

# Evaluation of Correlation Between Severity and Laboratory Data for COVID-19 Patients at Jakarta Private Hospital

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**Abstract:** As of June 29, 2022, the COVID-19 outbreak has caused around 6 million confirmed cases, with the deaths of around 156.000 patients in Indonesia. The purpose of this study was to clarify the correlation between severity and laboratory data for COVID-19 patients at Jakarta Private Hospital. A retrospective cohort study with convenience sampling was applied in this study. The study was conducted from March to June 2021. There were 980 patients, but only 320 patients were eligible for inclusions criteria. The gender of the majority of patients as the sample was male, 165 (52%) and 155 (48%) female patients. The results of this study showed that almost all non-ICU patients had moderate severity, totaling 261 (91%). Meanwhile, patients admitted to the ICU had a critical severity level of 32 (97%). In COVID-19 patients, severity correlated with ICU or non-ICU ( $P$ -value  $<0.05$ ). Laboratory data that show a correlation with the severity of COVID-19 infection are leukocytes ( $P=0.001$ ), platelets ( $P=0.006$ ), urea ( $P=0.003$ ), and creatinine ( $P=0.021$ ). The conclusion in this study shows that there is a significant correlation between laboratory data and the severity of COVID-19 patients ( $P$ -value  $<0.05$ ).

## 1 INTRODUCTION


In December 2019, an outbreak of an unknown pneumonia was reported. A virus called SARS-CoV2, which is characterized as a highly contagious and deadly disease, was discovered (Chen et al., 2020). SARS-CoV-2 is a new type of coronavirus that has never been identified in humans. At least two types of coronavirus are known to cause illnesses that can lead to severe symptoms, including Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) (Dirjen P2P Kemenkes R1, 2020) (WHO, 2020).

The COVID-19 outbreak has caused around 6 million confirmed cases, with the deaths of around 156,000 patients in Indonesia as of June 29, 2022 (Worldometers, 2022). According to the Minister of Health of the Republic of Indonesia, there are 4 categories of severity of COVID-19 patients: [1] asymptomatic, [2] moderate symptoms (patients with pneumonia symptoms and SpO<sub>2</sub> 93-95%), [3] severe symptoms (patients with pneumonia and SpO<sub>2</sub> $<93\%$ ), and [4] critical illness (patients with

ARDS, sepsis, and septic shock) (Michael & Ramatillah, 2022).

Some studies have shown that mild or asymptomatic COVID-19 has low levels of SARS-CoV, develops two specific antibodies, or cannot detect them at all levels. However, severely ill patients are at a higher level. This data raises questions with the protective ability of antibodies and the involvement of specific antibodies in the cause of COVID-19 (a new coronavirus infection) (Goudouris, 2021).

The consequences of SARS-CoV-2 infection with severe acute respiratory syndrome are very different, and it is clear that the majority of young people suffers from mild illness (Brodin, 2021). In patients with severe illness, men are overestimated, probably due to differences in evoked immune responses. Comorbidities such as obesity, hypertension, chronic obstructive pulmonary disease, and cardiovascular disease are all associated with severe COVID-19 infections (Brodin, 2021). SARS-CoV-2 copies at diagnosis were reported to be higher in patients with severe COVID-19 than in patients with mild COVID-

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19. Smoking is another risk factor. Cigarette smoke induces the expression of angiotensin-converting enzyme 2 (ACE2). This can allow SARS-CoV-2 to invade cells and affect viral entry beyond adverse effects on overall lung function (Brodin, 2021).

## 2 METHOD

This study used a retrospective cohort study with convenience sampling conducted from March to June 2021 on COVID-19 patients treated at the Jakarta Private Hospital.

### 2.1 Selection Criteria

#### 2.1.1 Inclusion Criteria

- Patients are >18 years old;
- Patients who have complete medical records;
- COVID-19 positive patients with and without comorbidities.

#### 2.1.2 Exclusion Criteria

- Patients with advanced cancer;
- SLE sufferers;
- Pregnant women;
- HIV/AIDS sufferers.

### 2.2 Ethical Approval

The research received approval from the ethical community by the Health Research Ethics Committee at the University of 17 August 1945 Jakarta, based on a certificate of ethical feasibility (*Ethical Clearance*).

### 2.3 Data Analysis

Before collecting data, the researcher first asked for ethical approval. The process of data collection and recording of medical record data for COVID-19 patients undergoing laboratory examinations. There were 980 patients but only 320 patients met the

inclusion criteria. The gender of the majority of patients in the sample were male 165 and 155 female patients. Then the data was analyzed descriptively with the Kruskal wallis method and Fisher's exact test using SPSS version 25 software. In this study the distribution was not normal or there was a significant correlation indicated by P-value<0.05 (error rate of 5%).

## 3 RESULT AND DISCUSSION

### 3.1 Correlation Between Severity with ICU / non-ICU of Covid-19 Patients

Almost all non-ICU patients had moderate severity, with 261 (91%) patients. Meanwhile, patients admitted to the ICU had a critical severity level of 32 (97%) patients. From table 1, it can be seen that there is a correlation between severity and patients admitted to ICU or non-ICU ( $p=0.001$ ).

