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Description of Hemoglobin Levels in Patients With Pulmonary Tuberculosis in The Intensive Treatment Stage at RSUD Ciamis

Endang Octaviana Wilujeng[1], Ayu Ratna Dewi[2], Euis Tia Istianah[2*]

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

* Corresponding author: euistiaistianah@stikesmucis.ac.id

ABSTRACT

Background & Objectives: Tuberculosis is one of the leading causes of death in the world. Pulmonary tuberculosis is a chronic disease that infects the lungs, caused by *Mycobacterium tuberculosis*, and can affect hemoglobin levels to causing anemia. Anemia occurs due to insufficient iron intake and the use of anti-tuberculosis drugs (OAT). Anemia is defined as reduced hemoglobin levels in the blood. Hemoglobin is a protein that contains iron in red blood cells. This study aims to determine the description of hemoglobin levels in patients with pulmonary tuberculosis in the intensive treatment stage at Ciamis Regional Hospital.
Methods: This research method is descriptive. Data collection techniques were obtained from secondary data. Sampling was done by a purposive sampling technique, which recruited 31 patients with pulmonary tuberculosis to be used as respondents.
Results: From this study, 19 (61%) samples with normal hemoglobin levels and 12 (39%) samples with low hemoglobin levels were obtained.
Conclusion: Based on the results of the examination of hemoglobin levels in patients with pulmonary tuberculosis in the intensive treatment stage at Ciamis Hospital, most of them have normal hemoglobin levels.

Keywords: Hemoglobin; Tuberculosis; Intensive Care Unit

INTRODUCTION

Tuberculosis is the leading cause of death. Tuberculosis disease in Indonesia in 2020 was recorded at 351,936 cases or 354 per 100,000 population (Indonesian Health Service, 2021). In Ciamis Regency in 2023 there were 14,506 cases (Ciamis Regency Health Office, 2019). Tuberculosis cases in RSUD Ciamis in 2023 amounted to 3,437 cases (RSUD Ciamis, 2023).

Mycobacterium tuberculosis is a bacterium that can attack the lungs. Transmission can occur when people with tuberculosis cough, sneeze, or talk; they can release splash particles containing bacteria that may be inhaled by others and infect them. The bacteria can survive several hours in the atmosphere (Jendra F.J. Dotulong, 2015).

Hemoglobin is a protein in red blood cells that serves to transport oxygen from the bloodstream to the rest of the body. There may be variations in hemoglobin levels. Anemia is the term used to describe decreased levels of hemoglobin in the blood. Iron deficiency, malabsorption syndrome, and suppression of erythropoiesis (erythrocyte maturation) are the three main causes of anemia in patients with pulmonary tuberculosis. Malnutrition can also be caused by tuberculosis as a result of changes in blood leptin concentration and metabolic abnormalities (Rahmadani, 2021).

Surah Yunus verse 57 explains "O man, indeed there has come to you a lesson from your Lord and a cure for the diseases (which are) in the chest and guidance and mercy for those who believe" (Q.S Yunnus: 57). Allah SWT sends down diseases in the chest, one of the organs is the lungs. Tuberculosis disease can be eliminated by implementing a healthy and clean lifestyle, as prescribed in Islam that cleanliness is part of faith, and by implementing a healthy lifestyle can prevent the occurrence of diseases, one of which is pulmonary tuberculosis disease (Jendra F.J. Dotulong, 2015).

Research on hemoglobin levels in patients with tuberculosis has previously been conducted by Nurani 2017 at the Poasia Health Center in Kendari city. The results obtained from 30 respondents, 21 people had hemoglobin levels less than normal values (Nurani, 2017). The results of Rahmadani's research in 2021, by examining pulmonary tuberculosis patients at RSUD M. Natsir Solok, found that out of 30 respondents, there were 8 people (27%) with normal hemoglobin levels, and as many as 22 people (73%) with hemoglobin levels less than normal values (Rahmadani, 2021). The difference in this study is in the treatment phase and the examination method; the previous study was conducted on patients with advanced treatment-stage pulmonary tuberculosis and used the analyzer method, while this study was conducted on patients with intensive-stage pulmonary tuberculosis and used the cyanmethemoglobin method.

OBJECTIVE

To know the description of hemoglobin levels in patients with pulmonary tuberculosis in the intensive treatment stage at Ciamis Regional Hospital.

METHODS

This study is a descriptive study to see the description of hemoglobin levels in pulmonary tuberculosis patients undergoing intensive stage treatment at Ciamis Regional Hospital in 2024. The sampling technique in this study was purposive sampling with a total of 31 samples. This study used primary and secondary data. This study used the cyanmethemoglobin method using

a photometer. This research was conducted in May 2024 at the STIKes Muhammadiyah Ciamis Laboratory.

