ORIGINAL RESEARCH

# OVERVIEW OF LEUKOCYTE COUNTS IN PULMONARY TUBERCULOSIS PATIENTS HOSPITALIZED RSU BUNDA THAMRIN

**Maniur A Siahaan[1*], Winda Irawati Zebua[1], Apriska Dewi Sipayung[1]**

*[1]Faculty of Vocational Education, Diploma Three Medical Laboratory Technology Study Program, Universitas Sari Mutiara Indonesia*
*Jln. Kapten Muslim No.79, Medan, Sumatera Utara, 20123, Indonesia*

**Article Info**

Article History:
Received: 25 Oct 2024
Revised: 15 Nov 2024
Accepted: 21 Nov 2024
Published: 23 Des 2024

**Keyword: Tuberculosis; Leukocyte; Autohematology analyzer**

**Corresponding Author**:
**Maniur A Siahaan***
Email: abby2510.acs@gmail.com

**Abstract**

Tuberculosis (TB) is a disease caused by mycobacterium tuberculosis. TB can be transmitted to onther through Saliva when someone sneezes or coughs, then through breathing. This disease is difficult to control worldwide. TB bacteria move from the lungs and spread through the blood to other parts of the body. These diseases damage bones, damage the liver, kidneys, heart and other organs, weaken the immune system, cause loss of consciousness, and if left untreated can result in death. The researhc method used in this study is descriptive, which aims to determine the Leukocyte Description in Pulmonary Tuberculosis patients. This study uses an autohematology analyzer to examine the number of leukocyte cells. This study was conducted at Bunda Thamrin Hospital Medan from May To Juni 2024 where the samples used were 15 blood samples from pulmonary tuberculosis patients. The population in this study were all patients who were clinically diagnosed with tuberculosis by doctors who were hospitalized at Bunda Thamrin Hospital, Medan, in May- June 2024 to conduct tuberculosis examinations totaling 15 people. The sampel in this study used the total sampling technique. The results of the examination found that patients wit decreased white blood cell counts (leukopenia) were 3 people (20%), while 6 patients experience d increased leukocytes (leukocytosis) (40%), and 6 people had normal leukocytes (40%) from 15 blood samples of pulmonary tuberkulosis patients. It is hoped that further research Will increase the sample to obtain a more optimal picture of leukocytes results.

**Jurnal Analis Laboratorium Medik**
**E.ISSN: 2527-712X**
**Vol. 9 No. 2 Desember 2024 (P 69-73)**

**Homepage: https://e-journal.sari-mutiara.ac.id/index.php/ALM**
**DOI: https://doi.org/10.51544/jalm.v9i2.5434**

**How to cite:** Siahaan MA, Zebua WI, Sipayung AD. Overview Of Leukocyte Counts In Pulmonary Tuberculosis Patients Hospitalized RSU Bunda Thamrin. JALM [Internet]. 2024 Dec. 23 [cited 2024 Dec. 23];9(2):69-73. Available from: https://e-journal.sari-mutiara.ac.id/index.php/ALM/article/view/5434

## 1. Introduction

Tuberculosis (TB) is a disease caused by the bacterium Mycobacterium tuberculosis. TB can spread to others through droplets that come out when someone sneezes or coughs, and transmission occurs through breathing. The disease is difficult to control worldwide (Jaya & Mediaarti, 2017; Kristini & Hamiah, 2020). TB bacteria move from the lungs and spread through the blood to other parts of the body. The disease destroys bones, damages the liver, kidneys, heart and other organs, weakens the immune system, causes loss of consciousness, and if left untreated can lead to death[1].

Tuberculosis (TB) remains a global health problem; the World Health Organization reports that half of the world's population, mainly in developing countries, is affected by the disease; between 2009 and 2011, about 89% of the population was affected. According to the World Health Organization's 2011 report, there are about 12 million cases of tuberculosis worldwide, which is 178 per 100,000 people, and there are 8.5 million cases and about 1.1 million deaths each year[3]. Compared to 2009, the situation has improved. It is estimated that more than 14 million cases of tuberculosis occurred worldwide, mostly in the productive age group[4].

There were 330,910 TB cases in Indonesia in 2015; the number of TB cases increased to 324,539 cases in 2014. The provinces with the highest TB cases in Indonesia are East Java, West Java and Central Java. The number of tuberculosis cases in North Sumatra reached 38% of all tuberculosis cases. It is the third province after West Java, Central Java and East Java. The highest number of tuberculosis cases, 22,169, were diagnosed in DKI, Jakarta, Banten, and North Sumatra[5].

