



Relationship between Clinicopathological Characteristics and Survival Rate in Patients Colorectal Cancer

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Abstract

The survival rate in colorectal cancer patients is influenced by factors that contribute to the individual diagnosed with colorectal cancer, including clinicopathological characteristics such as cancer location, histopathology, degree of differentiation, and cancer metastasis. This study aims to analyze the relationship between clinicopathological characteristics of colorectal cancer and the survival rate of colorectal cancer patients at RT Notopuro Sidoarjo Regional Hospital. Research methods used use observational analytic with design Cross-sectional. The results of this study showed that 53.8% of male colorectal cancer patients were aged >60 years, the most common location was in the colon (61.5%) with a good grade type, and no metastases in other organs (65.4%). From the results of the Kaplan Meier curve, it can be seen that there is a tendency that cancer locations in the colon, which are well differentiated, and which do not experience metastasis have a longer survival rate compared to cancer locations outside the colon, which are moderately-poorly differentiated, and which experience metastasis, although the results of the statistical analysis show an insignificant relationship ($p\text{-value}>0.05$).

Introduction

Colorectal cancer is one of the most common malignant diseases originating from the epithelial tissue of the colon and rectum and continues to represent a major challenge in both global and national health systems (Ghazy et al., 2025; Mitchell & Aydemir, 2025; Vallejos et al., 2025). The progression of this disease not only affects patients' physical condition and quality of life but also generates substantial social and economic burdens for healthcare institutions and families (Domaradzki et al., 2025; Wulandari et al., 2025; Hashim et al., 2025). Over recent decades, the incidence of colorectal cancer has shown a consistent upward trend in both developed and developing countries (Olfatifar et al., 2025; Sung et al., 2025; Zhou et al., 2025). In Indonesia, colorectal cancer has become one of the leading causes of cancer related morbidity and mortality, as reported by Ferlay et al. (2024). This situation indicates that colorectal cancer is no longer merely an individual health problem but a broader public health concern that requires sustained clinical attention and continuous scientific investigation (Toussaint et al., 2025; Goktas & Grzybowski, 2025; Gibb et al., 2025).

Along with the increasing number of cases, greater attention has been directed toward understanding patient survival outcomes. Survival rate serves not only as an indicator of therapeutic success but also as a reflection of the complex interactions between tumor biology, patient characteristics, and healthcare services. Previous studies have demonstrated that

colorectal cancer survival is influenced by multiple factors, including disease stage, histopathological type, degree of cellular differentiation, presence of metastasis, tumor location, carcinoembryonic antigen levels, and treatment modalities (Putra et al., 2023; Titu et al., 2025; Kostov et al., 2025; Xing et al., 2025). These factors do not operate independently but interact dynamically to shape individual prognostic trajectories. Therefore, a comprehensive understanding of clinicopathological characteristics is essential for improving patient outcomes and optimizing clinical decision making.

From a clinical perspective, clinicopathological characteristics play a central role not only in diagnosis but also in determining therapeutic strategies and predicting disease progression (Cendra et al., 2025; Xie et al., 2025; Popa et al., 2025). Empirical evidence suggests that colorectal cancer exhibits considerable variation according to age, sex, and anatomical tumor location. A study conducted in Bandung by Lukman et al. (2023) reported that most cases were located in the rectum and proximal colon, with adenocarcinoma as the predominant histological type and anemia showing a significant association with disease occurrence. Furthermore, differences between proximal and distal colorectal tumors have been shown to influence clinical presentation, treatment response, and complication risk, highlighting the importance of tumor location in clinical assessment (Troian et al., 2025; Goldberg et al., 2025; Lee et al., 2025).

In addition to anatomical factors, histopathological type and degree of differentiation are widely recognized as important determinants of prognosis. Research conducted in Makassar revealed that specific histopathological subtypes, such as mucinous adenocarcinoma, as well as advanced age, were associated with reduced five year survival rates (Arsyad et al., 2023; Kang et al., 2025; Gaston et al., 2025). Poorly differentiated tumors tend to demonstrate more aggressive biological behavior, higher invasive potential, and lower responsiveness to conventional therapies. Consequently, histopathological evaluation provides valuable insights into tumor aggressiveness and long term disease trajectory.

