Neutrophil-Lymphocyte Ratio (Nlr) And Erythrocyte Sedimentation Rate (Esr) Correlation In Covid-19 Patients At Hermina Hospital Medan

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ARTICLE INFO	ABSTRACT
Keywords: Covid-19, Neutrophil-Lymphocyte Ratio (NLR), Erythrocyte Sedimentation Rate (ESR)	Background: WHO in February 2020 officially announced the name of the mysterious pneumonia as Coronavirus Disease (COVID-19). COVID-19 is caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) virus. The Corona virus can be transmitted from human to other humans and WHO on March 12 2020 finally declared COVID-19 a global pandemic. Laboratory tests are used to determine the degree of severity so that appropriate treatment will be carried out. Purpose: This study aims to determine the relationship between the Neutrophil-Lymphocyte Ratio (NLR) and Erythrocyte Sedimentation Rate (ESR) in COVID-19 patients at Hermina Hospital Medan Method: This research is an observational correlation analytic study with a cross-sectional approach conducted at Hermina Hospital Medan against 54 research samples. Results: From this study it is known that the majority of confirmed COVID-19 patients who came to Hermina Medan Hospital were in the age group of 41-50 years and were female. The NLR value in patients with confirmed COVID-19 with the lowest score was 1.4, the highest was 46.50, and the average was 12.91. The ESR value in patients with confirmed COVID-19 with the lowest score was 10, the highest was 92, and the median was 51.12. The results showed that there was a correlation between NLR and CRP values (p = <0.001) with a low correlation strength (r = 0.354) Conclusion: A correlation was found between NLR and ESR but with a low correlation strength, so it can be concluded that the use of ESR to replace ESR value as a biomarker in COVID-19 patients is less precise.

1. INTRODUCTION

In December 2019 a case of pneumonia of unknown cause appeared and was reported in Wuhan, Hubei Province, China with an unknown source of disease transmission. It is suspected that it came from bats sold at a fish market in the Wuhan area. The transmission of this disease increased rapidly from the period December 31 2019 to January 3 2020, as evidenced by the reported 44 cases suspected of being caused by this mysterious pneumonia. In a short period of time the disease has spread to various other countries such as Thailand, Japan and South Korea and almost all continents.[1]

WHO in 2020 officially announced the name for the mysterious pneumonia as Coronavirus Disease (COVID-19). COVID-19 is caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) virus. The Corona virus can be transmitted from human to other humans and WHO on March 12 2020 finally declared COVID-19 a global pandemic.[1]

COVID-19 is a disease with a fast course and worsening that can occur suddenly, this contributes to an increase in patient mortality. Patients who have a history of previous illnesses or

comorbidities such as diabetes mellitus, hypertension, dyslipidemia, thyroid disease, dementia, and pulmonary disease are associated with severe symptoms that appear in patients with COVID-19. 2 So it is very important to provide prompt assistance with early diagnosis and proper supervision. in COVID-19 patients.

Laboratory tests are used to determine the severity so that the right treatment will be carried out. Laboratory investigations that are often used to help the patient's condition include hematological examination, kidney function tests, blood gas analysis, hemostasis, lactate, procalcitonin and D-dimer levels.[1]A combination of laboratory tests is often used to determine the prognosis and degree of hyperinflammation in COVID-19 patients. The combination used is the Neutrophil-Lymphocyte Ratio (NLR), C-reactive Protein (CRP), and D-dimer. In several studies, the Erythrocyte Sedimentation Rate (ESR) was also included as a biomarker in COVID-19. However, there is still little data on ESR in COVID-19.

In many cases of COVID-19, an increase in the number of leukocytes and the neutrophil-lymphocyte ratio was found, as well as a decrease in the proportion of monocytes, eosinophils and basophils. These biomarkers can also be used to predict severity, treatment and prognosis in COVID-19 patients. 3

The results of these laboratory tests still need to be studied further because there are still many uncertain hypotheses about the NLR and ESR laboratory results used to assess the severity and prognosis of COVID-19 patients. So the authors feel the need to conduct research that aims to determine the correlation between the Neutrophil-Lymphocyte Ratio (NLR) and Erythrocyte Sedimentation Rate (ESR) in patients with COVID-19.
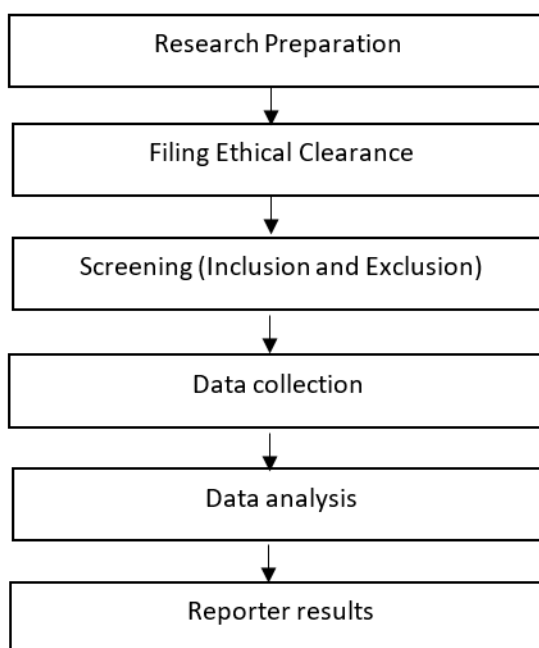
2. METHOD

Figure 1. **Research procedure**

Research variable

The independent variable in this study was the Neutrophil-Lymphocyte Ratio (NLR). The variable that was tied to this study was the Erythrocyte Sedimentation Rate (ESR).

