

Laboratory Results and Clinical Characteristics of Probable Omicron Patients at Dr. Wahidin Sudirohusodo Hospital

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ABSTRACT

Since the Omicron variant was first detected on November 24, 2021, in Southern Africa, it has now been detected in more than 110 countries and is estimated to continue to spread. Given the rapid spread and serious dangers of COVID-19, it is urgent to continuously improve and expand research on its clinical diagnosis and treatment. The analysis of this study identifies the laboratory results and clinical characteristics of probable Omicron. This study aimed to determine the laboratory results and clinical characteristics of probable Omicron patients at Dr. Wahidin Sudirohusodo Hospital. This descriptive study used a cross-sectional approach with medical record data of probable Omicron patients at Dr. Wahidin Sudirohusodo Hospital from January to July 2022 with a total of 241 research subjects. The results of the analysis showed that probable Omicron patients at Dr. Wahidin Sudirohusodo Hospital who were hospitalized consisted of 124 (51.5%) males and 117 (48.5%) females, 66 (22.8%) subjects with age range >60 years, 88 (30.4%) subjects with age range of 40-60 years, 45 (15.6%) subjects with age range 19-40 years and 42 (14.5%) subjects with age <18. Most subjects, which consisted of 79 (27.3%) patients reside in Makassar. The mean WBC count, NLR value, LMR value, and CT value found in this study were 10.8; 5.6; 0.5; and 33.94, respectively. The Omicron variant infects more males than females mainly at the age of 40-60 years, with a relatively low average CT value of 33.94 and a slight increase of NLR, MLR, and WBC count.

Keywords: COVID-19, probable Omicron, characteristics

INTRODUCTION

Since the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) was first reported in Wuhan, China, on November 17, 2019, the world has witnessed various waves of pandemics worldwide.¹ The virus that causes COVID-19, SARS-CoV-2 continues to mutate to form new variants, and the latest detected is the Omicron variant known as B.1.1.529 variant. The variant first reported in South Africa on 24 November 2021 has now spread worldwide has been detected in more than 110 countries and is estimated to continue to spread.²⁻⁴ This variant has a higher number of mutations compared to the previous viral variants, thereby causing changes in transmissibility and disease severity.^{1,2}

One of the specific mutations of the Omicron variant found in His69-Val70del was a 69-70 amino acid deletion in the SARS-CoV-2 spike protein, which causes failure detection of the S gene target in real-time PCR test.^{1,5}

The symptoms that arise in the Omicron variant are different from the previous variants, especially

the Delta variant. The predominant symptoms of Omicron sufferers are runny nose, headaches, malaise (both mild and severe), sneezing, and sore throat. Contrastingly, several symptoms such as fever, cough, and loss of sense of smell and taste are commonly found in the previous (Alpha) variant.⁴

The gold standard in diagnosing COVID-19 is the molecular identification of SARS-CoV-2 with the Reverse Transcriptase-quantitative Polymerase Chain Reaction (RT-qPCR) method. S.-gene target failure (SGTF), which can be used as a screening method for Omicron variants is currently the fastest variant screening test to detect and prevent the expansion of new variants.^{6,7}

Various studies have proven that the inflammatory process that occurs in patients with viral pneumonia is closely related to the incidence of COVID-19. The inflammatory response in the body is highly correlated with the adaptive immune response, which results in an imbalance of the immune response. Therefore, the simplest circulating biomarker that can represent inflammation and immune status is a potential predictor of prognosis. Both leukocyte (WBC) count

and Neutrophil-Lymphocyte Ratio (NLR) are indicators of a systematic inflammatory response.^{8,9}

Table 2. Characteristics of research subjects based on routine blood tests and CT value

	Median	Min	Max	Mean	SD
WBC (10 ³ cells/uL)	8.80	0.40	83.90	10.30	7.40
Platelet (PLT)	248.00	6.00	911.00	286.31	143.03
Neutrophil (%)	66.30	5.70	96.00	65.40	16.30
Lymphocyte (%)	22.10	1.10	83.00	24.32	13.63
Monocyte (%)	6.30	0.40	66.90	12.96	20.02
NLR	3.04	0.15	77.25	5.28	7.73
MLR	0.30	0.03	4.85	0.48	0.65
CT value	37.00	16.01	39.48	33.94	5.82

The characteristics of research subjects in Table 1 show that the highest frequency of patients with probable Omicron was in the age group of 41-60 years (36.5%) and probable Omicron was higher in males compared to females, and most of them resided in Makassar (Table 1 and Figure 1).

The mean values of WBC, platelets, neutrophils, lymphocytes, and monocytes count are listed in Table 2.

Table 2 shows the NLR ratio of 5.28 ± 7.73 , MLR of 0.48 ± 0.65 , and a CT value of 33.94 ± 5.82 .

