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ORIGINAL ARTICLE

Relationship between presenting symptoms and tumor location in colorectal cancer patients

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ABSTRACT

BACKGROUND

Colorectal cancer (CRC) often shows symptoms at an advanced stage, causing delayed diagnosis and poorer prognosis. Initial symptoms, or chief complaints, are usually identified through patient history and can vary based on tumor location. This can help in establishing a diagnosis. This study aimed to determine the relationship between presenting symptoms and tumor location in CRC patients at Zainoel Abidin Regional General Hospital, Banda Aceh.

METHODS

This cross-sectional study was conducted using secondary data from medical records (2019–2022) for 163 CRC patients. Information on symptoms of patients were collected from patient files: anemia, anorexia, diarrhea, constipation, abdominal pain, rectal bleeding, and palpable abdominal mass. Tumor locations were classified as right colon, left colon, rectum, and left colon plus rectum. Bivariate analysis was used to analyze the data.

RESULTS

Of the 163 patients, 98 (58%) were aged ≥50 years, 82 (50.3%) were male, and 99 (60.7%) had rectal tumors. The percentage of patients presenting with rectal bleeding was significantly higher in rectal cancers (47.47%) as compared with cancers in the left colon (28.57%) and left colon and rectal (33.33%) cancers (p=0.000). The percentage of patients presenting a palpable abdominal mass was significantly higher in right colon (31.58%) compared with left colon (4.76%) and rectal cancer (1.01%) (p=0.000).

CONCLUSIONS

Tumor location in the right colon is associated with palpable abdominal mass, while rectal location is associated with rectal bleeding in CRC patients. Familiarity with clinical symptoms of CRC could make patients more sensitive to undergo more frequent screening for cancer.

Keywords: Tumor location, symptoms, rectal bleeding, palpable abdominal mass, colorectal cancer

INTRODUCTION

Colorectal cancer (CRC) accounts for about 10% of all new cancer cases and 9.4% of cancer-related deaths worldwide in 2020. These statistics rank CRC as the 3rd most commonly diagnosed cancer and the second leading cause of cancer-related deaths globally.[1] The American Cancer Society states that the risk of developing CRC is around 4.3% (1 in 23 people) in men and 4.0% or about 1 in 25 people in women.[2] Asia has the highest incidence and mortality rates for CRC, with Southeast Asia ranking 2nd and 3rd for incidence and mortality, respectively. In Indonesia, CRC is the 4th most commonly diagnosed cancer. It is characterized by tumors or malignant neoplasms in the epithelial tissue of the colon and/or rectum.[1]

One of the factors contributing to the low life expectancy of CRC patients is the absence of visible and typical symptoms in the early stages of the disease. As a result, patients may not experience significant health problems or exhibit symptoms until the cancer has progressed to an advanced stage. Consequently, patients often seek medical attention only when their symptoms are advanced.[3] This abnormal and destructive growth of cells and tissue masses can occur along the colon to the rectum. Tumor location of CRC can determine the clinical presentation of the patient apart from tumor size and absence of metastases.[4] When symptomatic, the manifestations and their severity depend on the tumor's location and size. Symptoms that trigger diagnostic colonoscopies are rectal bleeding (37%), abdominal pain (34%), and anemia (23%).[5] The colorectal region is divided into three parts based on embryological, anatomical, and physiological distinctions: the right colon, left colon, and rectum.[6] In the right colon, which has a larger caliber and thinner walls, obstructions occur late, and bleeding is usually hidden. Anemia-induced fatigue may be the only symptom, and tumors often go unnoticed until discovered by colonoscopy or imaging. Tumors sometimes grow large enough to be palpable through the abdominal wall before other symptoms appear. In the left colon, with its narrower lumen and more solid feces, obstructions happen earlier, causing abdominal pain or blood in the stool. Rectal cancer commonly starts with bleeding during defecation, and may include a feeling of incomplete evacuation or, if advanced, pain due to perirectal involvement.[7]

Similar research has been conducted by Samem et al.,[8] focusing on patients diagnosed with CRC. One of their findings indicated a significant relationship between the tumor location in the right colon and complaints of anemia and abdominal mass. In another study conducted by Alrubaie et al.[9] in Iraq, it was found that tumors located in the right colon had a significant relationship with abdominal pain complaints. However, these investigators did not include abdominal CT scans as part of the diagnostic criteria for the inclusion of CRC patients.