Based on research by Hockova et al. Up to a quarter of hospitalized COVID-19 patients require intensive care unit (ICU) treatment, revealing epidemiological evidence that patients admitted to the intensive care unit are susceptible to the following illnesses: secondary pneumonia, heart injury, kidney injury, and neurological disorders (Hocková et al., 2021).

### 3.1 Correlation Between Severity with Laboratory Data of COVID-19 Patients

In Table 2, it can be seen that most of the leukocytes of COVID-19 patients had moderate severity in 262 (82%) patients. Leukocytes were found to be correlated to patient severity ( $p=0.001$ ). According to the guidelines for interpreting clinical data in Indonesia, the main functions of leukocytes are to fight infection, protect the body by attracting foreign organisms and produce or distribute antibodies. Leukocytes have a normal value of 3200-10,000/mm<sup>3</sup> (Kemenkes RI, 2011).

Table 1: Correlation Between Severity and ICU/non-ICU.

Factor	Severity				Total	Sig. (P-Value)*
	Mild n (%)	Moderate n (%)	Severe n (%)	Critical Illness n (%)		
Non ICU	16 (5.5)	261 (91)	10 (3.48)	0 (0)	287	0.000
ICU	0 (0)	1 (3.0)	0 (0)	32 (97)	33	
	16 (5.0)	262 (81.9)	10 (3.1)	32 (10)	320	

\*Fisher's Exact Test

Table 2: Correlation Severity and Laboratory data.

Factor	Severity				Total	Sig. ( <i>P-Value</i> )*
	Mild n (%)	Moderate n (%)	Severe n (%)	Critical illness n (%)		
ESR	16 (5)	262 (82)	10 (3)	32 (10)	320	0.870
Hb	16 (5)	262 (82)	10 (3)	32 (10)	320	0.952
RBC	16 (5)	262 (82)	10 (3)	32 (10)	320	0.601
WBC	16 (5)	262 (82)	10 (3)	32 (10)	320	0.001
Hematocrit	16 (5)	262 (82)	10 (3)	32 (10)	320	0.894
Platelets	16 (5)	261 (82)	10 (3)	32 (10)	319	0.006
MCV	16 (5)	262 (82)	10 (3)	32 (10)	320	0.782
MCH	16 (5)	262 (82)	10 (3)	32 (10)	320	0.914
MCHC	16 (5)	262 (82)	10 (3)	32 (10)	320	0.811
Kalium	13 (4.4)	245 (82.4)	10 (3.4)	29 (9.8)	297	0.052
Natrium	13 (4.4)	245 (82.4)	10 (3.4)	29 (9.8)	297	0.212
Chloride	13 (4.4)	245 (82.4)	10 (3.4)	29 (9.8)	297	0.079
Urea	2 (2)	68 (75.8)	4 (4.4)	16 (17.8)	90	0.003
Creatinine	15 (5.4)	219 (81)	9 (3.3)	28 (10.3)	271	0.021

\*Kruskal-Wallis Test

Platelets correlate with the severity of COVID-19 patients ( $p=0.006$ ) (table 2). According to the guidelines for interpreting clinical data in Indonesia, the normal value for platelets is 170-380. 103/mm<sup>3</sup> (Kemenkes RI, 2011). Research by Dawood et al., 2020, showed the occurrence of thrombocytosis in 6.26% of patients with a platelet count

>400,000/mm<sup>3</sup> and thrombocytopenia in 5.36% of patients with a platelet count <150,000/mm<sup>3</sup> in COVID-19 patients (Dawood et al., 2020).

Based on table 2, the highest creatinine in patients with moderate severity was about 219 (80.8%), so creatinine correlates with severity ( $p=0.021$ ). Based on the research of Cheng et al. (2020), 710 COVID-19 patients were reported to have a prevalence of 15.5% increase in serum creatinine (Fadillah et al., 2020)(Y. Cheng et al., 2020).

According to a study by Brian et al., creatinine clearance values are determined by measuring the concentration of endogenous creatinine (produced in the body) in plasma and urine. The reference range for men is generally in the range of 97-137 ml/min and for women, 88-128 ml/min (Vesselaldo & Ramatillah, 2022)(Nankivell, 2001). According to the guidelines for interpretation of clinical data in Indonesia, normal creatinine is 0.6-1.3 mg/dL (Kemenkes RI, 2011).

Based on table 2, urea correlated with severity ( $p=0.003$ ). According to the guidelines for interpreting clinical data in Indonesia, the normal urea value in adult women is 6-21 mg/dL and adult men, 8-24 mg/dL (Kemenkes RI, 2011). Blood urea

nitrogen (BUN) is the final nitrogen product of protein metabolism and has been observed to be associated with mortality from a variety of diseases (Cheng et al., 2020). BUN is a surrogate marker that predicts persistent organ failure after 48 hours of hospitalization, in addition to its role in assessing renal function (Cheng et al., 2020).

## 4 CONCLUSIONS

This study shows that there was a significant correlation between laboratory data from leukocytes, platelets, urea, and creatinine with the severity of COVID-19 patients ( $P$ -value <0.05).

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