Metastasis represents another critical factor influencing survival among patients with colorectal cancer (Chierici et al., 2025). Over the past two decades, the proportion of patients diagnosed at a metastatic stage has increased considerably (Zeineddine et al., 2023). The spread of cancer to distant organs, particularly the liver and lungs, remains one of the primary causes of reduced survival and limited therapeutic success (Dharmaji et al., 2021). The presence of metastasis complicates treatment planning, restricts curative options, and substantially diminishes life expectancy. Therefore, accurate assessment of metastatic status is an essential component of comprehensive prognostic evaluation.

Despite the growing body of research on colorectal cancer prognosis at national and international levels, findings often vary across regions and healthcare institutions. Differences in demographic characteristics, healthcare accessibility, referral systems, diagnostic facilities, and medical record quality may contribute to such variability. In many regional hospitals, especially in developing settings, locally generated evidence on survival determinants remains limited. This gap restricts the ability of healthcare providers to develop context specific, evidence based interventions tailored to local patient populations.

RSUD R. T. Notopuro Sidoarjo, as one of the major referral hospitals in East Java, has managed a substantial number of colorectal cancer cases in recent years. Its strategic position in regional healthcare delivery makes it a relevant setting for examining clinicopathological patterns and survival outcomes. However, systematic investigations that integrate clinicopathological data with survival analysis in this institution remain scarce. The absence of such evidence may limit efforts to enhance clinical management and long term patient care based on locally relevant data.

In response to this gap, the present study aims to analyze the relationship between clinicopathological characteristics and survival rate among patients with colorectal cancer treated at RSUD R. T. Notopuro Sidoarjo. Using an observational analytical approach, this research examines the associations between age, sex, tumor location, histopathological type, degree of differentiation, and metastatic status with patient survival. The findings are expected to contribute empirical evidence for improving clinical management at the local level while also serving as a foundation for future studies focused on strengthening colorectal cancer care and prognosis in similar healthcare settings.

Methods

This study employed an observational analytical design with a cross sectional approach to examine the relationship between clinicopathological characteristics and survival outcomes among patients with colorectal cancer. This design was selected to enable the simultaneous assessment of multiple clinical variables and survival status based on available medical records. Through this approach, the study aimed to identify patterns and potential associations between patient characteristics and survival rate within the specified study population.

The research was conducted at RSUD R. T. Notopuro Sidoarjo, East Java, Indonesia, from January to March 2025. Prior to data collection, ethical approval was obtained from the Medical Research Ethics Committee of Universitas Wijaya Kusuma Surabaya under reference number 74 SLE FK UWKS 2025. All research procedures were performed in accordance with ethical standards to ensure the confidentiality and protection of patient information.

The study population consisted of all patients diagnosed with colorectal cancer and treated at RSUD R. T. Notopuro Sidoarjo between 2020 and 2024. A total sampling technique was applied, in which all eligible patients who met the inclusion criteria were included in the study. The inclusion criteria were patients who had been clinically and histopathologically diagnosed with colorectal cancer and had received treatment at the hospital during the study period. Patients with incomplete medical records or unclear diagnostic information were excluded from the analysis. Based on these criteria, 26 patients were included as research subjects.

Data were collected retrospectively from hospital medical records using a structured data extraction form. The variables collected included demographic characteristics such as age and sex, as well as clinicopathological parameters including tumor location, histopathological type, degree of differentiation, and presence of metastasis. Survival status was determined based on the duration between the date of diagnosis and the date of death or last recorded follow up. Patients were classified into survival categories of less than one year and more than one year based on recorded clinical outcomes.

To ensure data accuracy and consistency, all extracted records were reviewed and cross checked before analysis. Incomplete or ambiguous entries were excluded to minimize potential bias. Data were then coded and entered into a statistical database for further processing.

Statistical analysis was performed using SPSS version 29. Descriptive analysis was applied to summarize patient characteristics and clinicopathological variables in the form of frequencies and percentages. Survival analysis was conducted using the Kaplan Meier method to estimate survival probability over time. Differences in survival distributions across clinicopathological groups were evaluated using the log rank Mantel Cox test. A p value of less than 0.05 was considered statistically significant.

The results of the analysis were presented in the form of tables and survival curves to facilitate interpretation. These visual and numerical presentations were used to describe survival patterns and to compare survival outcomes across different patient subgroups. Through this analytical framework, the study sought to provide a comprehensive overview of the relationship between

clinicopathological characteristics and survival among colorectal cancer patients at RSUD R. T. Notopuro Sidoarjo.

