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Comparison of mortality rates in solid vs hematological cancer patients post COVID-19 treatment at Dr. Soetomo General Hospital, Surabaya (2020–2021)

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Abstract: The COVID-19 pandemic significantly impacted cancer patients due to their immunocompromised status and comorbid conditions. However, comparative data on mortality outcomes between solid and hematological cancer patients post-COVID-19 treatment remains limited. This study aimed to analyze the mortality differences in these groups at Dr. Soetomo General Hospital, Surabaya, between 2020 and 2021. A retrospective cohort analysis was conducted using patient medical records. Inclusion criteria covered cancer patients confirmed with COVID-19 who underwent treatment and had complete mortality outcome data. Variables included cancer type, comorbidities, gender, and mortality. Statistical analysis involved chi-square tests and multivariate logistic regression. Among 237 patients, 78% had solid tumors, and 74.7% had comorbidities. No statistically significant difference in mortality was observed between cancer types ($p > 0.05$). However, comorbidities significantly influenced mortality risk ($p < 0.001$; RR = 25.08; 95% CI: 3.56–176.55). Comorbidities are a major determinant of mortality among cancer patients recovering from COVID-19, regardless of cancer type. Addressing comorbid conditions aggressively may reduce fatal outcomes in this vulnerable population.

Keywords: *Comorbidity, COVID-19, Hematological cancer, Mortality, Solid cancer.*

1. Introduction

The coronavirus disease 2019 (COVID-19), caused by the SARS-CoV-2 virus, has had a profound global impact, particularly on patients with comorbid conditions such as cancer [1]. Immunosuppression and systemic fragility render cancer patients more susceptible to severe complications and increased mortality from COVID-19. Previous coronaviruses, including SARS-CoV and MERS-CoV, also demonstrated elevated morbidity and mortality in vulnerable populations [2]. However, data directly comparing outcomes between solid and hematological cancer types post-COVID-19 treatment remain scarce.

In early studies, cancer patients constituted approximately 2.1% of confirmed COVID-19 cases, with mortality rates reaching 21.1% [3]. Hematological malignancies in particular have been linked with more severe disease progression and immune compromise. Nevertheless, the influence of cancer type—solid versus hematological—on mortality remains a subject of clinical inquiry [4-6].

Understanding which factors most contribute to poor outcomes in cancer patients following COVID-19 is essential for tailoring effective treatment and follow-up strategies. This study investigates mortality differences between solid and hematological cancer patients after COVID-19 treatment at Dr. Soetomo General Hospital in Surabaya during the 2020–2021 pandemic period.

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2. Methods

This study employed a retrospective cohort design conducted at Dr. Soetomo General Hospital, Surabaya, Indonesia. The timeframe included patients treated from March 2020 through December 2021.

The study population consisted of adult cancer patients who were diagnosed with COVID-19 and received inpatient treatment. Both solid and hematological cancer types were included. Patients with incomplete records or those undergoing concurrent clinical trials were excluded.

Data were extracted from electronic medical records. Variables included: cancer type, comorbidities, demographic data (age, gender), and mortality status. Descriptive statistics were used to summarize baseline characteristics. The chi-square test assessed associations between cancer type and mortality. Multivariate logistic regression identified predictors of mortality. Relative risk (RR) and 95% confidence intervals (CI) were calculated. A p-value < 0.05 was considered statistically significant.

This study was approved by the Institutional Ethics Committee of Dr. Soetomo General Hospital. All patient data were anonymized to ensure confidentiality.

