MUKHTABAR
JOURNAL OF MEDICAL
LABORATORY TECHNOLOGY

Overview of Lymphocyte Count Examination in Patients with Advanced-Phase Lung Tuberculosis at Ciamis Regional General Hospital

Euis Tia Istianah[1*], Selvira Rahma Firdaus[1], Endang Octaviana Wilujeng[2]

[1] Medical Laboratory Technology Department, STIKes Muhammadiyah Ciamis, West Java, Indonesia
[2] Clinical Pathology Laboratory of RSUD Ciamis, West Java, Indonesia

* Corresponding author: euistiaistianah@stikesmucis.ac.id

ABSTRACT

Background & Objectives: Pulmonary tuberculosis is a contagious infectious disease caused by *Mycobacterium tuberculosis*. This infection can be cured through two phases of treatment, namely the intensive phase and the continuation phase. The intensive phase is carried out for two months, while the continuation phase is carried out for four months. Tuberculosis treatment is carried out by administering Anti-Tuberculosis Drugs (OAT) consisting of Rifampicin, Ethambutol, Isoniazid, and Pyrazinamide. To monitor the success of treatment and the healing process of tuberculosis, a hematology examination can be done, namely a lymphocyte cell count. In a body infected with bacteria, lymphocyte cells will decrease. After treatment is given, lymphocyte cells will increase or return to normal. The purpose of this study was to see the description of the results of the examination of lymphocyte counts in patients with advanced phase pulmonary tuberculosis.
Method: This research method is descriptive which was conducted on patients with advanced phase pulmonary tuberculosis at the Ciamis Regional General Hospital in May 2024 with a sample size of 30 respondents. The study used secondary data and primary data which were processed into tables and then explained in narrative. The research was conducted using a hematology analyzer. The research was conducted in May 2024 at the hematology laboratory of the Ciamis Regional General Hospital.
Results: From this study obtained the results of 2 (7%) samples with lymphopenia results, as many as 25 (83%) samples with normal lymphocyte results and 3 (10%) samples with lymphocytosis results.
Conclusion: The results of the lymphocyte count examination in patients with advanced phase pulmonary tuberculosis found an average normal lymphocyte count.

Keywords: Infection; *Mycobacterium tuberculosis*; Tuberculosis

INTRODUCTION

The incidence of tuberculosis in Indonesia was recorded at 12.9% cases per 10,000 population (Indonesian Health Service, 2021). In Ciamis Regency in 2023, 8.4% of cases per 1,000 population were suspected of tuberculosis, and 1.2% were undergoing treatment. The target success rate was 70% (Ciamis Regency Health Office, 2023). Tuberculosis cases recorded in RSUD Ciamis in 2023 amounted to 3,437 cases. The target success rate at RSUD Ciamis in 2022 was 93% (RSUD Ciamis, 2023).

Pulmonary tuberculosis is a chronic infection that occurs in the lungs due to pathogenic microorganisms, namely *Mycobacterium tuberculosis*. This infection can be transmitted through saliva droplets (droplets) when people with TB cough or sneeze, so that the bacteria are carried in the air and inhaled into the lungs (Sia & Rengarajan, 2019). The immune system will respond by performing an inflammatory reaction. Lymphocyte cells are an immune response that will activate macrophages to destroy bacteria (Mar'iyah & Zulkarnain, 2021).

Medical Laboratory Technologists (ATLMs) play a role in diagnosing tuberculosis by performing sputum examination, Ziehl Neelsen staining, histology examination, electrolyte examination, lung function tests and blood tests (Supriatun & Insani, 2020). In addition, ATLM has a role in seeing the progress of tuberculosis treatment, one of which is by counting the number of lymphocyte cells.

According to the Ministry of Health of the Republic of Indonesia, TB case management in Indonesia is carried out by TB cadres drawn from community health centers or health offices. Tuberculosis cadres act as Drug Monitoring Officers (PMOs) who must monitor patients to take drugs regularly, provide counseling to patients' families, and remind patients to check sputum regularly (Muflihah et al., 2022).

Surah Yunus verse 57 explains "O man! Indeed, there has come to you a lesson (the Qur'an) from your Lord, a cure for the diseases (that are) in the chest and guidance and mercy for those who believe." (Q.S Yunus Ayat: 57). Everyone who experiences pain must have a way to recover depending on how to handle the disease so that it can heal with the permission of Allah SWT. The verse explains that Allah SWT has sent down a cure for every disease in the chest. As in tuberculosis disease, there are anti-tuberculosis drugs (OAT) that can help cure. Therefore, if you want to see the effectiveness of OAT treatment in tuberculosis patients, it can be done by checking the number of lymphocytes (Syakir, 2013).