A study on 46 patients diagnosed with CRC showed that pain reported by patients, pain occurring during physical examination, and the presence of pathological resistance on palpation are more often associated with cancer location in the colon, but not in the rectum. In the case of tumors located in the rectum, admixtures (blood, mucus, or both) appear more frequently in the stool.[10] Tumors of the right colon are often clinically silent and the only possible sign is anemia. Conversely, tumors of the left colon can present with fresh rectal bleeding, change of bowel habit, and intestinal obstruction due to its constricting nature.[11] Banaszkiewicz et al.[12] showed that pain in patients with CRC was more common in right-sided lesions. The same authors also described that constipation was more common in patients with rectal and left colon tumors, and diarrhea most frequently occurred in patients with rectal cancer. In addition, another study showed that iron deficiency anemia is strongly associated with right-sided CRC.[13]

The high incidence and mortality rates of CRC, coupled with the late diagnosis and poor prognosis,[10] and the inconsistent results of the previous studies, highlights the need for a new research study to determine the relationship between presenting symptoms and tumor location in CRC patients at Zainoel Abidin Regional General Hospital (RSUDZA) in Banda Aceh, Indonesia.

METHODS

Research design

This was an analytical-observational cross-sectional study, conducted at the Zainoel Abidin Regional General Hospital, Banda Aceh, Indonesia, from April to October 2022.

Research subjects

The total number of patients diagnosed with CRC from January 2019 to October 2022 was 452, but 289 did not meet the inclusion criteria, because

their medical records had incomplete data, were damaged, had missing parts, showed incorrect patient diagnosis, or were of patients on chemotherapy, therefore only 163 patients were included in this study. All patients diagnosed with primary CRC (ICD-10 codes: C18, C19, and C20) from January 2019 to October 2022, with or without supporting examinations, were included as meeting the inclusion criteria. Patients with secondary CRC or those with incomplete, damaged, or missing medical records that failed to provide the necessary information for the study, chemotherapy patients, and incorrect patient diagnosis, were classified under the exclusion criteria.

Data collection

The data were collected by tracing and reviewing the medical records of the patients and recording the data in a standard form. The initial presenting symptoms obtained from the data were anemia, anorexia, diarrhea, constipation, abdominal pain, rectal bleeding, and palpable abdominal mass. Age was categorized into <50 and ≥50 years. Gender was categorized into male and female. Tumor location was the site where the CRC tumor was found according to the colonoscopy, biopsy, and CT scan results recorded in the medical records. The tumor location in this study was limited to the right colon, left colon, rectum, and left colon and rectum based on the anatomy, physiology, and embryology of origin, and adjusting to the data found in the patient's medical record. The region from the cecum to two-thirds of the transverse colon was grouped into the right colon, while the region from one-third of the transverse colon to the sigmoid colon was grouped into the left colon.

Ethical clearance

The ethical approval letter was issued by the Health Research Ethics Committee of the Zainoel Abidin Regional General Hospital under KEPPKN registration number 1171012P (approval number: 080/EA/FK-RSUDZA/2022).

Statistical analysis

Data analysis was performed using univariate and bivariate approaches. Univariate analysis was performed to describe patient characteristics, tumor location, and symptoms. In bivariate analysis, each type of symptom acts as a variable with a measurement result of "yes" or "no". Pearson chi-square test or Fisher's exact test was used to analyze the data. Statistical significance was set at p-value <0.05.

