

Representation of NLR (Neutrophil Lymphocyte Ratio) Value in Corona Virus (Covid-19) Patients by Age Group at Gatoel Mojokerto Hospital

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ABSTRACT

Currently the world is faced with the condition of the Corona virus 2019 (Covid-19) disease pandemic whose cases are still increasing over time and widespread around the world. The Covid-19 pandemic is still a health problem throughout the country, not least in Indonesia. Covid-19 is an acute respiratory disease caused by a new type of coronavirus infection or later named Severe acute respiratory syndrome 2 (SARS-CoV-2). The purpose of this study was to find out the difference in the results of neutrophil lymphocyte ratio (NLR) between Covid-19 patients with productive age and elderly age. In Covid-19 patients with elderly age had a high NLR value above ≥ 3.13 with a percentage of 83% while in Covid-19 patients of productive age also had a high NLR value above ≥ 3.13 by 75% but the value was still lower than in Covid-19 patients with elderly age. It could be concluded that Covid-19 patients with elderly age and productive age had differences in NLR values although the same had a high NLR value above ≥ 3.13 and based on the results of this study in Covid-19 patients with elderly age and productive age had low lymphocyte values or experience lymphopenia.

Keywords: Covid-19; elderly age; productive age; neutrophil lymphocyte ratio

INTRODUCTION

At the end of 2019 precisely in December, the world was shocked by incident that made many people restless, namely known as the corona virus (covid-19). The incident began in China, Wuhan. At first this virus was thought to be the result of exposure to the huanan seafood wholesale market which sells many species of live animals. The disease is rapidly spreading domestically to other parts of China. From December 18 to December 29, 2019, five patients were treated with Acute Respiratory Distress Syndrome (ARDS). From December 31, 2019 to January 3, 2020 this case increased rapidly, marked by the reported number of 44 cases ⁽¹⁾.

The death rate from the coronavirus in Indonesia is highest in Asia after China, 181 people died, the percentage of deaths 9.11%, the number of coronavirus cases 1,986 cases, cured 134 people. Until April 5, 2020 confirmed Covid-19 amounted to 2,273 people, cured 164 people and died 198 people. Considering the Covid-19 outbreak is a global problem in countries in the world including Indonesia ⁽²⁾.

The virus first carried out animal-to-human transmission at a wet market in China's Wuhan in December 2019 and eventually maintained human-to-human transmission. The way of human-to-human transmission has been identified as through droplets and direct or indirect contact through the touch of objects⁽³⁾. People most at risk of contracting this disease are people who are in close contact with COVID-19 patients including those who treat COVID-19 patients. Common signs and symptoms of covid-19 infection include symptoms of acute respiratory distress such as fever, cough, and shortness of breath. The average incubation period is 5 - 6 days with an incubation period of fever, cough, and shortness of breath. In severe cases, covid-19 can cause pneumonia, acute respiratory syndrome, kidney failure, and even death⁽¹⁾.

Hematology test is one of the supporting diagnostics test to assess the severity of the disease and predict the risk in COVID-19 patients ⁽⁴⁾. The researchers concluded that some of the significantly altered hematological parameters in COVID-19 patients were leukocyte levels, lymphocyte levels, neutrophil levels, as well as neutrophil-lymphocyte ratios. Currently NLR is a powerful new inflammatory marker for detecting inflammation. NLR is superior to the total number of leukocytes, the number of neutrophils, or the number of lymphocytes as inflammatory markers, as they are less affected by a number of physiological conditions, such as dehydration or physical activity. In addition, NLR testing has advantages over other inflammatory markers, such as CRP or interleukin, because it is easy to do and inexpensive. The ratio of neutrophils to lymphocytes can be calculated quickly from a routine complete blood test, so doctors can identify patients at high risk for COVID-19 at an early

stage. In COVID-19 infection, the number of leukocytes, lymphocytes, monocytes and platelets was lower than in the non-COVID 19 group. The ratio of neutrophils to lymphocytes was significantly higher in the COVID-19 group. An increase in NLR in COVID-19 patients is associated with the severity of the disease⁽⁵⁾.

The Neutrophil-Lymphocyte ratio used to assess the degree of inflammation in some diseases. In COVID-19 disease, NLR can be used as a predictor of disease severity in the early phases of the disease's course. In 61 COVID-19 patients in China, NLR was an independent risk factor for critical illness with half of patients aged ≥ 50 years old and $NLR \geq 3.13$ would be critically ill on care while only 9.1% of patients aged ≥ 50 and $NLR < 3.13$ would be critically ill during treatment. NLR and Absolute Lymphocyte Count are inexpensive, easy to obtain, and can predict the severity of inflammation in COVID-19 infection, so this test may be used for early detection of COVID-19 infection in health facilities with limited means⁽⁶⁾. This study aims to find out representation of NLR (Neutrophil Lymphocyte Ratio) value in coronavirus patients (covid-19) by age group at Gatoel Mojokerto Hospital.

