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THE CORRELATION BETWEEN TREATMENT DURATION WITH PLATELET LYMPHOCYTE RATIO (PLR) AND MONOCYTE LYMPHOCYTE RATIO (MLR) IN PULMONARY TUBERCULOSIS PATIENTS IN JAMBI CITY

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ABSTRACT

Background: *Pulmonary tuberculosis (TB) is still a major health concern worldwide. The platelet-lymphocyte ratio and monocyte-lymphocyte ratio are simple blood-based markers of systemic inflammation that may track treatment response. This study examined whether a longer course of anti-TB therapy is linked to lower PLR and MLR values in patients from Jambi City.*
Methods: *A cross-sectional analysis involved 30 smear-positive pulmonary TB patients recruited from community health centres. Fifteen patients had received treatment for less than 2 months, and fifteen for more than 2 months. PLR and MLR were calculated from complete blood counts. Group differences were tested with the independent-samples t-test.*
Results: *The mean PLR was 142 in the < 2-month group and 137 in the > 2-month group. Mean MLR values were 0.36 and 0.34, respectively. Although both markers trended downward with longer therapy, neither difference reached statistical significance (PLR p = 0.42; MLR p = 0.48)*
Conclusion: *In this study, PLR and MLR did not differ significantly between early-phase and later-phase treatment groups, suggesting that these ratios may not be sufficiently sensitive to short-term changes during anti-TB therapy. Larger longitudinal studies are needed to clarify their utility as inflammatory biomarkers in pulmonary TB management.*

Keywords: *pulmonary tuberculosis; platelet lymphocyte ratio; monocyte lymphocyte ratio; treatment duration; inflammatory biomarkers*

INTRODUCTION

Pulmonary Tuberculosis (TB) remains a major global health threat, caused by Mycobacterium tuberculosis (MTB), an airborne pathogen that primarily infects the lungs but can also affect extrapulmonary sites such as lymph nodes, the brain, spine, skin, and heart. TB is one of the leading causes of death from infectious diseases worldwide, responsible for an estimated 1.25 million deaths annually (WHO, 2024). In 2023, approximately 10.8 million new TB cases were reported globally, with a significant burden concentrated in countries like India, Indonesia, and China. Indonesia ranks second worldwide, recording around 1,060,000 cases and approximately 134,000 deaths each year (Kemenkes RI, 2024). Despite the availability of effective treatments, the management of TB remains challenging due to factors such as delayed diagnosis, treatment non-adherence, and the emergence of drug-resistant strains.

The novelty of this study lies in its investigation of the relationship between the duration of tuberculosis treatment and changes in Platelet-to-Lymphocyte Ratio (PLR) and Monocyte-to-Lymphocyte Ratio (MLR) in pulmonary TB patients. While PLR and MLR have been previously studied as inflammatory markers, there is limited research specifically examining their dynamic changes throughout the treatment period, particularly within the Indonesian population.

Furthermore, studies focusing on regional data, such as that from Jambi City,

Indonesia, are scarce. This study offers a localized perspective and aims to contribute new insights into the use of PLR and MLR as practical, affordable, and accessible monitoring tools in the clinical management of pulmonary TB.

Previous research has supported the prognostic value of inflammatory markers such as PLR and MLR in TB management. Wicaksono (2018) demonstrated that elevated PLR and MLR values at diagnosis were linked to worse clinical outcomes and higher risks of treatment failure. Similarly, Abakay et al. (2015) reported that pulmonary TB patients had significantly higher PLR levels compared to healthy controls.

Studies by Rees et al. (2020) and Adane et al. (2022) have further emphasized that a normalization of PLR and MLR during treatment is indicative of successful therapy. These findings suggest that tracking these biomarkers could provide valuable insights into disease progression and treatment efficacy.

This study hypothesizes that the duration of anti-tuberculosis therapy is significantly correlated with reductions in PLR and MLR values in pulmonary TB patients. Specifically, it is expected that prolonged treatment duration will be associated with lower PLR and MLR values, reflecting a reduction in systemic inflammation and clinical improvement.

METHODS

This study was an observational analytic study using a cross-sectional approach, conducted at several community health centers in Jambi City from January 2025 – March 2025. The sample consisted of 30 pulmonary tuberculosis patients selected by purposive sampling. The patients were divided into two groups based on treatment duration, 15 for undergoing treatment < 2 months and 15 patients treated for > 2 months. PLR and MLR were measured using the Hematology Analyzer The treatment duration data were obtained from the patients' medical records.

RESULTS AND DISCUSSION

This study aims to determine whether there is a correlation between the duration of TB treatment and the levels of PLR and MLR in patients, with the hope that these biomarkers can serve as practical tools to monitor treatment progress.

3.1 Relationship between treatment duration and PLR

The mean PLR value in patients with ≤2 months of treatment was 142, while those with >2 months of treatment had a mean PLR of 137. Overall, there was a slight decrease in PLR values among patients undergoing longer treatment; however, this difference was not statistically significant (p = 0.429) (Table 3.1).

This finding aligns with previous studies suggesting that although PLR can serve as an inflammatory marker, short-term changes in PLR during TB treatment are not always statistically significant (Chen et al., 2016). A study by Wicaksono (2018) stated that changes in PLR are more noticeable in patients with active TB compared to those in the recovery stage.

This indicates that although there was a slight decrease in PLR values, treatment for more than 2 months did not result in a meaningful difference in inflammatory response.

Table 1. Relationship between treatment duration and PLR

Variabel	n	*Platelet Lymphocyte Ratio* (PLR)				
		Mean	Median	Range	SD	P value
≤ 2 Months	15	142	137	41-216	44,526	0,429
>2 Months	15	137	139	47-218	53,984	

3.2 Relationship between treatment duration and MLR

The results of this study shows that the mean MLR value for patients with ≤2 months of treatment was 0.36, while it was 0.34 for patients with >2 months of treatment. However, this difference was also not statistically

significant (p = 0.867) (Table 3.2). According to Savira et al. (2024), a higher MLR value may indicate greater inflammatory activity, especially during the early phase of TB infection. Nevertheless, with effective therapy, MLR values generally decrease. In this study, although a slight reduction in MLR was observed after more than 2 months of treatment, the change was not substantial enough to be considered significant.

Table 2. Relationship between treatment duration and MLR

Variabel	n	*Monocyte Lymphocyte Ratio* (MLR) Mean	Median	Range	SD	P value
≤ 2 Months	15	0,36	0,28	0,23-0,90	0,221	0,867
>2 Months	15	0,34	0,27	0,27-1,25	0,272	

CONCLUSION

This study revealed no significant difference in PLR and MLR levels between patients with <2 months of treatment and those with > 2 months of treatment. While slight changes were noted, they were not statistically significant. Additional longitudinal studies are recommended to track changes in these parameters throughout extended treatment periods more accurately. Further research could also investigate the impact of TB drug resistance (TB RO) on these biomarkers.

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CONFLICT OF INTEREST

All authors declared that there was no conflict of interest.

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