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# DESCRIPTION OF THE NUMBER OF ERYTHROCYTES IN TUBERCULOSIS PATIENTS WHO ARE ON TREATMENT

**Reta Hanifa Salwa[1], Irwana Wahab[2]**
[1,2]Poltekkes Kemenkes Aceh

***** Corresponding email: *retahanifasalwaa19@gmail.com*, *irwanawahab1969@gmail.com*

**ABSTRACT**

Pulmonary tuberculosis (TB) is a contagious infectious disease caused by Mycobacterium tuberculosis bacteria. Anti-tuberculosis drugs (OAT) have side effects on the body because taking drugs continuously during treatment can cause drug accumulation in the body which can affect erythrocytes. Therefore, the longer tuberculosis patients take OAT, the more red blood cells decrease, resulting in anemia. The purpose of examining the number of erythrocytes is to determine the number of erythrocytes in patients with Tuberculosis during the treatment period at Puskesmas Kuta alam Banda Aceh in 2024. This study uses descriptive method research. Aims to provide a description of what actually happened. This research was conducted at the Kuta Alam Health Center, Banda Aceh City. The number of samples of this study were 6 respondents. Of the 6 respondents, 4 respondents 67% were normal with an average erythrocyte count of 4.60 million/uL and 2 respondents 33% were low in patients who had undergone treatment for 3 months. The results showed 4 respondents (67%) had normal erythrocyte counts, 2 respondents (33%) had low erythrocyte counts.

***Keywords:*** *Tuberculosis, Erythrocyte Count, OAT*

## INTRODUCTION

Pulmonary tuberculosis (TB) is a contagious infectious disease caused by the bacterium Mycobacterium tuberculosis, which can affect various organs, especially the lungs. Globally, the death rate from TB is 13 people per hour and by 2020, it is known that 10 million people will develop TB and 1.5 million people will die from it. In 2020, 30 countries accounted for 86% of new TB cases and Indonesia ranked third as the country with the highest TB burden. In Indonesia, estimated TB cases reached 824,00 cases in 2020 with 13,110 deaths and BTA positive pulmonary TB reached 165,116 cases (Hasnanisa et al., 2022).

According to the World Health Organization, Indonesia has the second highest prevalence of tuberculosis in the world after India. 80% of the incidence of tuberculosis occurs in 10 countries, the top three being India 26%, Indonesia 11%, and Nigeria 9%. In 2017, deaths from tuberculosis amounted to 1.3 million people out of approximately 10 million people with tuberculosis and an estimated 82% of cases of multidrug resistant TB (MDR-TB). The population in adult men is about 5.8 million people, in adult women about 3.2 million people, and in children about 1 million people (Karwiti et al., 2021).

The Aceh Health Profile in 2020 stated that there were 6,456 cases of TB. This prevalence decreased from the previous year with an incidence of 8,647 cases. The report showed that North Aceh, Bireuen and Pidie districts had the highest percentage of TB cases in Aceh at 13%, 12% and 9% (Kam & Cahyady, 2023).

According to Ain et al., (2019), Tuberculosis is transmitted from human to human through the air when talking, coughing, sneezing when people with TB release droplets (splashes) inhaled and enter the human body. TB can affect all series of hematopoiesis, especially in erythrocytes, when erythrocytes are infected there will be a reaction where the life span of erythrocytes is shortened by about 10-20 days while in normal conditions the life span of erythrocytes is 120 days. In this situation, it affects the poor production of erythrocytes so that they are damaged and can affect the lower hemoglobin concentration and anemia.

TB infection can cause or exacerbate malnutrition due to increased energy requirements to maintain normal body functions, characterized by increased resting energy expenditure (REE). This increase amounts to 10-30% of a normal person's energy requirements. This process causes anorexia due to increased leptin production resulting in a decrease in food intake. The prevalence of anemia will increase in poor nutritional status because protein malnutrition causes a decrease in reticulocytes and erythropoesis in the bone marrow and spleen (Ain et al., 2019).

Anti-tuberculosis drugs (OAT) have side effects on the body because taking drugs continuously during treatment can cause drug accumulation in the body which can affect erythrocytes. Therefore, the longer tuberculosis patients take OAT, the more red blood cells decrease, resulting in anemia (Dwipayana, 2022).