Research on the description of lymphocytes in patients with pulmonary tuberculosis in the intensive phase was previously conducted by Christina Sitanggang in 2020 at the Poasia Andounohu Health Center in Kendari City. The study concluded that of the 20 samples examined, the results were obtained with a predominance of normal lymphocytes (Sitanggang, 2020). The difference in this study is in the phase of treatment of tuberculosis patients, the previous study was conducted on patients with pulmonary tuberculosis in the intensive phase, while this study was conducted on patients with pulmonary tuberculosis in the advanced phase.

OBJECTIVE

To know the description of the number of lymphocyte cells in patients with advanced phase pulmonary tuberculosis at Ciamis Regional Hospital.

METHODS

This study is a descriptive study to see the description of the number of lymphocytes from pulmonary tuberculosis patients undergoing advanced phase treatment at Ciamis Regional Hospital in 2024. This study involved all pulmonary tuberculosis patients at RSUD Ciamis as a population of 91 patients undergoing treatment in January-February 2024. The technique used in determining the research sample was incidental sampling, with a total sample size of 30. This study uses two types of data, namely primary data and secondary data. The instrument used was a Hematology Analyzer. The research was conducted in May 2024 at the Hematology Laboratory of the Ciamis Regional Hospital.

RESULTS

Respondents in the study were patients with pulmonary tuberculosis who were receiving advanced phase treatment at Ciamis Hospital in 2024.

TABLE 1. Characteristics of Respondents

Variable	N	(%)
Gender		
Male	19	63
Female	11	37
Age		
20 - 40 Years	15	50
>40 Years	15	50
Duration of Treatment		
3 Months	8	27
4 Months	9	30
5 Months	8	27
6 Months	5	16

The lymphocyte count examination was performed using an automated method using a hematology analyzer. Before specimen examination, control materials with controlled results were examined.

TABLE 2. Research Results

Lymphocyte Count Result	N	%
Lymphopenia	2	7
Normal	25	83
Lymphocytosis	3	10
Total	**30**	**100**

DISCUSSION

Lymphocyte count examination is a hematological examination that aims to detect the presence of infection. The examination is carried out through several stages, namely taking blood specimens, checking control materials, examining specimens, and processing results. Control

material examination is carried out using three levels, namely low, high, and normal, to prevent errors in the examination results. The results of the control material examination every day show in-control results.

Based on Table 2, the results of the number of lymphocytes in patients with advanced phase pulmonary tuberculosis were 7%, showing the results of lymphopenia. Lymphopenia is a condition where the number of lymphocyte cells is less than 20%, because the normal value of lymphocytes is 20-40%. Lymphopenia can occur due to an active bacterial infection in the body. Active pulmonary tuberculosis infection can cause lymphocyte cells to decrease as a result of decreased CD4 cells and the dominance of neutrophilia (Tiara et al., 2016). The decreased number of lymphocyte cells can also be caused by the movement of lymphocyte cells from the blood to the infected body area in the lung, so that the number of lymphocyte cells in the blood is small. This indicates an active disease process (Nilapsari et al., 2014).

Lymphocytosis is a condition where the number of lymphocyte cells in the blood is more than 40%. In this study, 10% of pulmonary tuberculosis patients with lymphocytosis. Lymphocytosis is a normal immune response condition in the blood when infected with pulmonary TB. Increased lymphocytes indicate that the healing process of pulmonary tuberculosis is ongoing. *Mycobacterium tuberculosis* will stimulate T lymphocyte cells to increase macrophage aggregation. Lymphocytosis can also be caused by bacterial reinfection and chronic tuberculosis (Nabilah, 2020).

Based on Table 2, the number of normal lymphocytes was 83%. This happens because of the patient's compliance in undergoing treatment and taking OAT. Treatment of pulmonary tuberculosis with OAT can reduce the number of lymphocytes that previously increased due to active infection. After undergoing advanced phase treatment, normal lymphocyte results were obtained. In the advanced phase, only two types of OAT are given, namely Isoniazid and Rifampicin, which are given for 4 months or more, depending on the patient's compliance (Diantari & Andini, 2022).

Pulmonary tuberculosis is an infectious disease that can cause hematologic abnormalities in both hematopoietic cells. These abnormalities can indicate complications such as anemia, hyponatremia, leukocytosis, lymphocytosis, neutrophilia, abnormal liver function, hypocalcemia, increased hematocrit, and OAT complications. Isoniazid has side effects on hematology, including agranulocytosis, thrombocytopenia, methemoglobinemia, aplastic anemia, hemolytic anemia, and eosinophilia. Meanwhile, Rifampicin can cause hematological side effects, namely thrombocytopenia, leukopenia, hemolysis, anemia, hemoglobinuria, hematuria, and eosinophilia (Karwiti et al., 2021).

