic scale) | High | 1 (4.0%) | 5 (19.2%) | 6 (11.8%) | 0.24 |
| | Low | 17 (68.0%) | 13 (50.0%) | 30 (58.8%) | |
| | Middle | 7 (28.0%) | 7 (26.9%) | 14 (27.5%) | |
| | Upper | 0 | 1 (3.8%) | 1 (2.0%) | |
| Education | Graduate | 6 (24.0%) | 2 (7.7%) | 8 (15.7%) | 0.045 |
| | Higher secondary | 2 (8.0%) | 1 (3.8%) | 3 (5.9%) | |
| | Illiterate | 1 (4.0%) | 10 (38.5%) | 11 (21.6%) | |
| | Middle | 0 | 1 (3.8%) | 1 (2.0%) | |
| | Primary | 10 (40.0%) | 8 (30.8%) | 18 (35.3%) | |
| | Secondary | 6 (24.0%) | 4 (15.3%) | 10 (19.6%) | |
| Charlson Co-morbidity Index [6] | 2 | 21 (84%) | 4 (15.4%) | | 0.001 |
| | >2 | 4 (16%) | 22 (84.6%) | | |
| Co-morbidities | Diabetes | 0 | 2 (7.7%) | 2 (3.9%) | 0.53 |
| | Hypertension | 0 | 3 (11.5%) | 3 (5.9%) | |
| | Diabetes and hypertension | 0 | 1 (3.8%) | 1 (2.0%) | |
| | No co-morbidities | 25 (100%) | 20 (76.9%) | 45 (88.2%) | |
| Habits | Alcohol | 2 (8.0%) | 8 (30.8%) | 10 (19.6%) | 0.041 |
| | Tobacco | 7 (28.0%) | 7 (26.9%) | 14 (27.5%) | 0.93 |

**[Table/Fig-2]:** Patients' demographics [6].
*independent t-test was used. For the rest, Chi-square test was used

(13.7%) patients each with ascending colon and sigmoid involvement. However, the Chi-square test showed no statistically significant association of the location involved with age groups ($\chi^2$=9.09; p=0.16) [Table/Fig-3].

| Subsites | Patient cohorts | | Total N (%) | p-value |
|---|---|---|---|---|
| | <45 years n (%) | ≥45 years n (%) | | |
| No. of patients | 25 | 26 | 51 | 0.16 |
| Caecum | 1 (4%) | 5 (19.2%) | 6 (11.8%) | |
| Ascending colon | 1 (4%) | 6 (23.1%) | 7 (13.7%) | |
| Transverse colon | 3 (12%) | 1 (3.8%) | 4 (7.8%) | |
| Sigmoid colon | 4 (16%) | 3 (11.5%) | 7 (13.7%) | |
| Upper rectum | 2 (8%) | 2 (7.7%) | 4 (7.8%) | |
| Mid rectum | 1 (4%) | 0 (0%) | 1 (2%) | |
| Lower rectum | 13 (52%) | 9 (34.6%) | 22 (43.1%) | |

**[Table/Fig-3]:** Distribution of patients based on the location of colorectal cancer. Chi-square test was used

The mode of presentation was elective among 42 (82.4%) patients, out of which 19 (76%) patients were aged <45 years, and 23 (88.5%) patients were aged ≥45 years. An emergency mode of presentation was seen in 9 (17.6%) patients. The Chi-square test showed no statistically significant association of the mode of presentation with age groups ($\chi^2$=1.36; p=0.24). Serum CEA levels were raised in patients under 45 years but were statistically insignificant (p=0.33) [Table/Fig-4].