METHODS

The study was descriptive, to know the representation of NLR (neutrophil lymphocyte ratio) values in COVID-19 patients at productive and elderly age at Gatoel Mojokerto Hospital. The study was conducted at the Gatoel Mojokerto Hospital Laboratory installation in April - June 2021. The population was the productive age and the elderly who conducted a complete blood test and viewed NLR (neutrophil lymphocyte ratio) values in COVID-19 patients at Gatoel Mojokerto Hospital. The sample was the productive age and the elderly tested positive for COVID-19 at Gatoel Mojokerto Hospital. The data was taken based on the results of tests in the Laboratory at Gatoel Mojokerto Hospital conducted for 1 month. The data collection technique used primary data, was conducting complete blood test activities and taking medical record data, data retrieval begins with the management of permits by hospital SOPs. Data in the form of sample test with SOP in the laboratory at Gatoel Mojokerto Hospital under the supervision of the laboratory team of Gatoel Mojokerto Hospital. The variable was NLR (neutrophil lymphocyte ratio) value in COVID-19 patients of productive and elderly age at Gatoel Mojokerto Hospital. Data Collection technique obtained from the laboratory based on data on the value of neutrophil lymphocyte ratio (NLR) in productive age and elderly at Gatoel Mojokerto Hospital. Data collection techniques conducted include place surveys, sending research licenses, conducting checks and collecting data. The data obtained by the test results are then tabulated in the form of a table.

RESULTS

The data collected during April-June 2021 in Corona virus (Covid-19) patients who conducted Complete Blood tests at Gatoel Hospital as many as 84 data, with the characteristics of respondents consisting of 44 patients of productive age (23 men & 21 women) and 40 elderly patients (21 men & 19 women) obtained the following data results:

Table 1. Mean and standard deviation in Covid-19 patients productive and elderly age in April - June 2021

| Age | Calculation results | | |
|----------------|---------------------|------|-------|
| Productive Age | Neutrophil | Mean | 68.45 |
| | | SD | 12.03 |
| | Lymphocyte | Mean | 24.2 |
| | | SD | 10.8 |
| | NLR Value | Mean | 17.76 |
| | | SD | 8.43 |
| Elderly Age | Neutrophil | Mean | 73.4 |
| | | SD | 10.5 |
| | Lymphocyte | Mean | 17.5 |
| | | SD | 7.5 |
| | NLR Value | Mean | 19.41 |
| | | SD | 8.9 |

NLR Value in Productive Age

Data was collected from complete blood test results and NLR values at Gatoel Mojokerto Hospital, then analyzed by percentage. Results are as follows:

Table 2. Test results in Covid-19 patients of productive age in April - June 2021

| Age | NLR value | Test result | | Percentage |
|----------------|-----------|-------------|-------------|------------|
| | | | n | |
| Productive Age | | <3,13 | 11 patients | 25 |
| | | ≥3,13 | 33 patients | 75 |
| | Total | | 44 patients | 100 |

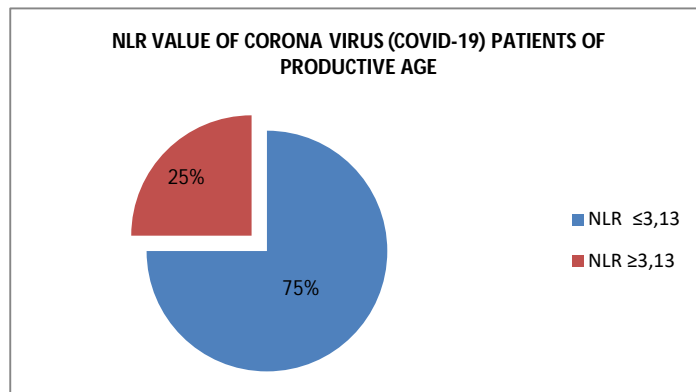


Figure 1. Percentage of NLR values in corona virus (Covid-19) patients productive age at Gatoel Hospital Mojokerto in April - June 2021.

Figure 1 shows the results of a complete blood count and NLR values for Covid-19 patients at the Gatoel Mojokerto Hospital. The red color indicates a normal value of 25% in 11 patients and the blue color indicates a high NLR value of 75% in 33 patients.

NLR Values in Elderly

Data was collected from complete blood test results and NLR values at Gatoel Mojokerto Hospital, then analyzed by percentage. Results are as follows:

Table 3. Test results in elderly age Covid-19 patients in April - June 2021

| Age | NLR value | Test result | | Percentage |
|-------------|-----------|-------------|-------------|------------|
| | | | Frequency | |
| Elderly age | | <3.13 | 7 patients | 17.5 |
| | | ≥3.13 | 33 patients | 82.5 |
| | Total | | 40 patients | 100 |