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Load Concept

Figure 2.load Concept

Table 1. Operational Definition

Not	Variable	Operational definition	Scale	
1.	Neutrophil-Lymphocyte Ratio (NLR)	Comparison of neutrophil and lymphocyte values	numeric	**Data**
2.	Erythrocyte Sedimentation Rate (ESR)	the rate at which red blood cells settle in a test tube in mm/hour.	numeric	

analysis

The collected data will be collected and then analyzed using the statistical program SPSS (Statistical Product and Service Solutions). Descriptive data is presented in the frequency distribution table in the form of proportions. Prior to analysis, the Kolmogorov-Smirnov normality test was performed. Hypothesis test using Pearson correlation test. If data is obtained that is not normally distributed and is not homogeneous, then the data is analyzed using the Spearman test. Spearman's bivariate test was used between NLR and ESR.

3. RESULTS AND DISCUSSION

This research was conducted in the clinical pathology laboratory room, floor 1, Hermina General Hospital, which is located at Jalan Asrama, Sei Sikambing C. II, Kec. Medan Helvetia, Medan City, North Sumatra in September 2021. From data on 81 COVID-19 patients, 54 research samples were found that met the inclusion and exclusion criteria. The research sample was selected by means of non-probability sampling, namely the consecutive sampling technique. The table below is divided into 2 tables which describe the description of the age and sex of the research subjects.

Table 2. Characteristics of Research Subjects

Age	N	%
11-20	2	3.7
21–30	7	12.96
31–40	12	22.22
41–50	19	35.19
51–60	3	5.56
61–70	7	12.96
71 - 80	4	7.41
Gender	**N**	**%**
Man	25	46.23

Woman	29	53.77
Total	54	100

Description of NLR and ESR values

Table 3 shows a description of the NLR and ESR values obtained.

Table 3. Description of NLR and ESR values

Variable	Minimum	Maximum	Means	Standard Deviation
NLR	1.40	46.50	12.9156	11.61638
ESR	10.00	92.00	51.1296	22.75053

Based on table 4.2, it can be seen that the minimum NLR value in patients with confirmed COVID-19 at Hermina Medan Hospital is 1.40 and the maximum NLR score is 46.50. With a minimum ESR value of 10.00 and a maximum ESR value of 92.00.

Correlation of NLR and ESR

Table 4 shows the correlation of NLR and ESR values in 54 patients with confirmed COVID-19 at Hermina Hospital Medan.

Table 4. Correlation of NLR & ESR

		NLR	ESR
NLR	Pearson correlation	1	.354**
	Sig. (2-tails)		.009
	N	54	54
ESR	Pearson correlation	.354**	1
	Sig. (2-tails)	.009	
	N	54	54

**. Significant correlation at the level of 0.01 (2-tailed).

Based on the results of a bivariate analysis of the correlation between NLR values and ESR in patients who were confirmed to have COVID-19, it was found that there was a correlation between NLR values and CRP (p = <0.001) with a low correlation strength (r = 0.354)

Discussion

This research was conducted using secondary data from 54 research samples that met the criteria and exclusion criteria. This research aims to determine the correlation between NLR and ESR values in patients with confirmed COVID-19 at Hermina Medan Hospital in 2021. The characteristics of patients with confirmed COVID-19 in this study were assessed based on age and gender. Based on the age in this study, of the 54 confirmed COVID-19 patients at Hermina Medan Hospital, the majority were aged 41-50 years with a total of 19 people (35.59%). Based on gender, this study found 25 men (46.23%) and 29 men (53.77%) women who had confirmed COVID-19. A correlation was found between NLR and ESR but with a low correlation strength.

4. CONCLUSION

A study has been conducted on the correlation between NLR and ESR values in patients with confirmed COVID-19 at Hermina Medan Hospital with the conclusion that the majority of confirmed COVID-19 patients who come to Hermina Medan Hospital are in the age group of 41-50 years and are female. The NLR value in patients with confirmed COVID-19 with the lowest score was 1.4, the highest

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was 46.50, and the mean was 12.91. The ESR value in patients with confirmed COVID-19 with the lowest score was 10, the highest was 92, and the median was 51.12 The results showed a correlation between the NLR and CRP values (p = <0.001) with low correlation strength (r = 0.354) Based on the results In this research, there are several suggestions given as follows:

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