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Clinicopathological Profile of Colorectal Cancer Patients at Dr. Zainoel Abidin General Hospital, Banda Aceh, Indonesia: A Single-Center Retrospective Study

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ABSTRACT

Introduction: Colorectal cancer (CRC) is a leading malignancy worldwide and an increasing public health challenge in Southeast Asia. Regional referral hospital-based data from Indonesia, particularly those outside Java, are limited. Objective: To characterize the demographic, anatomical, pathological, staging, and surgical profiles of patients with colorectal cancer treated at Dr. Zainoel Abidin General Hospital, Banda Aceh, in 2024.

Methods: This single-center retrospective observational study reviewed the records of all patients with histopathologically confirmed colorectal cancer who were managed between January and December 2024. Total sampling was performed, and incomplete records were excluded. The variables included age, sex, tumor location, AJCC stage, histological subtype, and surgical procedure. Continuous data are expressed as mean ± standard deviation, and categorical data are expressed as frequencies, percentages, and 95% confidence intervals. Distributional differences were evaluated using the chi-squared goodness-of-fit test, one-sample t-test, and proportion tests, with $p < 0.05$ considered significant.

Results: Fifty-seven patients were included in this study. The mean age was 49.37 ± 12.4 years, significantly lower than the global reference mean of 60 years ($p < 0.001$). Most patients were aged 46–65 years (57.9%), and men predominated slightly (54.4%). The rectum was the most frequent tumor site (56.1%), and stage III was the most common presentation (40.4%). Advanced-stage disease (stage III–IV) was observed in 52.6% of the patients. Adenocarcinoma was the predominant histological type (91.2%). Open laparotomy was the leading surgical approach (70.2%), followed by abdominoperineal resection, low anterior resection, and Hartmann procedure.

Conclusion: Colorectal cancer diagnosed at RSUDZA in 2024 showed younger age at diagnosis, rectal predominance, frequent advanced-stage presentation, and a high prevalence of open surgery, supporting earlier detection and strengthening colorectal surgical capacity in Aceh.

Keywords

Colorectal Cancer, Rectal Cancer, Staging, Adenocarcinoma, Surgical Management, Indonesia

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INTRODUCTION

Colorectal cancer (CRC) is the third most common malignancy and the second leading cause of cancer-related mortality worldwide, accounting for approximately 9.2% of all cancer deaths and demonstrating a steadily

increasing burden in low- and middle-income countries (LMICs) [1,2]. CRC develops through the progressive malignant transformation of the colonic or rectal glandular epithelium, driven by cumulative genetic and epigenetic alterations influenced by aging, dietary patterns, obesity, smoking, chronic inflammation, and hereditary susceptibility [3,4]. Despite substantial reductions in CRC mortality in high-income countries through organized screening programs and advances in multidisciplinary treatment, many Southeast Asian countries continue to experience increasing incidence rates and a high prevalence of advanced-stage disease at initial presentation [5-7]. In Indonesia, CRC is among the most prevalent malignancies and increasingly affects younger individuals, with a considerable proportion of patients diagnosed before the age of 50 years, reflecting the growing concern regarding early-onset CRC [8].

Optimal CRC management depends on timely diagnosis, precise staging, and stage-appropriate surgical intervention integrated with neoadjuvant or adjuvant chemoradiotherapy, when indicated [9-11]. However, the clinicopathological spectrum of CRC in Indonesian tertiary referral hospitals is strongly influenced by disparities in public awareness, accessibility of endoscopic services, referral pathways, and availability of colorectal surgical expertise, which vary substantially between provinces [12,13]. Aceh Province, located in northern Sumatra, predominantly relies on the Dr. Zainoel Abidin General Hospital (RSUDZA) as its principal tertiary referral center. However, contemporary epidemiological and surgical data on CRC in this population are limited. Comprehensive local data are essential for supporting healthcare planning, evaluating current management patterns, and guiding the development of region-specific screening and early detection strategies. Therefore, this study aimed to characterize the demographic, anatomical, pathological, and surgical profiles of patients with CRC managed at RSUDZA in 2024.