RESULTS

This research was conducted at the Zainoel Abidin Regional General Hospital Medical Record Installation, with 452 patients having been diagnosed with CRC, in the time period from January 2019 - October 2022. However, data of 289 patients did not meet the inclusion criteria, therefore only data of the remaining 163 patients were included in this study (Figure 1).

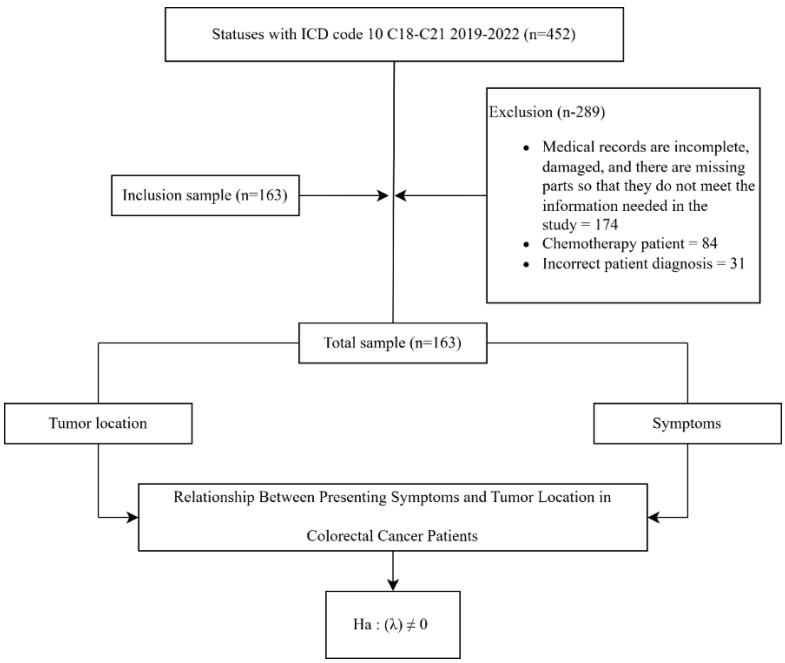

Figure 1. The flow chart of the participants

Table 1. Characteristics of CRC patients (n=163)

Characteristics	n (%)
Age (years)	
< 50	65 (39.87)
≥ 50	98 (60.13)
Gender	
Male	82 (50.31)
Female	81 (49.69)
Tumor location	
Right colon	19 (11.66)
Left colon	42 (25.77)
Rectum	99 (60.73)
Left colon and rectum	3 (1.84)
Symptoms	
Anemia	11 (6.75)
Anorexia	2 (1.23)
Diarrhea	16 (9.82)
Constipation	38 (23.31)
Abdominal pain	26 (15.95)
Rectal bleeding	61 (37.42)
Palpable abdominal mass	9 (5.52)

Data presented as n (%), CRC : colorectal cancer

Table 1 illustrates that the majority of CRC patients in this study were aged 50 years and above (60.13%), of male gender (50.31%), with tumors located in the rectum, and the chief complaint of rectal bleeding. Out of the 163 cases recorded, 160 (98.16%) cases had tumors located in a single anatomical location, while only three (1.84%) cases had tumors in two anatomical locations.

The percentage of patients presenting with rectal bleeding was significantly higher in rectal cancer (47.47%) as compared with left colon (28.57%) and left colon and rectal (33.33%) cancers (p=0.000). The percentage of patients presenting with a palpable abdominal mass was significantly higher in cancers of the right colon (31.58%) compared with those in the left colon (4.76%) and rectum (1.01%) (p=0.000) (Table 2). No significant difference was noted when comparing patients younger and older than 50 years with respect to the location of the tumor (p=0.371). No such gender difference was observed either (p=0.072).