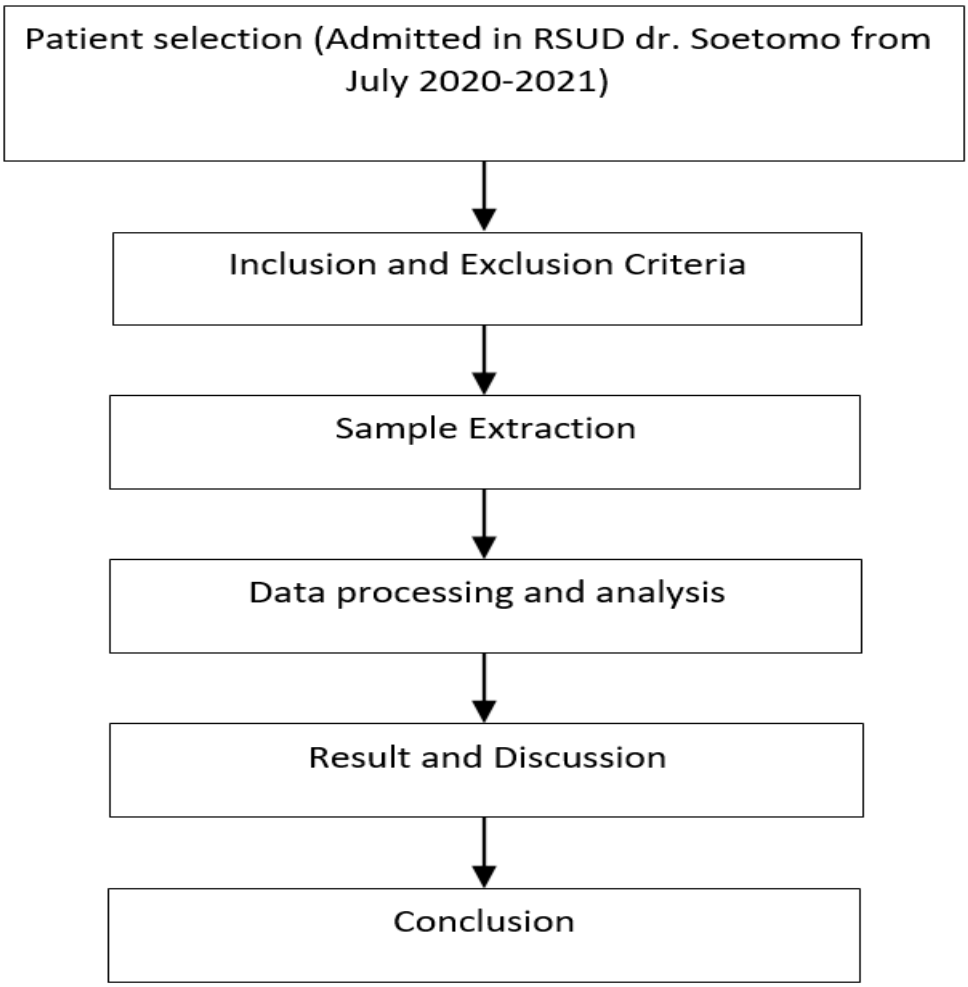

Figure 1.
Research Flow.

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3. Results

A total of 237 patients met the inclusion criteria. Among them, 185 (78%) had solid tumors, while 52 (22%) had hematological malignancies. The cohort had a slight male predominance, and the majority of patients presented with at least one comorbid condition (n = 177, 74.7%).

Table 1.
Subject Characteristic Distribution.

Variable	Total, n (%)
Solid Cancer	185 (78%)
Sex	
Male	79 (33.3%)
Female	106 (44.7%)
Comorbidities	
With comorbidities	139 (58.7%)
Without comorbidities	46 (19.3%)
Mortality	
Survived	123 (52%)
Deceased	62 (26%)
Hematologic Cancer	52 (22%)
Sex	
Male	20 (8.5%)
Female	32 (13.5%)
Comorbidities	
With comorbidities	38 (16%)
Without comorbidities	14 (6%)
Mortality	
Survived	39 (16%)
Deceased	13 (6%)

There was no statistically significant difference in mortality between solid and hematological cancer types ($p > 0.05$). However, bivariate analysis revealed a significant association between the presence of comorbidities and increased mortality ($p < 0.001$).