Results and Discussion

Univariate analysis was used to describe the frequency distribution of each studied variable . Data analyzed included age, gender, cancer location, histopathology, degree of differentiation, metastasis, and survival.

Table 1 Clinicopathological Characteristics of Colorectal Cancer

Category		Distribution (n %)
Age	< 60 Years	12 (46.2%)
	>60 Years	14 (53.8%)
Gender	Woman	9 (34.6%)
	Man	17 (65.4%)
Cancer Location	Colon	16 (61.5%)
	Rectum	10 (38.5%)
Histopathology	<i>Adenocarcinoma</i>	24 (92.3%)
	Mucinous Adenocarcinoma	2 (7.7%)
Degrees Differentiation	<i>Well Differentiated</i>	18 (69.2%)
	<i>Moderate-Poor Differentiated</i>	8 (30.8%)
Metastasis	There isn't any	17 (65.4%)
	There is	9 (34.6%)
<i>Survival</i>	<1 Year	12 (46.2%)
	>1 Year	14 (53.8%)

Source: Times New Roman 11, 2020

Table 1 shows distribution The frequency in the age group ≥ 60 years was 14 (53.8%) and the remaining 12 (46.2%) in the age group <60 years. male as many as 17 sufferers cancer (65.4%), whereas Woman as much as 9 sufferers Cancer (34.6%) . The most common location was the colon, with 16 cancer patients (61.5%), and the rest were in the rectum, with 10 (38.5%) . Most were adenocarcinomas (24 (92.3%), and a small proportion were mucinous adenocarcinomas (2 (7.7%). The grade was *well differentiated* (18 (69.2%), and the grade was *moderate-poor differentiated* (8 (30.8%). There were no metastases. There were 17 (65.4%), and 9 (34.6%) metastases. *The survival rate* of colorectal cancer patients with a survival rate of less than one year was 12 (46.2%), and colorectal cancer patients with a *survival rate* of more than one year were 14 (53.8%).

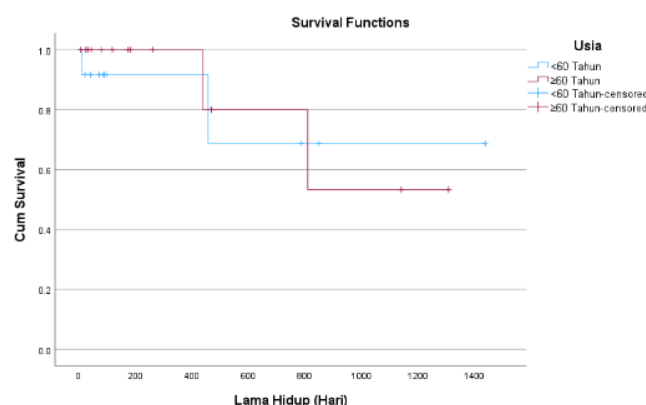


Figure 1. Test of the Relationship between Age and Colorectal Cancer Survival Rate

In Figure 1 above, the *survival curves* of the two age groups show that there is no tendency to have a better survival rate with the results of the log-rank test (Mantel-Cox) showing a *p-value* = 0.860, which means there is no statistically significant difference between survival and age

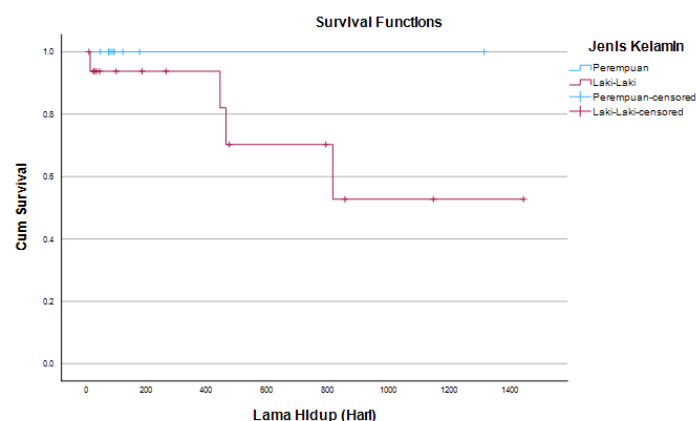


Figure 2. Test of the Relationship between Gender and Colorectal Cancer Survival Rate

Figure 2 shows that female colorectal cancer patients tend to have a higher survival rate than male patients. However, statistical analysis using the log-rank (Mantel-Cox) test yielded a *p-value* of 0.303 > 0.05, it can be concluded that there is no statistically significant difference between *survival* and gender.