Table 2. The relationship between tumor location and symptoms of CRC patients (n=163)

Symptoms	Tumor location				p value
	Right colon (n=19)	Left colon (n=42)	Rectum (n=99)	Left colon and rectum (n=3)	
Age (years)					
< 50	11 (57.89)	17 (40.48)	36 (36.36)	1 (33.33)	0.371
≥ 50	8 (42.11)	25 (59.52)	63 (63.64)	2 (66.67)	
Gender					
Male	14 (73.68)	16 (38.09)	50 (50.51)	2 (66.67)	0.072
Female	5 (26.32)	26 (61.91)	49 (49.49)	1 (33.33)	
Anemia					
Yes	0 (0.00)	4 (36.36)	7 (63,64)	0 (0.00)	0.547
No	19 (100.0)	38 (25.00)	92 (60.52)	3 (1.98)	
Anorexia					
Yes	0 (0.00)	1 (2.38)	1 (1.01)	0 (0.00)	0.856
No	19 (11.80)	41(97.62)	98 (98.99)	3 (100.00)	
Diarrhea					
Yes	2 (10.52)	3 (7.14)	11 (11.11)	0 (0.00)	0.864
No	17 (89.48)	39 (92.86)	88 (88.89)	3 (100.00)	
Constipation					
Yes	5 (26.32)	13 (30.95)	20 (20.20)	0 (0.00)	0.405
No	14 (73.68)	29 (69.05)	79 (79.80)	3 (100.00)	
Abdominal pain					
Yes	6 (31.58)	7 (16.67)	12 (12.12)	1 (33.33)	0.155
No	13 (68.42)	35 (83.33)	87 (87.88)	2 (66.67)	
Rectal bleeding					
Yes	0 (0.00)	12 (28.57)	47 (47.47)	1 (33.33)	0.000
No	19 (100.00)	30 (71.42)	52 (52.53)	2(66.67)	
Palpable abdominal mass					
Yes	6 (31.58)	2 (4.76)	1 (1.01)	0 (0.00)	0.000
No	13 (68.42)	40 (95.24)	98 (98.99)	3 (100.0)	

Data presented as n (%), CRC: colorectal cancer

However, unlike other symptoms, there was no correlation between tumor location and symptoms such as anemia (=0.547), anorexia (p= 0.856), diarrhea (p=0.834), constipation (p=0.405), and abdominal pain (p=0.155). These findings hold important implications for clinicians, suggesting the need for tailored diagnostic and treatment approaches based on the patient's presenting symptoms and tumor location.

DISCUSSION

The study revealed that most CRC patients were in the age group of ≥50 years. This finding is consistent with the incidence of new cases of CRC in the United States, where 88% or approximately 130,020 of the total 147,950 new cases were patients aged ≥50 years.[14] In addition, it also supports previous research findings which highlight that the majority of CRC cases occur in individuals over 50 years old. This trend supports the idea that older adults are more susceptible due to long-term exposure to risk factors such as diet, lifestyle, and potential genetic changes. The study likely emphasizes the need for routine screening starting at age 50, as CRC incidence notably rises within this demographic group. This supports existing screening guidelines targeting those over 50 years of age to reduce mortality by detecting CRC in earlier, more treatable stages.[15] Age is one of the risk factors for CRC. As individuals age, their immune system function declines, and the accumulation of exposure to and intake of carcinogenic agents increases. These factors, combined with the increased likelihood of DNA mutations, result in a higher risk of CRC in older adults. Diagnoses of progressive CRC increase markedly after age 50.[16]

The results of this study show that men have the highest percentage compared to women for CRC cases with a total of 82 patients (50.3%). This is in accordance with the results of the study by Briggs et al.[17] where men constituted the majority of CRC cases, with 327 male patients, covering 52.2% of the total cases. This gender distribution suggests that men may be at a slightly higher risk for CRC compared to women. This difference could be related to various factors, such as lifestyle, diet, and possibly genetics, which contribute more significantly to the male population's risk profile.