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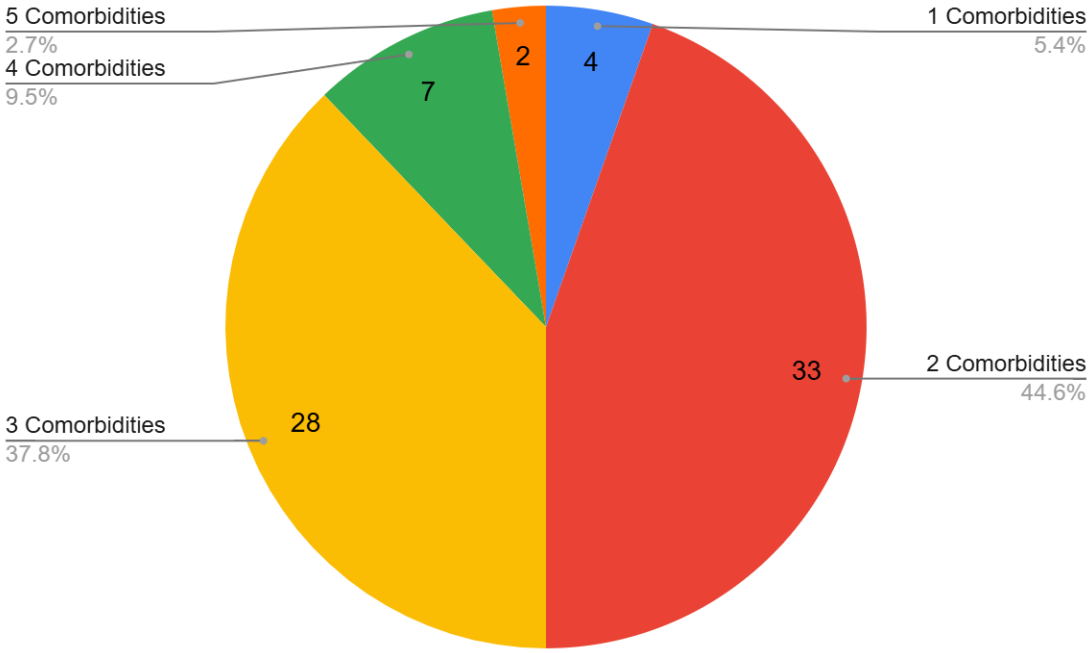

Figure 2.
Distribution pie chart of number of deceased patients based on comorbidities.

As shown in Figure 2., patients with two comorbidities had the highest mortality among the 177 patients with comorbid conditions (33 patients, 18.6%), followed by those with three comorbidities (28 patients, 15.8%). Mortality was also observed in patients with four comorbidities (7 patients, 4%), one comorbidity (4 patients, 2.3%), and all patients with five comorbidities (2 patients, 1.1%).

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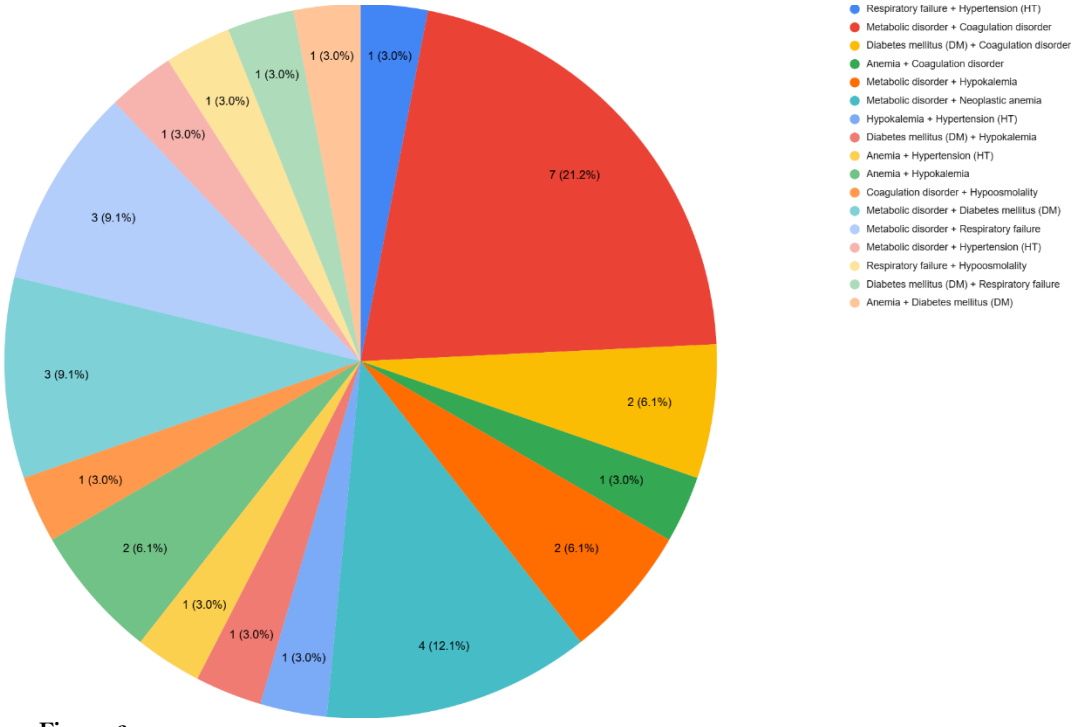

Figure 3.
Distribution pie chart of comorbidity combinations in the patient group with the highest mortality among those with two comorbidities.