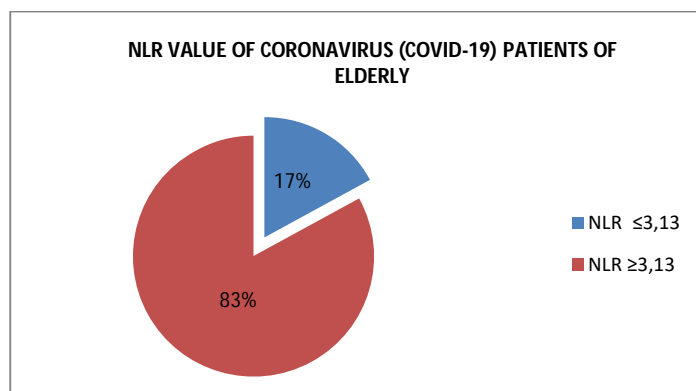


Figure 2. Percentage of NLR value research results in coronavirus patients (Covid-19) in elderly age at Gatoel Mojokerto Hospital in April - June 2021.

Figure 2 shows the results of a complete blood count and NLR values for Covid-19 patients at the Gatoel Mojokerto Hospital. The blue color indicates a normal value of 17% in 7 patients and the red color indicates a high NLR value of 83% in 33 patients.

DISCUSSION

Based on the data results of collected from LIS (Laboratory Information System) in coronavirus patients (Covid-19) at Gatoel Mojokerto Hospital in April to June 2021 to obtain the results of NLR values in routine blood tests with patients infected with coronavirus (COVID-19) with RT-PCR method obtained data as many as 84 respondents consisting of two groups are productive age and elderly age. The productive age is from 20-60 years while the elderly age is over 60 years old, then the data obtained is 44 respondents of productive age and 40 respondents of elderly age. The overall results obtained from the data are NLR values at productive age with high scores of 33 respondents and NLR values that are below the cut off limit of 11 respondents. While NLR values in the elderly with high scores there are as many as 33 respondents and NLR values that are below the cutoff limit as many as 7 respondents.

Neutrophil lymphocyte ratio (NLR) is one component of early warning score (EWS) or an early warning parameter that is useful as a marker of inflammatory reactions in a person's body and is an indicator of complications⁽⁷⁾. NLR values can be used as an increase in evaluation capacity to assess prognosis, evaluate the degree of disease based on clinical symptoms of patients, and determine the right treatment in Covid-19 patients and also as a cheap test parameter because it is only by calculating the value of neutrophil and lymphocyte levels in patients who perform complete blood tests⁽⁸⁾.

Based on the results of the study also found that the percentage of patients who experience lymphopenia in elderly Covid-19 patients is higher compared to productive age. An increase in NLR values in Covid-19 patients indicates a decrease in the number of lymphocytes as well as an inflammatory reaction caused by SARS-CoV-2 infection. The SARS-CoV-2 virus infects circulating immune cells and causes increased apoptosis or cell death and leads to decreased lymphocyte levels in the blood, especially in covid-19 patients who tend to develop lymphopenia and worsen inflammation⁽⁹⁾.

In this study, NLR scores were observed in the productive and elderly. Results obtained from the laboratory test NLR value in productive age increased by 75% while NLR value in the elderly age increased by 83%. Based on the results obtained in this study it is known that NLR values that are more than 3.13 (abnormal) in elderly Covid-19 patients are higher than those of Covid-19 patients of productive age even though Covid-19 patients of productive age NLR values are also high more than 3.13 with a percentage still above 50%.

While at the level of age grouping is more vulnerable at the age of the elderly than at the productive age is characterized by the productive age of the immune system is stronger than the elderly age. And also if in the elderly age has comorbid diseases allow also the rise of NLR values. In Covid-19 patients. In the elderly population, immunosenescence can occur both in hematopoietic stem cells and in the innate and adaptive immune system. The reduction and aging of the immune system accompanied by comorbidities will increase the susceptibility and fatality rate of COVID-19 in old age⁽⁵⁾.

Although NLR values in Covid-19 patients with elderly age are higher or exceed normal values compared to Covid-19 patients of productive age, clinical symptoms found in the field there is no significant difference in the form of symptoms commonly felt in Covid-19 patients, namely cough, fever, shortness of breath. however, the average length of hospital treatment time is longer in Covid-19 patients with comorbid (≥ 20 Days) compared to Covid-19 patients without comorbid (≤ 20 Days). In previous studies, high NLR value correlated with the amount of time needed for the recovery process of Covid-19 patients in the hospital there are several factors that affect the length of time patients are treated until it actually becomes negative SARS-CoV-2 virus, namely hospital treatment, hospital costs, and the severity of Covid-19 patients⁽¹⁰⁾.

CONCLUSION

Based on the results of research on Representation of NLR (Neutrophil Lymphocyte Ratio) values in coronavirus patients (covid-19) by age group at Gatoel Mojokerto Hospital with a total of 84 patients, namely 44 patients of productive age and 40 elderly patients during April-June 2021 it can be concluded that the elderly have a high NLR value above ≥ 3.13 with a percentage of 83% while in Covid-19 patients of productive age also have high NLR values above ≥ 3.13 is 75% but the value is still lower than in covid-19 patients with elderly age.

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