The American Cancer Society states that men have a 30% greater risk of developing CRC than women. This increased incidence in males is attributed to several lifestyle-related and biological factors. Men tend to have higher rates of lifestyle-related risk factors, such as higher consumption of red and processed meats, consumption of alcohol, and smoking, all of which have been strongly linked to CRC. Additionally, men have higher rates of obesity, another significant risk factor for CRC development. Alcohol consumption and smoking significantly increase the risk of CRC through mechanisms that promote cellular damage and mutations. The metabolism of alcohol produces acetaldehyde, a carcinogenic compound that induces oxidative stress and DNA damage, while also disrupting key molecules such as S-adenosylmethionine, resulting in epigenetic changes and weakening of tumor suppressor genes. Similarly, smoking compounds CRC risk, as tobacco contains over 60 carcinogens, including N-nitrosamines and polycyclic aromatic hydrocarbons, which damage DNA and induce mutations in colorectal epithelial cells. This cellular disruption fosters conditions leading to polyposis and potentially invasive adenocarcinoma, highlighting how these lifestyle factors collectively contribute to elevated CRC risk.[18]

This study revealed that the rectum was the most common location for CRC. This finding is consistent with research conducted by Holtedahl et al.,[19] reporting that the most common site for CRC was found in the rectum, in 29 out of 94 cases. The primary reason for this higher prevalence is likely due to the distinct and more noticeable symptoms associated with rectal cancer, such as rectal bleeding. This symptom has high specificity for CRC, often prompting patients to seek medical attention earlier than they might for less apparent symptoms. Additionally, the anatomical location of the rectum allows for easier access and evaluation through diagnostic procedures such as colonoscopy or sigmoidoscopy, facilitating earlier detection. The rectum is a frequent site of CRC development, strongly influenced by dietary factors, particularly fiber, fat, and protein intake. A low-fiber diet can result in prolonged exposure of rectal tissues to carcinogenic compounds, heightening the risk of mutation. High intake of protein and fat, especially from animal sources, further exacerbates this risk by altering gut microbiota, leading to the production of harmful metabolites that induce inflammation in the rectal region. This inflammatory environment, combined with extended contact between carcinogenic byproducts in the stool and rectal tissues, contributes to the rectum’s susceptibility to tumor

formation. Diets low in fiber but rich in protein and fat tend to increase fecal retention in the rectum, which may stimulate CRC development, particularly in the rectal area due to its role in fecal storage and elimination.[20]

The symptoms obtained in this study were anemia, anorexia, diarrhea, constipation, abdominal pain, rectal bleeding, and palpable abdominal masses. Rectal bleeding is one of the patient's chief complaints that often appear besides constipation, diarrhea, and anemia. Similarly, in our study, rectal bleeding was the most prevalent chief complaint. The Ministry of Health of the Republic of Indonesia [21] also states that the symptoms and signs showing high predictive value for CRC consist of the chief complaint of rectal bleeding accompanied by increased frequency of defecation and/or diarrhea for at least 6 weeks (all ages), rectal bleeding without anal symptoms (above 60 years), increased frequency of defecation or diarrhea for at least 6 weeks (above 60 weeks), palpable mass in the right iliac fossa (all ages), intra-luminal mass in the rectum, signs of mechanical intestinal obstruction, and any patient with iron deficiency anemia.

Similar results were also reported by Holtedahl et al.[19] In this study, the most common symptom reported by CRC patients was rectal bleeding, observed in a significant proportion of cases. This symptom occurs primarily due to the close proximity of rectal tumors to the anal canal, making any bleeding more visible and identifiable by the patient. Unlike tumors located higher in the colon, where bleeding may be absorbed or darkened by the time it reaches the rectum, rectal tumors result in fresh bleeding that is more easily detected. The high specificity of rectal bleeding in rectal cancers serves as a key diagnostic indicator, guiding healthcare providers towards early diagnosis and intervention.

This study found four types of tumor locations and seven types of symptoms in the patient medical record data. Tumor location data were obtained from the patient's admission and discharge summary form and/or from supported examinations, such as colonoscopy, tissue biopsy, and abdominal CT scan, while the symptoms data was obtained from the patient's anamnesis form.