| Clinical presentation | | Patient cohorts | | Total N (%) | p-value |
|---|---|---|---|---|---|
| | | <45 years n (%) | ≥45 years n (%) | | |
| **No. of patients** | | 25 | 26 | 51 | - |
| Mode of presentation | Elective | 19 (76%) | 23 (88.5%) | 42 (82.4%) | 0.24 |
| | Emergency | 6 (24%) | 3 (11.5%) | 9 (17.6%) | |
| Symptoms | Abdominal pain | 12 (48%) | 16 (61.53%) | 28 (54.9%) | 0.376 |
| | Abdominal distension | 1 (4%) | 0 | 1 (1.96%) | - |
| | Alteration in bowel habit | 11 (44%) | 5 (19.23%) | 16 (31.37%) | 0.061 |
| | Blood mixed stool | 5 (20%) | 3 (11.53%) | 8 (15.68%) | 0.405 |
| | Abdominal swelling | 0 | 3 (11.53%) | 3 (5.88%) | - |
| | Loose stools | 2 (8%) | 2 (7.69%) | 4 (7.84%) | 0.733 |
| | Bleeding Per Rectal (PR) | 10 (40%) | 6 (23.07%) | 16 (31.37%) | 0.65 |
| | Generalised weakness | 0 (0%) | 5 (19.23%) | 5 (9.80%) | - |
| | Loss of appetite | 0 (0%) | 2 (7.69%) | 2 (3.92%) | - |
| | Significant weight loss | 2 (8%) | 1 (3.84%) | 3 (5.88%) | 0.66 |
| | Tenesmus | 1 (4%) | 1 (1.84%) | 2 (3.92%) | - |
| | Others | 5 (20%) | 4 (15.38%) | 9 (17.64%) | 0.753 |
| S. CEA (Carcino embryonic antigen) >2.9 ng/mL | | 12 (48%) | 9 (34.61%) | 21 (41.1%) | 0.33 |

**[Table/Fig-4]:** Clinical presentation of Colorectal Cancer (CRC) patients. Chi-square test was used

Radiological features: Among a total of 51 (100%) patients, obstruction was not seen in any patients, perforation was present in 1 (2%) subject, and breach in the peritoneum was seen in 26 (51%) patients. However, the Chi-square test showed no statistically significant association with obstruction, perforation (p=0.32), breach in the peritoneum (p=0.88), invasion to surrounding structures (p=0.61), lymph node involvement (p=0.406), and metastasis (p=0.35) [Table/Fig-5].

| Radiological features | | Patient cohorts | | Total N (%) | p-value |
|---|---|---|---|---|---|
| | | <45 years n (%) | ≥45 years n (%) | | |
| No. of patients | | 25 | 26 | 51 | - |
| Mass | Yes | 3 (12.0%) | 7 (26.9%) | 10 (19.6%) | 0.18 |
| | No | 22 (88.0%) | 19 (73.1%) | 41 (80.4%) | |
| Length (mean length) | - | 6.87±2.33 | 5.25±1.82 | - | 0.016* |
| Thickening | Yes | 23 (92.0%) | 22 (84.6%) | 45 (88.2%) | 0.41 |
| | No | 2 (8.0%) | 4 (15.4%) | 6 (11.8%) | |
| Perforation | Yes | 0 | 1 (3.8%) | 1 (2.0%) | 0.32 |
| | No | 25 (100.0%) | 25 (96.2%) | 50 (98.0%) | |
| Lymph nodes | Yes | 19 (76.0%) | 17 (65.4%) | 36 (70.6%) | 0.40 |
| | No | 6 (24.0%) | 9 (34.6%) | 15 (29.4%) | |
| Breach in peritoneum | Yes | 13 (52.0%) | 13 (50.0%) | 26 (51.0%) | 0.88 |
| | No | 12 (48.0%) | 13 (50.0%) | 25 (49.0%) | |
| Invasion to surrounding structure | Yes | 7 (28.0%) | 9 (34.6%) | 16 (31.4%) | 0.61 |
| | No | 18 (72.0%) | 17 (65.4%) | 35 (68.6%) | |
| Metastasis | Yes | 4 (16.0%) | 2 (7.7%) | 6 (11.8%) | 0.35 |
| | No | 21 (84.0%) | 24 (92.3%) | 45 (88.2%) | |