The relationship between white blood cells when the body is attacked by bacteria, one of which is mycobacterium tuberculosis, is related to white blood cells or also called leukocytes. White blood cells are part of the body's blood cells and play an important role in protecting against disease or killing bacteria and viruses that enter the body's blood. The main function of leukocytes is to protect the body by interfering with foreign substances and producing or transporting/distributing antibodies[6]. There are two types of white blood cells; granulocytes (neutrophils, eosinophils, and basophils) and agranulocytes (lymphocytes and monocytes). Neutrophils serve as the front line of the immune system, killing bacteria and diluting them with amino acid D oxidase in the product, and eosinophils drive amoeboids, engulfing bacteria or foreign substances that enter the body. At the same time, lymphocytes cannot drive amoeboid bacteria and phagocytose, but lymphocytes can produce antibodies and activate the immune system, so white blood cells play an important role in the body[7].

## 2. Methods

This study used a descriptive method with the aim of identifying the Leukocyte Picture in Tuberculosis Patients undergoing hospitalization at Bunda Thamrin Hospital MedanResearch design.

This research was conducted at the Bunda Thamrin Hospital Laboratory on Jalan Sei Batang Hari 28, Babura Sunggal, Medan. The research time will be carried out in October-November 2024.

Data collection in this study with primary data obtained directly from the results of the examination of the leukocyte count of tuberculosis patients using the automatic method with the Hematologic Analyzer Mindray BC-780 R. This examination was carried out to ensure accurate and valid results as the basis for further analysis. Secondary data were taken from the medical records of patients hospitalized with a diagnosis of tuberculosis that were available at Bunda Thamrin Hospital in Medan. The data covered the treatment period from May to September 2024 and was used to support and complete the analysis of the primary data obtained.

This study analyzes the results of leukocyte examination in pulmonary tuberculosis patients conducted in the laboratory using the automatic method through the Hematologic Analyzer Mindray BC-780 R. The examination produces leukocyte count data grouped into three categories, namely normal, high, and low levels, based on laboratory standard reference values. This data was then presented in tabular form to facilitate understanding and further analysis. The presentation of this data aims to identify patterns of leukocyte levels that may be associated with the body's immune response to pulmonary tuberculosis infection, while providing clinical insights that can support more effective diagnostic evaluation and patient management.

## 3. Results

After conducting research on the Leukocyte Picture of 15 patients with pulmonary tuberculosis using the automatic method. At Bunda Thamrin Hospital Medan. In May-June, the results obtained are as follows:

**Table 1. Results of the Leukocyte Count in Hospitalized Pulmonary Tuberculosis Patients at Thamriin Hospital**

| NO | SAMPLE CODE | AGE (YEAR) | GENDER TYPE | LEUKOSIT RESULTS | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | S1 | 30 | Female | 6,610 | Normal |
| 2 | S2 | 26 | Female | 9,730 | Normal |
| 3 | S3 | 37 | Female | 20,350 | Increased |
| 4 | S4 | 50 | Male | 10,540 | Increased |
| 5 | S5 | 22 | Female | 4,010 | Normal |
| 6 | S6 | 36 | Male | 3,560 | Decreased |
| 7 | S7 | 33 | Male | 10,760 | Increased |
| 8 | S8 | 34 | Male | 23,800 | Increased |
| 9 | S9 | 40 | Female | 2,500 | Decreased |
| 10 | S10 | 76 | Female | 14,380 | Increased |
| 11 | S11 | 24 | Male | 6.490 | Normal |
| 12 | S12 | 71 | Female | 13.220 | Increased |
| 13 | S13 | 35 | Male | 2,950 | Decreased |
| 14 | S14 | 26 | Female | 7,080 | Normal |
| 15 | S15 | 31 | Male | 9,510 | Normal |

Description:
S1-S15 : Sample code
L : Male
P : Female
Normal Value : 4.000-10.000

Based on the results of the research conducted, the number of patients with pulmonary tuberculosis at Bunda Thamrin Medan Hospital in October-November 2024 who checked leukocyte levels was 15 people. Patients who experienced normal leukocytes were 6 people, increased by 6 people, and decreased by 3 people.

**Table 2. Frequency Distribution of Leukocyte Counts in Pulmonary Tuberculosis Patients at Bunda Thamrin Hospital Medan**

| DESCRIPTION | N | % |
|---|---|---|
| Normal | 6 | 40% |
| Increased | 6 | 40% |
| Decreased | 3 | 20% |
| **Total** | **15** | **100%** |

From table 2. above, it can be seen that most of the pulmonary tuberculosis patients have normal leukocyte counts, namely 6 people (40%), while patients with increased leukocytes (leukocytosis) are 6 people (40%), and patients with decreased leukocytes (leukopenia) are 3 people (20%).