Figure 3. shows that among the 33 patients with two comorbidities, the most frequent combination was metabolic disorder and coagulopathy (7 patients, 21.2%), followed by metabolic disorder with neoplastic anemia (4 patients, 12.1%). Metabolic disorder combined with either diabetes mellitus or acute respiratory failure was observed in 3 patients each (9.1%). Combinations of diabetes mellitus with coagulopathy and neoplastic anemia with hypokalemia were each found in 2 patients (6.1%), while the remaining combinations were observed in 1 patient each (3%).

Table 2.
Bivariate Analysis Results of Independent Variables.

Variable	**Mortality Rate**			
	Deceased n (%)	**Survived n (%)**	**Total (n)**	**p-value**
Male	32 (32.3%)	67 (67.7%)	99	0.849
Female	43 (31.2%)	95 (68.8%)	138	
Solid	62 (33.5%)	123 (66.5%)	185	0.244
Non-solid / Hematologic	13 (25.0%)	39 (75.0%)	52	
With Comorbidities	74 (41.8%)	103 (58.2%)	177	**0.000**
Without Comorbidities	1 (1.7%)	59 (98.3%)	60	
Total	75 (31.6%)	162 (68.4%)	237	

Comorbidities emerged as the strongest independent predictor of mortality post-COVID-19 treatment ($p < 0.001$; RR = 25.08; 95% CI: 3.56–176.55). Other variables, including cancer type and gender, did not reach statistical significance in the multivariate model.

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Table 3.
Relative Risk (RR) Values of Independent Variables.

Variable	Mortality Rate			Relative Risk (95% CI)
	Deceased n (%)	Survived n (%)	Total (n)	
Male	32 (32.3%)	67 (67.7%)	99	1.04 (95% CI: 0.71 – 1.51)
Female	43 (31.2%)	95 (68.8%)	138	0.96 (95% CI: 0.66 – 1.41)
Solid	62 (33.5%)	123 (66.5%)	185	1.34 (95% CI: 0.80 – 2.24)
Non-solid / Hematologic	13 (25.0%)	39 (75.0%)	52	0.75 (95% CI: 0.45 – 1.25)
With Comorbidities	74 (41.8%)	103 (58.2%)	177	25.08 (95% CI: 3.56 – 176.55)
Without Comorbidities	1 (1.7%)	59 (98.3%)	60	0.04 (95% CI: 0.01 – 0.28)
Total	75 (31.6%)	162 (68.4%)	237	

Table 4.
Relative Risk (RR) Values of Independent Variables.

	B	S.E.	Wald	df	Exp(B)	p-value
Constant	-5.325	1.355	15.447	1	0.005	**0**
Gender	0.254	0.306	0.688	1	1.289	0.407
Cancer Type	0.447	0.381	1.381	1	1.564	0.24
Comorbidities	3.802	1.023	13.821	1	44.783	**0**

4. Discussion

This study examined mortality outcomes in cancer patients following COVID-19 treatment and found that comorbidities, rather than cancer type, significantly influenced patient survival. Despite widespread assumptions that hematological malignancies would confer higher mortality due to more profound immunosuppression, our analysis showed no significant difference in mortality rates between solid and hematological cancers.

These findings align with previous research indicating that comorbidities such as cardiovascular disease, diabetes, and chronic respiratory conditions exacerbate COVID-19 outcomes [7-9]. Our results further emphasize that managing underlying conditions is critical in improving outcomes for cancer patients, regardless of tumor histology.

The significantly elevated risk associated with comorbidities (RR = 25.08) underscores the need for aggressive comorbidity management, even in the context of active cancer care. The absence of statistical significance between cancer types suggests that clinical decision-making should focus more on patient-specific risk factors rather than tumor classification alone.

Limitations of the study include its retrospective design, which may introduce bias due to incomplete data documentation. In addition, treatment modalities and timing for both cancer and COVID-19 were not analyzed, which could influence mortality. Nevertheless, the findings provide valuable insight into prioritizing supportive care and comorbidity screening in oncologic patients during infectious disease outbreaks such as COVID-19.

5. Conclusion

Comorbidities are the primary determinant of mortality among cancer patients following COVID-19 treatment, regardless of whether the malignancy is of solid or hematological origin. These findings highlight the importance of aggressive identification and management of comorbid conditions in cancer patients to reduce the risk of fatal outcomes in the context of infectious disease pandemics. Future research should explore prospective multicenter data and incorporate treatment variables to further refine mortality risk assessments.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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