METHOD

This single-center retrospective descriptive observational study was conducted at the Department of Surgery, Dr. Zainoel Abidin General Hospital (RSUDZA), Banda Aceh, Aceh, Indonesia. RSUDZA is the main provincial tertiary referral hospital serving approximately five million people in Aceh Province. The study population included all patients with histopathologically confirmed colorectal cancer managed by the Digestive Surgery Division between January 1 and December 31, 2024. A consecutive total sampling method was used. Patients were excluded if their medical records lacked any of the predefined study variables required for the analysis. Age was analyzed as a continuous variable and categorized into four groups: 18–25, 26–45, 46–65, and >65 years. The clinicopathological variables included tumor location, AJCC stage, histological type, and primary surgical procedure. Tumor location was classified as the cecum, ascending colon, transverse colon, descending colon, sigmoid colon, rectosigmoid colon, or rectum. The clinical stage was categorized according to the AJCC 8th edition as stage I, II, III, or IV. The histological type was grouped as adenocarcinoma or non-adenocarcinoma. Surgical procedures included exploratory laparotomy with tumor resection, low anterior resection, abdominoperineal resection/Miles procedure, and Hartmann's procedure.

Data were extracted from the institutional medical record system using a standardized case record form. Histopathological diagnoses were confirmed by board-certified anatomical pathologists at RSUDZA. Disease staging was determined based on clinical assessment, imaging findings, intraoperative findings, and final histopathological reports, according to the American Joint Committee on Cancer 8th-edition criteria. Continuous variables are presented as mean ± standard deviation, and categorical variables are presented as frequencies, percentages, and Wilson 95% confidence intervals. Chi-square goodness-of-fit tests were used to evaluate whether categorical distributions differed from a uniform distribution. One-sample z-tests for proportions were used to compare selected observed proportions, including rectal tumor location, adenocarcinoma histology, and male sex, with previously reported Indonesian benchmarks. One-sample t-tests were used to compare the cohort mean age with reference values of 60 and 50 years. A two-sided p-value <0.05 was considered statistically significant. Analyses were performed using IBM SPSS Statistics version 22.0 and independently verified using open-source statistical routines. The study protocol was approved by the Institutional Review Board of the Faculty of Medicine, Universitas Syiah Kuala/Dr. Zainoel Abidin General Hospital. Because this study used de-identified secondary medical record data, the requirement for

individual informed consent was waived. This study was conducted in accordance with the Declaration of Helsinki.

RESULTS

A total of 57 patients with histopathologically confirmed colorectal cancer fulfilled the eligibility criteria during the study period. The mean age at diagnosis was 49.37 ± 12.4 years. This value was significantly lower than the internationally reported CRC reference mean age of 60 years ($t = -6.47$, $df = 56$, $p < 0.001$) but was not significantly different from 50 years ($p = 0.703$), indicating a relatively younger CRC population. Patients aged 46–65 years constituted the largest age group (57.9%), followed by those aged 26–45 years (31.6%). The age distribution differed significantly from that of a uniform distribution ($\chi^2 = 43.98$, $df = 3$, $p < 0.001$). Furthermore, one-third of the patients were aged ≤45 years, indicating a substantial proportion of early-onset CRC cases. Male patients slightly predominated, accounting for 54.4% of the cases, with a male-to-female ratio of 1.19:1; however, this difference was not statistically significant ($p = 0.508$).

Table 1. Demographic distribution of patients with colorectal cancer at RSUDZA, 2024 (n = 57)

Variable	n	%	95% CI
Age group (years)			
18–25	1	1.8	0.3–9.4
26–45	18	31.6	20.7–44.9
46–65	33	57.9	45.0–69.8
>65	5	8.8	3.8–18.9
Mean ± SD: 49.37 ± 12.4 years			
Sex			
Male	31	54.4	41.6–66.6
Female	26	45.6	33.4–58.4

The rectum was the most common primary tumor location, accounting for 56.1% of cases, followed by the sigmoid and descending colons (10.5% each). Tumors involving the ascending colon, transverse colon, cecum, and rectosigmoid junction were less frequent. The overall anatomical distribution demonstrated significant non-uniformity ($\chi^2 = 83.37$, $df = 6$, $p < 0.001$). When grouped anatomically, rectal tumors were more common than colonic tumors (59.6% vs. 40.4%), although the difference was not statistically significant ($P = 0.145$).