There were a total of 241 research subjects in this study, with a higher number of males compared to females and an age range between 41 and 60 years (36.5%). The high number of cases in this age group found in this study was in line with the process of decreasing cell function, which can increase the risk of infection in people with COVID-19 at an advanced age.¹⁰ Research by Hu *et al.* in China showed that probable Omicron was reported in 63.08% of the total 65 subjects and the highest number was found in the age of 21-30 years (35.38%).¹¹

Differences in the incidence of COVID-19 in males and females are related to differences in both responses to immune reactions or specific characteristics of the SARS-CoV-2 infection process. It is known that the TLR-7 encoded in the X chromosome plays a role as an innate immune modulator. Testosterone may also contribute to the suppression of the innate immune response, making men more susceptible to viral infections. Smoking habits can reduce circulating levels of immunoglobulins, immune cells, and proinflammatory cytokines, and impair antibody responses to antigens. Outdoor physical activity may also be one of the causes of the vulnerability of males to infection with the virus compared to females. Research on gender differences can provide important insights into the pathophysiology of COVID-19 and possibly help identify effective interventions.¹²

Neutrophils are the main component of leukocytes that actively migrate towards the immune system or organs. Neutrophils release large amounts of Reactive Oxygen Species (ROS), which induce damage to the cell's DNA and cause free viruses to leave the cell. Antibody-Dependent Cell-mediated Cytotoxicity (ADCC) can directly destroy and trigger humoral immunity. Neutrophils can be stimulated by virus-associated inflammatory factors, such as IL-6, IL-8, tumor necrosis factor, granulocyte colony-stimulating factor, and interferon-gamma factors, which are produced by lymphocytes and endothelial cells. In addition, the human immune response caused by viruses mainly depends on lymphocytes, whereas systemic inflammation significantly suppresses cellular immunity, which significantly reduces CD4⁺ T lymphocyte levels and increases CD8⁺ suppressor T lymphocytes. Virus-induced inflammation increases the NLR. An increase in the NLR triggers the progression of COVID-19.¹²

Leukocyte (WBC) count, NLR, and Monocyte-Lymphocyte Ratio (MLR) are indicators of a systematic inflammatory response. This study found a WBC count of 10.3, an increased NLR value of 5.28, and an MLR value of 0.48. These results were in line with a study by Bhandari *et al.* in India, which found a slight increase in NLR, MLR, and WBC count.¹³

According to available evidence, the average incubation period of the Omicron variant is shorter than that of the Delta variant. WHO also reported that the Omicron variant has a growth advantage with a duplication time of 2-3 days compared to the Delta variant, which provides evidence that the transmissibility of the Omicron variant is greater than the Delta variant. On the other hand, routine blood tests did not show a significant increase in Omicron cases in this study. This might be due to the high vaccination coverage across the population during the Omicron epidemic. Research conducted in China by Wang *et al.* showed an increased WBC count of

11.46×10^9 cells/L in COVID-19 patients, which indicated that WBC counts in COVID-19 patients generally did not increase. Contrastingly, the NLR value was 29.9, which indicated its significant increase Delta variant.^{11,13}

The CT value can be very informative in determining the viral load, although it cannot be used as an absolute scale. The CT value increases gradually in subjects who have recovered from this virus. According to other studies, a higher viral load can be associated with the transmissibility of a person and indicates the severity of the disease.¹¹

The mean CT value of 33.94 (16.01-39.48) in this study indicated that the Omicron variant did not significantly reduce CT values. This study was in line with a study conducted by Schrom *et al.* in San Francisco, which found an average CT level <40 in nasopharyngeal swabs of 75 Omicron patients.

The viral load of patients infected with the Omicron variant was statistically better with a mean CT value of 33.94 (16.01-39.48) compared to the Delta variant in a study conducted in China by Hu *et al.*, which showed that the mean CT value in COVID-19 patients with the Delta variant was 25.0 (12.0-35.0).¹¹

This study provides information about the characteristics of the dominant Omicron variant in males with mild inflammatory features. However, the limitation of this study is that the administration of vaccines to COVID-19 sufferers is unknown, which might affect the symptoms that appear. Further research is needed to obtain more evidence on characteristics of Omicron variant in future, including immune escape, transmission dynamics such as incubation period, the generation time, the serial interval, etc.

CONCLUSIONS AND SUGGESTIONS

Patients with Omicron infection did not show a significant increase in systemic inflammatory markers, except for NLR (5.28). In contrast to the previous variant, the increase in inflammatory markers is markedly increased in NLR (29.9). This indicates that the inflammation caused by the Omicron variant is lower than the Delta variant.

Further research is needed to obtain more evidence about the characteristics of the Omicron variant, including the status of immunity, the effectiveness of the vaccine, which might affect the inflammatory process, which leads to lower NLR

value in the Omicron variant, and transmission characteristics or incubation period.

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