**[Table/Fig-5]:** Radiological features and tumour characteristics. *independent t-test was used. For the rest, Chi-square test was used

Mean scores of the quantitative parameters were compared between the groups (<45 years and >45 years) using an independent sample t-test. The mean length (cm) of the tumour was found to be higher in patients aged <45 years, i.e., 6.87±2.33 compared to patients aged ≥45 years with 5.25±1.82. The independent sample t-test showed a statistically significant difference between the groups and the tumour length of patients (p=0.016) with a mean difference of 1.62.

In the present study, out of 51 (100%) adenocarcinoma patients in total, three patients each of <45 years had adenocarcinoma (Signet cell) and mucinous adenocarcinoma. The Chi-square test showed a statistically significant association of histological type with age groups ($\chi^2$=7.07; p=0.029) [Table/Fig-6]. Among a total of 51 (100%) patients, moderately differentiated lesions were seen in 17 (33.3%) patients, poorly differentiated lesions were seen in 15 (29.4%) patients, and well-differentiated lesions were seen in 10 (19.6%) patients. The Chi-square test showed a statistically significant association of types of lesion differentiation with age groups ($\chi^2$=13.01; p=0.005) [Table/Fig-7].

| Histological type | Patient cohorts | | Total N (%) |
|---|---|---|---|
| | <45 years | ≥45 years | |
| Adenocarcinoma | 19 (76.0%) | 26 (100.0%) | 45 (88.2%) |
| Adenocarcinoma (signet cell) | 3 (12.0%) | 0 | 3 (5.9%) |
| Mucinous adenocarcinoma | 3 (12.0%) | 0 | 3 (5.9%) |
| Total | 25 | 26 | 51 |
| p-value 0.029* | | | |

**[Table/Fig-6]:** Distribution of patients based on histological subtypes. *Chi-square test was used

| Clinical presentation | | Patient cohorts | | Total N (%) | p-value |
|---|---|---|---|---|---|
| | | <45 years n (%) | ≥45 years n (%) | | |
| **No. of patients** | | 25 | 26 | 51 | - |
| T (Tumour) | T1 | 0 | 0 | 0 | 0.61 |
| | T2 | 0 | 1 (3.8%) | 1 (2.0%) | |
| | T3 | 13 (52.0%) | 13 (50.0%) | 26 (51.0%) | |
| | T4 | 12 (48.0%) | 12 (46.2%) | 24 (47.1%) | |

| | | | | | |
|---|---|---|---|---|---|
| N (Node) | N0 | 7 (28.0%) | 7 (26.9%) | 14 (27.5%) | 0.88 |
| | N1 | 5 (20.0% | 4 (15.4%) | 9 (17.6%) | |
| | N2 | 13 (52.0%) | 15 (57.7%) | 28 (54.9%) | |
| | N3 | 0 | 0 | 0 | |
| M (Metastasis) | M0 | 20 (80.0%) | 24 (92.3%) | 44 (86.3%) | 0.20 |
| | M1 | 5 (20.0%) | 2 (7.7%) | 7 (13.7%) | |
| **Clinical stage groups (AJCC 8th edition)** | I | 0 (0%) | 1 (3.8%) | 1 (2.0%) | 0.62 |
| | II | 6 (24.0%) | 6 (23.1%) | 12 (23.5%) | |
| | III | 15 (60.0%) | 17 (65.4%) | 32 (62.7%) | |
| | IV | 4 (16.0%) | 2 (7.7%) | 6 (11.8%) | |
| **Grade** | WD | 6 (24%) | 4 (15.4%) | 10 (19.6%) | 0.005* |
| | MD | 3 (12%) | 14 (53.8%) | 17 (33.3%) | |
| | PD | 8 (32%) | 7 (26.9%) | 15 (29.4%) | |
| | NA | 8 (32.0%) | 1 (3.8%) | 9 (17.6%) | |