Table 2. Anatomical distribution of colorectal cancer (n = 57)

Site	n	%	95% CI
Rectum	32	56.1	43.3–68.2
Sigmoid colon	6	10.5	4.9–21.1
Descending colon	6	10.5	4.9–21.1
Ascending colon	5	8.8	3.8–18.9
Transverse colon	3	5.3	1.8–14.4
Caecum	3	5.3	1.8–14.4
Rectosigmoid	2	3.5	1.0–11.9
Goodness-of-fit: $\chi^2 = 83.37$, $df = 6$, $p < 0.001$			

Stage III disease was the most frequent presentation, observed in 40.4% of patients, followed by stage II (29.8%), stage I (17.5%), and stage IV (12.3%) disease. Stage distribution differed significantly from a uniform distribution ($\chi^2 = 10.86$, $df = 3$, $p = 0.013$). Overall, advanced-stage disease (stage III–IV) was identified in 52.6% of patients, indicating that more than half of the cohort presented with locally advanced or metastatic disease at the time of diagnosis. Adenocarcinoma was the predominant histopathological subtype, identified in 52 of 57 patients (91.2%). The remaining cases were categorized as non-adenocarcinoma colorectal malignancies with metastatic presentations, according to institutional pathology reporting standards. The predominance of adenocarcinoma was statistically significant ($\chi^2 = 38.75$, $p < 0.001$).

Table 3. Stage at diagnosis (n = 57)

Stage	n	%	95% CI
I	10	17.5	9.8–29.4
II	17	29.8	19.1–43.2
III	23	40.4	28.6–53.3
IV	7	12.3	6.1–23.3
Goodness-of-fit: χ^2 = 10.86, df = 3, p = 0.013; Advanced (III–IV) vs early(I–II): p = 0.691			

Open exploratory laparotomy with tumor resection was the most frequently performed surgical procedure, accounting for 70.2% of cases. Abdominoperineal resection (Miles procedure), low anterior resection, and Hartmann's procedure were performed less frequently. The procedural distribution differed significantly from the uniform expectation (χ^2 = 62.37, df = 3, p < 0.001). Laparoscopic colorectal resections were not performed during the study period.

Table 4. Distribution of surgical procedures (n = 57)

Procedure	n	%	95% CI
Exploratory laparotomy with tumour resection	40	70.2	57.3–80.5
Miles abdominoperineal resection	7	12.3	6.1–23.3
Low anterior resection (LAR)	6	10.5	4.9–21.1
Hartmann's procedure	4	7.0	2.8–16.7
Goodness-of-fit: χ^2 = 62.37, df = 3, p < 0.001			

DISCUSSION

This study provides one of the few contemporary clinicopathological descriptions of colorectal cancer (CRC) in the Aceh Province and highlights several findings with important epidemiological and surgical implications. The most notable observation was the relatively young age at diagnosis, with a mean age of 49.37 ± 12.4 years, and one-third of the patients were aged ≤45 years. This pattern supports the growing evidence that early-onset CRC is increasingly prevalent in Indonesia and other low- and middle-income countries [14-16]. Similar findings have been reported in several Indonesian hospital-based studies demonstrating a shift toward younger age groups compared with Western populations, where the median age at diagnosis generally exceeds 60 years [17-19].The rising incidence of younger-onset CRC has been associated with rapid dietary westernization, obesity, sedentary behavior, smoking, microbiome dysbiosis, and metabolic disorders [20-22]. These findings indicate that the conventional screening threshold beginning at 50 years may no longer adequately reflect the demographic profile of CRC in developing Asian populations [23]. The male predominance in the present cohort was modest and not statistically significant, although the male-to-female ratio remained slightly elevated. This observation is consistent with previous Indonesian and Asian studies that reported a mild predominance of CRC among men [24,25]. Proposed mechanisms include differences in visceral adiposity, tobacco exposure, alcohol consumption, dietary patterns, and the protective effects of endogenous estrogen on colorectal epithelium.Nevertheless, the relatively balanced sex distribution observed in this study suggests that CRC constitutes a substantial health burden for both sexes within the Aceh population [29].