CRC is often asymptomatic in the early stages of the disease, and symptoms tend to vary depending on the location of the primary tumor. A tumor located in the right colon often grows larger before showing symptoms compared to the left colon and rectum.[5] Patients with tumors in the right colon in this study, had palpable abdominal masses as the reason for hospitalization, which is similar to the finding of Loree et al.[22] In addition, patients with tumors in the rectum in this study mostly complained of rectal bleeding as the reason for hospitalization, which is in line with the finding of Marija [23] stating that tumors in the rectum often result in stools with blood and mucus or hematochezia.

A study by Holtedahl et al.[19] identified a significant association between tumor location in CRC and the primary symptoms reported by patients. Tumors located in the rectum (distal colorectal region) were more frequently associated with rectal bleeding, a symptom that often prompts early medical consultation due to its visible nature. Rectal tumors, located closer to the anus, were more likely to cause visible bleeding, while proximal colon tumors often developed gradually and often without immediate symptoms.

In addition, the results of our study conducted at the Zainoel Abidin Regional General Hospital, Banda Aceh, are also in line with the study conducted by Briggs et al.[17] which established a clear relationship between the location of the tumor in the colorectal area and the main symptoms experienced by patients, highlighting the role of certain symptoms that need to be watched out for. In particular, rectal tumors are more likely to present with rectal bleeding or blood in the stool, making these symptoms a strong indicator of rectal cancer. This can be explained by differences in anatomy and symptom development; tumors in the rectum are more likely to interfere with nearby blood vessel structures, causing bleeding that is seen early in the disease. In contrast, right-sided colon tumors may grow larger before symptoms appear, because this area has a wider lumen and loose stools, which allow the tumor to enlarge before causing obstruction and to develop into a palpable mass over time.

The relationship between tumor location and symptom presentation is crucial for diagnostic and screening strategies in early-onset CRC. Specifically, rectal tumors have a higher likelihood of presenting with rectal bleeding or blood in stool, which serves as a red-flag symptom of rectal cancer. In contrast, proximal (right-sided) colon tumors commonly present with anemia and abdominal pain and are more likely to be detected as a palpable mass. This correlation is partly due to anatomical differences; the larger lumen in the right colon allows the tumor to grow before causing obstruction, while its location can result in chronic but frequent occult bleeding, leading to anemia. These anatomical and symptomatological

distinctions are essential for improving early diagnosis. Screening strategies for patients with rectal bleeding may involve flexible sigmoidoscopy for younger patients and colonoscopy for older patients, particularly those with risk factors or red-flag symptoms. Awareness and timely investigation of red-flag symptoms in patients under 50 years of age could lead to earlier diagnoses and better outcomes for early-onset CRC.[15]

The limitation in this study is that the medical records used are still paper-based so that much of the data in the patient's medical records is incomplete and lost. This research is expected to be used as additional information and description to carry out a diagnostic and prognostic approach to patients. Therefore, it is recommended that relevant agencies implement electronic medical records to ensure the organization and storage of complete patient data, which can facilitate all activities, especially research for advancing health services.

CONCLUSIONS

Based on the research findings, it can be concluded that rectal cancer represents the highest percentage of all anatomical locations of CRC. Rectal tumors were associated with rectal bleeding. Tumors located on the right colon were associated with palpable abdominal mass. Analysis of these symptoms could indicate to the physician the location of the CRC.

Conflict of Interest

No relevant disclosures.

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Author Contributions

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Formal analysis: AGP, NLS
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Methodology: DM, FDI, FY,VDM, AGP
Project administration: FDI
Visualization: NLS, AGP, DM
Writing - original draft: NLS, DM, FDI, AGP
Writing- review & editing: DM, FY, VDM
All authors have read and approved the final manuscript.

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Data Availability Statement

Research master data is stored by researchers

Declaration of Use of AI in Scientific Writing

The writing process of this article did not use AI.

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