**[Table/Fig-7]:** Tumour stage and grade.
*Significant, WD: Well differentiated; MD: Moderately differentiated; PD: Poorly differentiated; NA: Not applicable
Chi-square test was used

## DISCUSSION

One of the leading causes of morbidity and mortality in the world is CRC, with varied incidence as well as clinical presentation across different geographical regions. The present research evaluated the clinicopathological characteristics of patients with CRC centred on their age. Generally, CRC has long been believed to be a disease of the elderly [1]. Nevertheless, in present study, the mean age was 30 years in the group <45 years of age and 58 years in the group ≥45 years, although the mean age of the groups taken together was 44.73 years. The majority of patients were from Uttar Pradesh-27 (52.9%), followed by 22 (43.1%) of the patients from Uttarakhand. 1 (2%) subject each was from Delhi and Haryana. According to some recent research, CRC is becoming more common among young people in the Middle East and other parts of the world [2]. In the United States of America (USA), there is an increased incidence of CRC in people below 50 years, as shown by Kasi PM et al., 2019 [3]. Research conducted on 233 patients in Central India over eight years revealed that the median age at diagnosis was 43 years [7]. The mean age of patients with CRC was observed to be 47.01 years in another study from Eastern India [8]. Patil PS et al., conducted a single-centre-based audit on CRC in India and opined that it is different compared to Western countries, with a greater number of young patients in India [9]. Many studies showed that young patients with CRC are more likely to have poor histological features and are often presented in an advanced stage compared to the older age group [10]. These findings suggest that young patients with CRC could be a distinct biological entity and require more intensive treatment [11]. The impact of age on the presentation and survival of CRC patients, however, remains controversial.

The present study population showed that patients aged <45 years and ≥45 years were predominantly males compared to females. This aligns with current studies demonstrating that men experience a higher incidence of CRC than women [12,13]. The incidence rate ratio of male-to-female gradually rises from the caecum to the rectum, from almost one for caecal cancers to two for rectal cancers [13]. Although the cause of CRC has not been fully understood, Murphy G et al., opined that differential exposure to risk factors associated with diet and lifestyle, such as alcohol and red meat consumption, as well as differences in hormone and other receptor expressions along the length of the colon and rectum, may be the most common culprits [14].

Authors did not find a significant difference between the early-onset and late-onset groups in terms of socioeconomic status and educational status. These findings in present study are in agreement with the study results of Thomas R et al., [15].

Co-morbidities are substantially more common in patients with late-onset CRC than in those with early-onset CRC. The present study supports a study that examined the connection between diabetes and CRC [16].

In present study, rectal bleeding and abdominal pain were the most frequently reported symptoms in both age groups. These findings are in accordance with the published literature [17]. Low EE et al., observed that weight loss is an important early clinical sign that may be linked to early-onset CRC [18].

Numerous observational studies report the association of smoking as well as alcoholism with early-onset CRC [18-20]. In present study, alcohol was consumed by 10 (19.6%) patients in total, out of which 8 (30.8%) patients were aged ≥45 years, showing a statistically significant association of alcohol consumption habits with age groups. Tobacco was consumed by seven patients in both groups. Thomas R et al., found no substantial difference in the frequency of either drinking or smoking tobacco between patients with early-onset and late-onset CRC [15].

Abdominal Computed Tomography (CT) frequently reveals Colonic Wall Thickening (CWT), a radiologic abnormality [16-19]. It may be connected to benign or non pathological illnesses, but in many instances, it can be a marker of serious pathologies such as neoplastic and Inflammatory Bowel Disease (IBD) [20,21]. Previous research has indicated that patients with CWT had a 7-21% malignancy rate [22,23]. In present study, among 51 (100%) patients, thickening was seen in 45 (88.2%) patients with almost equal distribution in both age groups. In a recent study, localised CWT was found to be independently linked with CRC, whereas a higher platelet count and younger age were separately linked with IBD [24].