This study was conducted on tuberculosis patients with a length of treatment between 3-6 months (continuation phase). Lymphopenia occurred in some patients with a treatment duration of 3 months, while normal and lymphocytosis occurred in patients with a treatment duration of 4-6 months. Pulmonary TB can cause hematologic abnormalities, namely lymphopenia, which is caused by side effects of OAT treatment. Lymphopenia indicates an active infection, while lymphocytosis indicates the healing process of the infection. So, the longer the treatment is given, will cause lymphocyte cells to normalize or increase (Aprilia et al., 2023).

CONCLUSION

It can be concluded that the average result of the lymphocyte count examination in patients with advanced phase pulmonary tuberculosis is normal.

ACKNOWLEDGMENT

Thanks to all those who have supported this research so that this research can be carried out properly.

CONFLICT OF INTEREST

There is no conflict of interest in preparing this research and article.

REFERENCES

1. Aprilia, A., Hidriya, H. (2023). Gambaran Jumlah Limfosit Pada Penderita Tuberkulosis Paru Yang Mendapat Terapi Obat Anti Tuberkulosis (Oat) Di Puskesmas Pekauman Kota Banjarmasin. *Jurnal Elektronik Mahasiswa Polanka*, *1*(1), 1–8. http://jurnal.polanka.ac.id/index.php/JMP

2. Diantari, N. M., & Andini, A. S. (2022). Leukosit Pada Penderita Tb Paru Dalam Masa Pengobatan. *Lombok Journal of Science*, *4*(2), 6–13.

3. Dinas Kesehatan Kabupaten Ciamis. (2023). Profil Kesehatan Kabupaten Ciamis. *Profil Kesehatan Kabupaten Ciamis*, 1–162.

4. Dinas Kesehatan RI. (2021). Profil Kesehatan Indonesia Tahun 2020. In *Dinas Kesehatan Republik Indonesia*.

5. Karwiti, W., Lestari, W. S., . N., & Rezekiyah, S. (2021). Perbedaan Profil Hematologi Pada Penderita Tuberkulosis Paru Yang Menjalani Pengobatan. *Jambura Journal of Health Sciences and Research*, *3*(1), 126–132. https://doi.org/10.35971/jjhsr.v3i1.8350

6. Mar'iyah, K., & Zulkarnain. (2021). Patofisiologi penyakit infeksi tuberkulosis. *In Prosiding Seminar Nasional Biologi*, *7*(1), 88–92. https://doi.org/10.24252/psb.v7i1.23169

7. Muflihah, A. I., Martha, E., Agustian, M. D., Masria, S., Ismawati, Nurjana, M. A., *et al.* (2022). Penanggulangan Tuberkulosis Pada Masa Pandemi Di Kelurahan Kwitang Dengan Peningkatan Kemampuan Kader. *Media Penelitian Dan Pengembangan Kesehatan*, *2*(1), 1–6. https://doi.org/10.24853/jpmt.3.2.77-82

8. Nabilah, R. (2020). Hubungan Kadar Limfosit Dan Monosit Dengan Tingkat Keparahan Pada Pasien Tuberkulosis Ekstra Paru. *Jurnal Ilmu Kedokteran Dan Kesehatan*, *7*(3), 514–519. https://doi.org/10.33024/jikk.v7i3.2960

9. Nilapsari, R., Sahal, Y. P., & Afghani, A. (2014). Hubungan Jumlah Sel Limfosit dengan Usia dan Status Nutrisi pada Penderita Tuberkulosis. In *Global Medical and Health Communication* (Vol. 2, pp. 73–78). https://doi.org/10.29313/gmhc.v2i2.1534

10. RSUD Ciamis. (2023). Angka Kejadian Tuberkulosis dan Angka Sucsess Rate Tuberkulosis Di Rumah Sakit Umum Daerah Ciamis Tahun 2023.

11. Sia, J. K., & Rengarajan, J. (2019). Immunology of Mycobacterium tuberculosis infections. *Microbiology Spectrum*, *7*(4), 1056–1086. https://doi.org/10.1128/9781683670131.ch64

12. Sitanggang, C. (2020). Pemeriksaan Jumlah Sel Limfosit pada Penderita Tuberkulosis Paru. *Karya Tulis Ilmiah, Poltekkes Kemenkes Medan*.

13. Supriatun, E., Insani, U. (2022). Pencegahan Tuberkulosis. Kediri : Lembaga Chakra Brahmana Lentera.

14. Syakir, A. M. (2013). Musnad Imam Ahmad Jilid 2. Jakarta Selatan : *Penerbit Buku Islam Rahmatan*, 867–870.

15. Tiara, D., Tiho, M., & Mewo, Y. M. (2016). Gambaran kadar limfosit pada pekerja bangunan. *Jurnal E-Biomedik*, *4*(2), 2–5. https://doi.org/10.35790/ebm.4.2.2016.14620