DYNAMIC PATTERNS OF MONOCYTE LYMPHOCYTE RATIO (MLR) IN PULMONARY TUBERCULOSIS PATIENTS DURING TREATMENT: INSIGHTS FROM JAMBI CITY HEALTH CENTER

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ABSTRACT

Background: Pulmonary Tuberculosis (TB) is an infectious disease caused by the Mycobacterium tuberculosis (M.tb) bacteria. The occurrence of infection is closely related to immune response. An increase in monocytes and lymphocytes is one of the active immune responses. An increase or decrease in the ratio of these two cells can describe the healing process of TB disease. This study was conducted with the aim to determine the decrease in the Ratio of Monocyte Lymphocyte Ratio (MLR) based on the length of treatment in patients with TB.

Method: This type of research is descriptive research with a cross sectional approach with a variable length of treatment. Cross sectional approach with variable length of treatment. This research was conducted in February-June 2023 with a total sample of 40 TB patients from several Puskesmas in Jambi City.

Results: From the research that has been done on TB patients, the average results are as follows The average MLR based on the length of treatment in the initial stage for ≤ 2 months is 0.55; the average MLR in the advanced stage for > 2 months is 0.36; the results of the MLR T test based on the length of treatment with a p-value = 0.36. T test results based on length of treatment with a p-value = 0.129 (p>0.05), there is no significant difference in MLR in patients with pulmonary TB.

Conclusion: Significant difference in MLR in patients with pulmonary TB based on length of treatment

Keywords: pulmonary tuberculosis; monocyte-lymphocyte ratio (rml); length of treatment

INTRODUCTION

Pulmonary Tuberculosis (TB) is a deadly infectious disease that is one of the leading causes of death worldwide. This disease is second only to Covid-19. WHO reports that the prevalence of people diagnosed with pulmonary tuberculosis in 2021 globally was 10.6 million cases, and was more prevalent among men (WHO, 2021).

Based on data from the Global TB Report 2021, there are an estimated 824,000 cases of pulmonary TB in Indonesia. This makes Indonesia ranked third highest after India and China (Ministry of Health, 2022). Jambi Province is one of the provinces with the number of pulmonary TB cases, namely 4,838 cases according to data from the Central Statistics Agency (BPS) in 2020 with a total of 11 cases. (BPS) in 2020 with a total of 11 districts (BPS, 2020). Jambi City Health Office Jambi City Health Office noted that in 2021 the number of Lung TB patients in Jambi City was 828 patients (Dinkes, 2021).

Pulmonary TB is a contagious infectious disease caused by Mycobacterium tuberculosis and is transmitted through airborne droplets. This bacterium can attack almost all organs of the human body, but mostly attacks the lungs (Wahdi & Puspitosari, 2021). Pulmonary TB treatment is carried out by administering Anti-Tuberculosis Drugs (OAT) consisting of several types of drugs for 6 months. The treatment process is carried out in 2 stages, namely the initial stage or 2 intensive stage must be given for 2 months and the advanced stage for 4 months. Treatment irregular treatment can result in bacterial resistance to drugs (Kemenkes, 2019).

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During pulmonary TB infection, the number of monocyte cells will increase and lymphocytes will decrease (Giyartika & Keman, 2020). The Monocyte Lymphocyte Ratio (MLR) canreflect the immune response to Pulmonary TB infection, because when infection occurs the value of MLR will increase. In the healing process, the number of monocytes will decrease, while lymphocyte cells increase, causing the ratio to return to normal (Wang et al., 2015). Treatment success can be seen by RML examination (Choudhary et al., 2019). MLR examination is performed to determine the etiology disease and treatment progress in patients with pulmonary tuberculosis (Putra, 2015).

Research conducted by Jeon et al (2019) shows that the average MLR in healthy people is 0,22 and in people with Lung TB the average MLR is of 0,55. This indicates an increase in the average MLR in patients with pulmonary TB and can be used as a predictor of prognosis. This is in line with research conducted by Choudhary et al (2019) which stated that during the 6 months of OAT treatment in childrenwith pulmonary TB, the average MLR decreased and was the same as the MLR of healthy children. There was a higher MLR among children with treatment failure.This suggests that the decrease in MLR occurs along with OAT treatment.

METHOD

This study used descriptive research methods with a cross-sectional approach. Data Monocyte Lymphocyte Ratio (MLR) is obtained from the results of the number of limphocytes. This study used a sample of 40 patients with pulmonary tuberculosis who received treatment at 5 Puskesmas in Jambi City (Puskesmas Putri Ayu, Pakuan Baru, Simpang Kawat, Simpang IV Sipin and Rawasari). Inclusion criteria are patients with pulmonary tuberculosis who have undergoing treatment for less than or equal to 2 months and more than 2 months. And exclusion criteria are patients with DR-TB (Drug Resistant), comorbid Diabetes Mellitus (DM), Covid-19 and HIV.