## METHODS

The type of research conducted is descriptive research, where this study aims to describe or provide an overview of the number of erythrocytes in Tuberculosis patients who are on treatment at Puskesmas Kuta Alam Banda Aceh. The research was conducted at the Kuta Alam Health Center Banda Aceh which is located on Jl. Dharma, Mulia, Kec. Kuta Alam, Banda Aceh City from January 28 to June 12, 2024.

The population in this study were Tuberculosis patients who were on outpatient treatment at the Kuta Alam Health Center Banda Aceh. The samples used were only samples of Tuberculosis patients who were on treatment until June 2024 at the Kuta Alam Health Center Banda Aceh. Tools and materials used in this study are: torniquiet, syringe, EDTA vacuum tube, hematology analyzer PE-6800, and plaster. Materials used venous blood, dry cotton, alcohol swab.

The method of checking the number of erythrocytes using the Automatic hematology Analyzer method. With the working principle of Impedance Flowcytometry by means of simultaneous measurement of several physical characteristics of a single cell that has been suspended and flowed through a gap called Aperture. Cell measurements that can be used in Impedance Flowcytometry by using the electrical impedance of a cell.

Furthermore, Intra Venous Phlebotomy is performed by applying a tourniquet to the arm while the hand is in a fist, placing the patient's arm straight on the table with the palm of the hand facing up, the arm is cleaned with 70% alcohol, looking for a blood vessel selected cubital vein, puncturing the vein using a syringe, inserting the needle with the needle positioned obliquely facing up and forming an angle of 250, Pulling the syringe sucker until the desired amount of blood is then inserted into the EDTA tube.

## RESULTS AND DISCUSSION

The results of the study of the number of erythrocytes in Tuberculosis patients who were undergoing treatment at the Kuta Alam Health Center, Banda Aceh City on January 26 to June 12, 2024 were 6 respondents. The data obtained can be seen in table 1:

**Table 1.**
**Data of Tuberculosis Patients Who Are Undergoing Treatment At Kuta Alam Health Center, Banda Aceh City**

| No | Gender | Age | Length Of Treatment | Erythrocyte Count (Juta/Ul) | Description |
|---|---|---|---|---|---|
| 1. | Male | 21 | 5 Month | 4,86 | Normal |
| 2. | Male | 35 | 3 Month | 4,89 | Normal |
| 3. | Women | 38 | 5 Month | 4,16 | Normal |
| 4. | Women | 24 | 3 Month | 3,77 | Low |
| 5. | Male | 38 | 5 Month | 4,50 | Normal |
| 6. | Male | 38 | 3 Month | 3,72 | Low |

Table 1 shows the percentage of erythrocyte counts in Tuberculosis patients undergoing treatment with values obtained 67% normal with an average erythrocyte count of 4.60 million/uL and 33% low in patients who have undergone treatment for 3 months.

**Table 2.**
**Percentage Data Of Erythrocyte Count Values In Tuberculosis Patients Undergoing Treatment at Kuta Alam Health Center, Banda Aceh City**

| Results | Amount | Persentase(%) |
|---|---|---|
| Normal | 4 | 67% |
| Low | 2 | 33% |
| High | 0 | 0 |
| Amount | 6 | 100% |

Table 2 shows that out of 6 respondents, 4 respondents (67%) were normal and 2 respondents (33%) were low. (67%) normal and 2 respondents (33%) low.

**Table 3.**
**Results Of Erythrocyte Count Examination In Tuberculosis Patients Undergoing Treatment Based On Gender**

| NO | Jenis Kelamin | Normal | Low | Total |
|---|---|---|---|---|
| **1.** | **Male** | 3 | 1 | 4 |
| **2.** | **Women** | 1 | 1 | 2 |

Table 3 shows that male respondents with low erythrocyte counts are 1 respondent and female respondents are 1 respondent.

**Table 4.**
**Results Of Erythrocyte Count Examination In Tuberculosis Patients Undergoing Treatment Based On Age**

| NO | Age | Normal | Low | Amount |
|---|---|---|---|---|
| **1.** | **20-30** | 1 | 1 | 2 |
| **2.** | **31-40** | 3 | 1 | 4 |

Table 4 shows that respondents aged 20-30 with low erythrocyte counts were 1 respondent and aged 31-40 1 respondent.