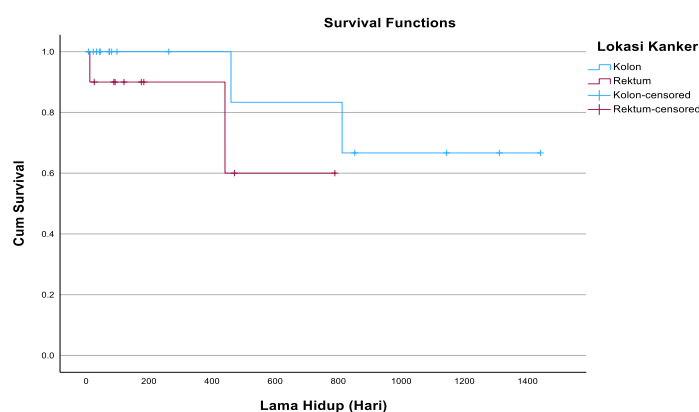


Figure 3. Test of the Relationship between Cancer Location and Colorectal Cancer Survival Rate

Figure 3 shows the Kaplan-Meier curve for colorectal cancer patients with colon cancer, which tends to have a longer survival rate than patients with rectal cancer. However, statistical analysis using the log-rank (Mantel-Cox) test yielded a *p-value* of 0.207 > 0.05, concluding that there was no statistically significant difference between *survival* and cancer location.

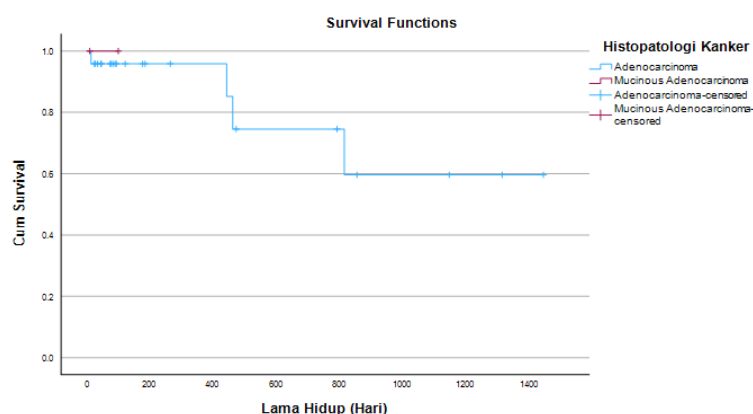


Figure 4. Test of the Relationship between Histopathology and Colorectal Cancer Survival Rate

In figure 4 above it shows The results of statistical analysis using the log-rank test (Mantel-Cox) produced a p -value of $0.838 > 0.05$, so it can be concluded that there is no statistically significant difference between *survival* and cancer histopathology.

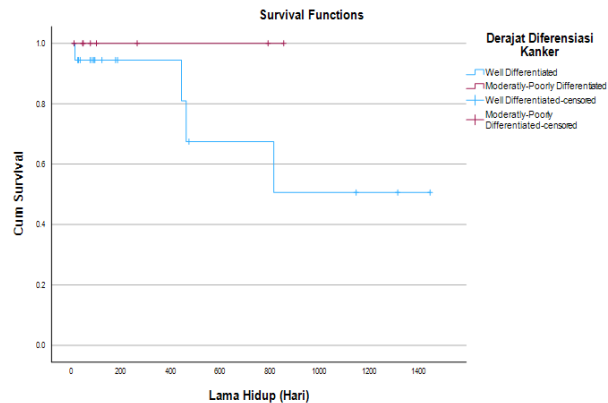


Figure 5. Test of the Relationship between Degree of Differentiation and Survival Rate of Colorectal Cancer

Figure 5 shows that although the *survival rate tendency* in well-differentiated is higher compared to moderate-poor differentiated and the results of statistical analysis using the log-rank test (Mantel-Cox) produce a p -value of $0.262 > 0.05$, it can be concluded that there is no statistically significant difference between *survival* and the degree of cancer differentiation.