In this study using sampling with purposive sampling which is the selection of samples that refer to specific characteristics that have been determined in a population and in accordance with the inclusion and exclusion criteria. This research has obtained ethical approval from the Ethics Committee at the Jambi Ministry of Health Poltekkes.

RESULTS AND DISCUSSION

This study was conducted in February-June 2023 with the number of respondents 40 people with Pulmonary TB who live in the Jambi City area. The grouping of respondents based on the characteristics of the respondents sourced from the The interview sheet can be described as follows:

Table 1. Respondent Characteristics

Characteristics	Frequency	Percentage
Gender		
Man	21	52,5
Woman	19	47,5
Age		
18-65	33	82,5
>65	7	17.5
Length of treatment		
≤ 2 bulan	12	30
> 2 bulan	28	70
Total	N = 40	100

Table 1. It can be seen that the characteristics of male gender are slightly more (52.5%) than female respondents (47.5%). Based on age, the 18-65 years category was dominated (82.5%) compared to the age category of > 65 years (17.5%). Based on the length of treatment ≤ 2 months less (30%) compared to treatment duration > 2 months (70%).

Table2. Average Monocyte and Lymphocyte Cells Based on Length of Treatment in Patients with Pulmonary TB

Variable	n	Mean	Median	Min	Max
Monocyte Cells					
≤ 2 months	12	8,92	8,20	4,20	19,90
> 2 months	28	8,92	7,95	2,40	17,71
Lymphocyte Cells					
≤ 2 months	12	23,23	24,35	6,80	42,00
> 2 months	28	27,86	28,00	12,40	42,80

Based on Table 2. the average monocyte cells ≤ 2 months and > 2 months are equal to 8.92 with the lowest value of 2.40 in the treatment duration > 2 months and the highest 19.90 in the treatment duration ≤ 2 months. While the average lymphocyte cells > 2 months is 27.86 higher than ≤ 2 months which is 23.23 with the lowest value of 6.80 in the treatment duration ≤ 2 months and the highest 42.80 in the treatment duration > 2 months.

Table 3. Overview of MLR Based on Duration of Treatment in Patients with Pulmonary TB

MLR in Patients with Pulmonary TB(%)				
Variable	n	Mean	Std. Deviation	Std. Error Mean	P. Value
≤ 2 months	12	0,55	0,57	0,16	
> 2 months	28	0.23	0,23	0,04	0,129

Based on the table above, it can be seen that respondents who have a long duration of treatment ≤ 2 months has an average MLR of (0.55) which is higher and outside the normal range compared to the length of treatment > 2 months (0.36) which is in the normal range of average MLR. However, the results of the analysis with statistical tests (T test) obtained P-value = 0.129 > α (0.05), indicating that there is no significant difference in MLR in patients with pulmonary TB based on the length of treatment.

The results of research conducted on monocyte cells based on the length of treatment obtained the same average of 8.92 but the number of respondents is different. While lymphocyte cells based on the length of treatment have an average of > 2 months of 27.86 higher than ≤ 2 months of 23.23. The results of research conducted on the average MLR in patients with pulmonary TB based on the length of treatment obtained the average MLR in the initial phase for ≤ 2 months of 0.55 is outside the normal range of average MLR, while the continuation phase for > 2 months of 0.36 is in the normal range of average MLR, where the normal range of average MLR is 0.05-0.4. Based on the T-test conducted, there was no significant difference between MLR in patients with pulmonary TB based on the length of treatment with a P-value> 0.05.

Monocytes are the main cells in the formation of tubercles (Sihombing et al., 2015). When TB bacteria enter the body, monocyte cells become the first cells to fight by multiplying to phagocyte the TB bacteria. Meanwhile, lymphocyte cells have specific receptors to recognize foreign antigens and then eliminate them, so that normally there will be a decrease in lymphocytes due to the cleaning process (Ilham et al., 2020). This causes the average MLR to increase and be higher in the early stages, but along with the treatment or healing process the number of monocyte and lymphocyte cells will return to normal, making the average MLR also normal.

CONCLUSSION

The results of research conducted on the description of the Monocyte Lymphocyte Ratio (MLR) based on the length of treatment in patients with Pulmonary Tuberculosis (TB) at the Jambi City Health Center, can be concluded that the average MLR based on the length of treatment in the initial stage for ≤ 2 months w a s 0.55. 2. The average MLR based on length of treatment in the advanced stage for > 2 months was 0.36. 3. And there is no significant difference in MLR in patients with pulmonary TB based on length of treatment.

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CONFLICT OF INTEREST

The author affirms the absence of any conflict of interest.

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