RESULTS

Respondents in the study were patients with pulmonary tuberculosis who were undergoing intensive stage treatment at Ciamis Hospital in 2024.

TABLE 1. Characteristics of Respondents

Respondent Characteristics	Total (n)	Persentage (%)
Gender		
Male	20	67%
Female	11	33%
Age		
18-40 Years	17	55%
>40 Years	14	45%

Hemoglobin levels were checked using the cyanmethemoglobin method using a photometer. Before the sample was examined, a control material with controlled results was examined.

TABLE 2. Research Results

Hemoglobin Level Results	Total (n)	Persentage (%)
Normal	19	61%
Low	12	39%
Total	**31**	**100**

DISCUSSION

Hemoglobin examination serves as an early detection of anemia symptoms. In this study, several stages were carried out, namely taking blood specimens, examining control materials, examining samples, and processing results. The results of the control material examination every day show in-control results. The control material examination aims to prevent errors in the examination results.

Based on table 2, the results of hemoglobin levels in patients with intensive pulmonary tuberculosis are 19 (61%) have normal hemoglobin levels and 12 (39%) have low hemoglobin levels. The decrease in hemoglobin levels in patients with tuberculosis is due to the process of bacterial infection and OAT administration. Normal hemoglobin levels occur due to good sleep patterns, adequate exercise and fulfilled iron intake (Nurani, 2017).

Mycobacterium tuberculosis is the organism that causes tuberculosis (TB) disease. This bacterium can survive several months in dark and cold environments, especially in humid environments. Pulmonary tuberculosis is the name given to the infection caused by *Mycobacterium tuberculosis*. Other body parts affected by the spread of this bacteria include the abdomen, brain lining, lymph nodes, bones, and so on. Extrapulmonary tuberculosis refers to tuberculosis disease that occurs

outside the lungs. *Mycobacterium tuberculosis* is a type of harmful bacterium that measures 1-4 mm long and 0.3-0.6 mm wide (Kartiwi, 2021).

Anemia is one of the symptoms of tuberculosis, namely a decrease in hemoglobin levels. Erythrocytes contain the protein hemoglobin. Iron produces hemoglobin, which transports oxygen from the lungs to the rest of the body. Poor nutrition is the cause of reduced hemoglobin levels in tuberculosis patients. The hemoglobin level of tuberculosis patients drops due to the infection process and the administration of anti-tuberculosis drugs (OAT) in the early stages, namely rifampicin, isoniazid, pyrazinamide, and ethambutol. Administration of isoniazid and pyrazinamide can cause B6 deficiency and metabolic disorders. Vitamin B6 plays a role in heme biosynthesis. B6 deficiency disrupts the heme biosynthesis process and causes anemia (Andri, Randi, & Setyawati, 2020).

The decrease in hemoglobin levels in pulmonary tuberculosis patients occurs due to bacterial infection and intensive administration of OAT such as Isonazid, Pyrazinamide, and Rifampicin. Isoniazid and rifampicin administration can cause metabolic disorders that increase the excretion of B6 through the urine and can lead to B6 deficiency. B6 deficiency can interfere with heme biosynthesis and lead to anemia. Anemia is a condition where hemoglobin and erythrocyte levels are less than normal (Handayani, 2021).

The length of treatment for pulmonary tuberculosis patients in the intensive stage is for the first 2 months, and is usually given OAT such as Isoniazid, pyrazinamide, ethambutol, and blood enhancing drugs. In the intensive treatment stage, the body experiences a decrease in immunity, one of which is a decrease in hemoglobin levels. The length of treatment can affect the increase in hemoglobin levels after the patient has undergone intensive treatment because the nutritional intake in the patient's body is fulfilled as needed for the formation of hemoglobin. Administration of blood-boosting drugs, vitamins, and consumption of high-calorie foods play a role in increasing hemoglobin levels (Nurani, 2017).

Based on the results of hemoglobin examination in tuberculosis patients, hemoglobin levels were normal in 19 patients (61%). Normal hemoglobin levels in patients with pulmonary tuberculosis are caused by a healthy lifestyle, and maintaining a clean living environment. Normal hemoglobin levels are also influenced by good sleep patterns, adequate exercise, high intake of nutrients and iron (Rahmadani, 2017).

CONCLUSION

It can be concluded that the average examination results of hemoglobin levels in patients with pulmonary tuberculosis in the intensive treatment stage at the Ciamis Regional Hospital are normal.

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CONFLICT OF INTEREST

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

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