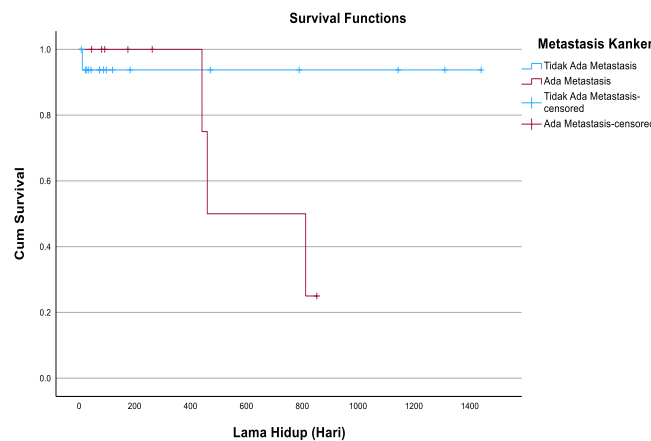


Figure 6 Test of the Relationship between Cancer Metastasis and Colorectal Cancer Survival Rate

In figure 6 shows that statistical analysis using the log-rank test (Mantel-Cox) produces a p -value of $0.145 > 0.05$, so it can be concluded that patients without metastasis have a tendency for a higher *survival rate compared to patients with metastasis*.

The results of the Kaplan-Meier analysis conducted based on age groups (<60 years and ≥ 60 years) with the log-rank test results showed a p -value of 0.86 , which indicates that this difference has no statistical significance. This finding is different from several previous studies, in which it was proven that individuals with advanced age have a greater risk of death compared to younger age groups (Labeda et al., 2022). The results of the log-rank test showed a p -value of 0.303 , which indicates that this difference has no statistical significance. This finding indicates that gender is an independent prognostic factor in the survival of colorectal cancer patients. Biologically, this difference may be influenced by hormonal, genetic, or lifestyle factors between men and women (Afify et al., 2024). Statistical analysis using the log-rank test (Mantel-Cox) produced a p -value of 0.207 , which indicates there is no significant

difference in survival rates based on cancer location. This finding is contrary to a study (Sanjaya et al., 2023) on colorectal cancer patients who underwent colonoscopy examinations showing that the most common location of cancer is in the rectum (72.4%). This location has an influence on the diet of cancer patients. Colorectal cancer is high in fat and low in fiber, thus delaying fecal transit. The results of statistical analysis using the log-rank test (Mantel-Cox) produced a p-value of 0.838, indicating no significant difference in survival rates based on histopathology. This finding differs from a study conducted at Dr. Sardjito Hospital with a total of 411 samples, which showed that the most common histopathological type affecting survival rates was grade III adenocarcinoma with a five-year *survival rate* of 45.5%, while grade I and II adenocarcinoma had a five-year survival rate of 71.4% and 59.5%, respectively (Putra et al., 2023). Meanwhile, the mucinous adenocarcinoma (MAC) type did not affect survival factors in colorectal cancer patients compared to the non-MAC group with a p- *value* of 0.002. This is due to the presence of metastases that spread to the lymph nodes (Huang et al., 2022). A study of patients receiving neoadjuvant chemotherapy showed that *histologic grade* significantly affected cancer-specific survival (CSS) and overall survival (OS) ($p < 0.001$) in patients with moderately differentiated colorectal cancer with prognostic factors are age, race, marital status, serum carcinoembryonic antigen (CEA) levels before treatment, primary tumor location, histological type, pT stage, pN stage, liver metastasis, and lung metastasis (Luo et al., 2023). metastasis but the difference is not statistically significant (p- *value* 0.145). This is in line with research by (Fitrianto et al., 2025) stating there is no relationship between colorectal cancer metastasis and survival rates performing appropriate therapeutic management to improve survival rates. The limitation of the study experienced by researchers is the lack of cancer stage data. If these variables are present and complete, it can improve statistical accuracy regarding the influence of clinicopathological characteristics on *the survival rate* of colorectal cancer patients.

Conclusion

Clinicopathological characteristics, such as age, gender, cancer location, histopathology, degree of differentiation, and metastasis in colorectal cancer patients at RSUD RT Notopuro Sidoarjo showed that the Kaplan Meier curve showed a tendency that cancer locations in the colon, which were well differentiated, and those without metastasis had a longer survival rate compared to cancer locations outside the colon, which were moderately-poorly differentiated, and those with metastasis, although the results of statistical analysis showed an insignificant relationship ($p\text{-value} > 0.05$).

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