**Table 5.**
**Results Of Erythrocyte Count Examination In Tuberculosis Patients Who Are Undergoing Treatment Based On Length Of Treatment**

| NO | Lama Pengobatan | Normal | Low | Total |
|---|---|---|---|---|
| **1.** | **3 month** | 1 | 2 | 3 |
| **2.** | **5 month** | 3 | 0 | 3 |

Table 5 shows that most respondents with a treatment duration of 3 months had 2 respondents with low erythrocytes while the treatment duration of 5 months was normal.

Based on the results of the study, the number of erythrocytes in tuberculosis patients who were on treatment at the Kuta Alam Health Center in Banda Aceh City showed normal and decreased results. Of the 6 samples examined, 4 samples were 67% normal with an average erythrocyte count of 4.60 million/uL and 2 samples were 33% low in patients who had undergone treatment for 3 months.

Of the 6 respondents, most respondents with a length of treatment of 3 months had 2 respondents with low erythrocytes while the length of treatment of 5 months showed normal results. The low erythrocyte count in patients with pulmonary tuberculosis after 2 months of taking OAT is caused by the effect of OAT consumed by patients with pulmonary tuberculosis, isoniazid (INH) and rifampirin are drugs that can cause the destruction of red blood cells. Therefore, the longer tuberculosis patients take OAT, the more red blood cells decrease (Kognisi et al., 2021). Of the 6 respondents, the respondents aged 20-30 with low erythrocyte counts were 1 respondent and those aged 31-40 were 1 respondent. Based on the results of the chisquare statistical test, the p-value = 0.093 ($p < 0.10$) means that Ho is rejected.

This shows that there is a statistically significant relationship between age and the incidence of pulmonary TB. This is in line with the results of research conducted by Konde (2020) which shows that the group of people with pulmonary TB is mostly at the age of 15-55 years (productive age). At this age people spend a lot of time and energy to work where energy is drained, reduced rest time so that the immune system decreases while in the group not suffering from pulmonary TB the most age> 55 years. Based on the results of research and existing and related theories, the researchers argue that there is a significant relationship between age and the incidence of pulmonary tuberculosis. And researchers concluded that old age is more susceptible to pulmonary TB because old age has decreased organs (Sunarmi & Kurniawaty, 2022). Of the 6 respondents, 1 respondent was male with a low erythrocyte count and 1 respondent was female.

Based on the results of the chisquare statistical test, the p-value = 0.030 (p <0.10) means that Ho is rejected. This shows that there is a statistically significant relationship between gender and the incidence of pulmonary TB. This is in line with the results of research conducted by Marleni (2020) found that respondents experienced pulmonary tuberculosis and were male as many as 26 people (92.9%) more than respondents who experienced pulmonary tuberculosis and were female as many as 9 people (33.3%).

With the result of p value = 0.047 greater than a = 0.05, it shows that there is a significant relationship between gender and the incidence of pulmonary tuberculosis. Pulmonary tuberculosis disease tends to be higher in men than women. Men have heavy workloads and unhealthy lifestyles such as smoking and alcohol. Women pay more attention to their health than men, therefore women are less likely to develop pulmonary tuberculosis. Women report more symptoms of the disease and consult a doctor because women tend to have more diligent behavior than men (Sunarmi & Kurniawaty, 2022).

Tuberculosis treatment is divided into 2 stages, namely: Early Stage (Intensive): lasts from the start of treatment for up to 2 months, where TB patients are required to take medicine every day. Advanced Stage: from the 2nd month to the 6th month or more, at this stage, patients are only required to take medicine 3x a week. The two stages above in total last at least 6 months, it can also be more even up to 12 months. However, the duration of this treatment depends on the severity of the TB disease suffered by the patient and is determined by trained health workers. If at the end of the intensive stage the sputum examination results are still positive, then this treatment stage will be added 1 month (Fortuna et al., 2022).

## CONCLUSION

Based on the results of research conducted on 6 respondents, it can be concluded that the number of erythrocytes in Tuberculosis patients who are undergoing treatment is mostly found in normal erythrocytes as many as 4 respondents (67%) and low hemoglobin values as many as 2 respondents (33%).

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