## 4. Discussion

From the results of research conducted at Bunda Thamrin Hospital Medan in May-June 2024, 15 patients with pulmonary tuberculosis were examined. Of these, 40% of patients showed normal leukocyte counts, while 40% had increased and 20% had decreased. Leukocytes play an important role in the body's resistance to foreign objects that enter the body. An increase in leukocyte count indicates an inflammatory process due to the entry of Mycobacterium tuberculosis into the body, which causes an increase in leukocyte count as an immune response. In normal tuberculosis infection, this infection stimulates lymphocytes to activate macrophages, making them more effective in killing germs. On the other hand, neutrophils are found in 20% of patients with tuberculosis through infiltration into the bone marrow[8].

Leukopenia is a condition where there is a decrease in the number of white blood cells in the peripheral blood. It can be caused by a reduced number of any one type of leukocyte, generally due to ineffective granulopoiesis or due to excessive neutrophil destruction, which can lead to accelerated leukocyte shedding. If leukopenia occurs in patients with tuberculosis, some factors that may be responsible are chronic infection, malnutrition, drug side effects, and co-infection with HIV[9].

Based on previous research by Hairani (2019), it was found that out of 20 samples of pulmonary tuberculosis patients, 18 samples (90%) showed a decrease in the number of leukocytes, while the other 10% experienced an increase[10.] This finding indicates that there is generally an increase in leukocyte count in patients with pulmonary tuberculosis due to infection that stimulates the activation of white blood cells to fight infection. The relationship between tuberculosis and white blood cells (leukocytes) is seen when the body is infected by bacteria, including Mycobacterium tuberculosis. White blood cells, which are part of blood cells, play an important role in protecting the body from disease and killing bacteria and viruses that enter the bloodstream. The main function of leukocytes is to protect the body from infection by interfering with foreign substances and producing or distributing antibodies.

## 5. Conclusion

Based on the results of research on the description of leukocytes in pulmonary tuberculosis patients hospitalized at Bunda Thamrin Hospital Medan, the frequency distribution of leukocyte values shows different categories of information, namely normal, increased, and decreased leukocyte values. In this case, the calculation percentage results show that of the 15 patients studied, 6 people (40%) have normal leukocyte values, 6 people (40%) have increased, and 3 people (20%) show a decrease in leukocyte values.


## 6. Acknowledgments

The authors would like to express their deepest gratitude to the Director of Bunda Thamrin Hospital Medan for the assistance and support provided in the implementation of this research.


## 7. Reference


1. Aini, N., dkk., 2017. Sistem Pakar Pendiangnosa[1]Penyakit Tuberkulosis.[2]Jurnal Infomatika Mulawarman.
2. Aliviameita, A., & Puspitasari, p. Buku Ajar Mata Kuliah Hematologi. Pers Umsida; 2021.
3. Bestari, G. 2014. Perbedaan Kadar Leukosit Sebelum Dan Sesudah Pemberian Obat Anti Tuberkulosis Pada Fase Awal. Universitas Muhammadiyah Yogyakarta.
4. Eka Margaretha Sinaga, Maniur A Siahaan, Apriska Dewi Sipayung. 2023. "Analisa Bakteri Tahan Asam Pada Dahak Perokok Aktif Penderita Tuberkulosis Paru." Jurnal Analis Laboratorium Media8: 45–49
5. Darliana, D. (2011). Pengelolaan Pasien Tuberkulosis Paru. M.Psik-FK Unsyiah, Vol. 11(1), 27-31.
6. Dewi, B. D. N. 2019. Diabetes Melitus & Infeksi Tuberculosis. Jakarta Penerbit Kedokteran EGC.
7. Dinas Kesehatan Republik Indonesia. 2015. Profil kesehatan Indonesia Tahun 2015.
8. Dicky, Y. W., & Ahmad, H. R. 2019. Pemeriksaan jumlah sel leukosit pada penderita tuberkulosis paru di UPT Kesehatan Paru Masyarakat Dinas Kesehatan Provinsi Sumatera Utara. Jurnal Analis Laboratorium Medik, 4(2), 31-35. E-ISSN: 2527-712X.
9. Fitriani, Pratiwi, dan Betty (2020) Menerbitkan Buku Ajar Mengenai ASKEP TBC Dan Pengawasan Obat, Yang Diterbitkan Oleh STIkes Widya Dharma Husada di Tangerang.
10. Giyartika, & Kemen, (2020). Mengkaji Peningkatan Jumlah Leukosit Pada Radiografer Di RS Islam Jemursari Surabaya, Jurnal Kesehatan Lingkungan, Volume 12, Halaman 98-104.
11. Javetz, Melnyk, Adelberg. Mikroorganisme kimia. Jakarta: PEB; 2017. Strategi Nasional Pengendalian TBC. Kementerian Kesehatan Republik Indonesia : Jakarta;
12. Rosita, L., Cahaya, A. A., & Arfira, F. R. (2019). Hematologi Fundamental. Yogyakarta: Universitas Islam Indonesia.
13. World Health Organization. (2020). Pengendali Tuberulosis Global: Laporan WHO 2011. Janewa: WHO Press.