In present study population, out of 51 (100%) patients, lower rectum involvement was seen in 22 (43.1%) patients, followed by 7 (13.7%) patients each with ascending colon and sigmoid involvement. According to Patil PS et al., anorectal/rectal disease impacted around 54% of the patients in India [9]. Laskar RS et al., also found that low rectal tumours predominated in Northeast Indian patients, which is similar to our study [25].

Trivedi V et al., observed that younger individuals were more likely to have intestinal obstruction and perforation compared to faecal incontinence, which is more persistent in older patients [26]. Additionally, younger age groups reported intestinal perforations, obstruction, as well as colostomy more frequently. This might be due to the disease's more aggressive nature in younger patients or due to the longer duration of symptoms [8].

Colon wall thickening was observed in the cecum, descending colon, transverse colon, ascending colon, sigmoid colon, and rectum, among other areas of the colon. CWT that is only found in one of the colon's aforementioned regions, regardless of its length, such as solely in the ascending colon, is referred to as localised thickening [24]. In present study, among 51 (100%) patients, lower rectum involvement was observed in 22 (43.1%) patients, followed by 7 (13.7%) patients each with involvement in the ascending colon and sigmoid colon. Consistent with present study findings, Trivedi V et al., reported that rectum involvement was present in 70 (31.25%) patients and in 25 (11.16%) patients, the sigmoid colon was involved in rectal cancer [26]. Saluja SS et al., evaluated 112 patients under 45

years of age and found that individuals with a family history of CRC often had tumours localised in the proximal colon, while 77% of patients without a family history of CRC had tumours in the distal colo-rectum [27]. According to Chang DT et al., CRCs found in patients under the age of 40 have a preference for the distal colon (80%), specifically the sigmoid colon (44%) and rectum (36%) [28].

The incidence as well as mortality of CRC are significantly reduced by colonoscopy-based early diagnosis and excision of these precancerous lesions [29]. CRC has been viewed as largely a disease of the elderly, typically developing during the fifth decade of life [30]. As a result, screening for CRC has been recommended for people aged 50 to 75 years by numerous advisory committees worldwide [31]. However, recent data from Western and Asian countries have revealed an increase in the incidence of CRC among patients under 50 years of age. Consequently, the United States (US) Preventive Services Task Force modified its recommendations for colon cancer screening age range, stating that it should start at 45 years of age rather than 50 years [32]. Additionally, studies have shown that younger age groups upon diagnosis are associated with significantly more advanced disease stages and more aggressive histological characteristics that negatively impact survival [33].

Out of the 51 (100%) patients with adenocarcinoma, 25 patients were aged <45 years, and 26 patients were aged ≥45 years. Three patients in each age group had adenocarcinoma (Signet cell) and mucinous adenocarcinoma, which is significant. The present finding is similar to the study by Thomas R et al., which found that adenocarcinoma was higher in late-onset age groups compared to early-onset age groups [15]. In the research conducted by Trivedi V et al., adenocarcinoma was the most common histology seen in both age groups. Young patients showed a higher incidence of adenocarcinoma with signet cell carcinoma as well as a signet ring component, which was 4.05% and 8.78%, respectively, compared to 1.31% and 39.4% in the older group, respectively [26]. Additionally, 6.08 percent of young patients were found to have adenocarcinoma with a mucinous component, compared to 3.94 percent of individuals in the elderly group [25].

### Limitation(s)

A prolonged period of participant accrual was experienced due to the ongoing COVID-19 pandemic and there is a lack of adequate follow-up data.

## CONCLUSION(S)

Younger patients tended to have larger tumours that were of a higher grade and had signet ring or mucinous histopathology. The social and clinical implications of these findings are to be explored.

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