Another important finding was the predominance of rectal tumors, which accounted for more than half of all cases. This distribution parallels the findings of several Indonesian and East Asian studies in which rectal cancer remains more frequent than proximal colon malignancy [30-33]. In contrast, Western registries have increasingly reported a shift toward right-sided and proximal colon cancers [34,35]. Geographic variation in tumor location may reflect differences in dietary exposure, environmental carcinogens, genetic susceptibility, microbiome composition, and access to early screening programs [36]. From a clinical perspective, rectal predominance has major therapeutic implications because optimal rectal cancer management requires multidisciplinary coordination, high-resolution pelvic magnetic resonance imaging, neoadjuvant chemoradiotherapy, and a technically demanding total mesorectal excision [37,38]. The delayed presentation

of bulky low rectal tumors substantially limits the opportunities for sphincter-preserving surgery and increases the likelihood of permanent stoma formation [39]. More than half of the patients in this cohort presented with advanced-stage disease (stage III–IV), with stage III being the most frequent stage at diagnosis. This finding is consistent with reports from several Indonesian and low-resource healthcare settings, where delayed diagnosis remains highly prevalent [40,41]. Late-stage presentation is frequently associated with poor symptom awareness, limited participation in screening programs, reluctance to undergo rectal examination or colonoscopy, financial constraints, and delayed referral pathways [42-44]. The predominance of advanced disease observed in this study highlights the urgent need to strengthen colorectal cancer awareness campaigns, expand colonoscopic access, and improve referral systems for symptomatic patients in Aceh and other underserved regions of Indonesia [45].

Adenocarcinoma overwhelmingly dominated the histopathological profile, accounting for more than 90% of all cases, consistent with global CRC epidemiology [46]. This predominance reflects the glandular origin of the colorectal epithelium and the adenoma–carcinoma sequence underlying most colorectal malignancies [47]. Histopathological confirmation in all patients further strengthened the validity and diagnostic reliability of the present dataset [48]. Open laparotomy with tumor resection was the dominant surgical approach, whereas laparoscopic colorectal surgery was not performed during the study period. This operative pattern likely reflects advanced-stage presentations, limitations in minimally invasive infrastructure, and restricted availability of specialized colorectal laparoscopic expertise [49]. Similar findings have been reported in several regional referral centers in developing countries, where open surgery remains the principal operative strategy for advanced CRC [50]. The relatively low proportion of sphincter-preserving procedures among rectal cancers also suggests that many tumors were anatomically unsuitable for low anterior resection at presentation. The expansion of minimally invasive colorectal surgery programs, structured MRI-based staging pathways, and integrated neoadjuvant treatment strategies may substantially improve future oncological and functional outcomes in the Aceh referral system. This study had several important strengths, including the use of consecutive total sampling, histopathological confirmation in all cases, and quantitative benchmarking against external reference populations. However, this study has several limitations. The retrospective single-center design limits generalizability beyond the Aceh referral system, whereas the modest sample size restricts subgroup and multivariate analyses. Additionally, the absence of longitudinal follow-up data precluded survival and recurrence analyses. Future multicenter studies incorporating molecular profiling, treatment outcomes, and survival evaluations are warranted to better characterize the evolving burden of CRC in Indonesia.

CONCLUSION

Patients with colorectal cancer treated at RSUDZA in 2024 commonly presented with rectal tumors and advanced-stage disease, whereas open surgery remained the predominant treatment approach. The notable proportion of patients aged ≤45 years highlights the growing burden of early-onset colorectal cancer. These findings emphasize the need to strengthen early-detection strategies, improve diagnostic access, and expand surgical capacity to optimize colorectal cancer outcomes in Aceh.

DECLARATIONS

None

CONSENT FOR PUBLICATION

The Authors agree to the publication in the Journal of Society Medicine.

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All authors have reviewed and approved the final version of the manuscript and agreed to its publication in the Journal of Society Medicine.

AUTHORS' CONTRIBUTIONS

S.S.W. conceived the study, collected and analyzed the data, and wrote the manuscript. K.R. supervised the study, interpreted the data and critically revised the manuscript. All authors approved the final manuscript and agreed to be accountable for all aspects of the study.

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