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Relationship between hematocrit values in tuberculosis (TB) sufferers who received anti-tuberculosis drug treatment at the Pematangsiantar Raya Community Health Center

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ABSTRACT

Tuberculosis*is* a direct infectious disease caused by germs Microbacterium Tuberculosis. Transmission occurs when TB patients cough or sneeze, germs are spread in the air in the form of droplet nuclei. The use of OAT in TB sufferers based on the duration of OAT consumption can cause a decrease in hematocrit values due to side effects of the drug, namely anemia and thrombocytopenia. The method used in this research is descriptive. This study aims to determine the description of hematocrit values in TB sufferers who received OAT treatment at the Pematangsiantar Raya Community Health Center. The sample for this research was 30 people taken randoml*y*purposive sampling. The results of the study showed that the results of the examination that received OAT treatment at the end of the second month were 24 people (80%), of which the results of the examination showed that the hematocrit value was low as many as 15 people (62.5%), and normal as many as 9 people (37.5%) shows a low hematocrit value. In the examination of patients who received treatment at the end of the sixth month, 6 people (20%) showed examination results with low hematocrit values, 6 people (100%). The low hematocrit value found in TB sufferers at the end of the second and sixth months of treatment is due to the side effects of the OAT consumed, age, gender and the body's immunity in fighting bacteria that attack blood cells, resulting in a decrease in the hematocrit value. It can be concluded that of the 30 TB sufferers who received OAT treatment at the end of the second and sixth months, the number of sufferers with low hematocrit values was greater than those with normal hematocrit values.

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INTRODUCTION

Until now, Tuberculosis (TB) is still a major health problem in the world and in Indonesia(Wikurendra, 2010). According to WHO, in 2013 the incidence of tuberculosis cases in

Indonesia was around 4% of the number of tuberculosis patients in the world and was the 4th largest after India, China and South Africa. According to the 2013 Global TB Report, there were 189 per 100,000 population or 450,000 cases. The prevalence of HIV among tuberculosis patients is estimated at 3%(Sulistyowati, 2015). The drugs used in the treatment of tuberculosis consist of several combinations, including isoniazid, rifampicin, pyrazinamide, streptomycin and ethambutol. TB treatment is one of the main strategies for controlling TB because it can break the chain of transmission(Noviyani et al., 2015).

Even though the National TB Control Program has succeeded in achieving the target discovery rate and cure rate, TB management in most hospitals and private practices is not yet in accordance with the Directly Observed-Treatment Short-course (DOTS) strategy and the implementation of service standards based on the International Standards for Tuberculosis Care (ISCT) (Indonesian Ministry of Health, 2015). The hematocrit value is the volume of all erythrocytes in 100 ml of blood and is called%of that blood volume(Johnny et al., 2003). Determination of hematocrit values can be done by macro and micro methods as well as automatically. In the macro method a tube is used*wintrobe,*whereas in the micro method a microcapillary tube is used and in the automatic method a Hematology Analyzer is used(Hidayah, 2018). (Gandasoebrata, 2017).

Based on data obtained from an initial survey at the Pematangsiantar Community Health Center, the number of positive BTA TB cases in 2017 was 61 cases.(SITORUS, 2019). Meanwhile, in 2018 there were 49 positive smear TB cases. For the period January-April 2019, the number of positive smear TB cases visiting the Pematangsiantar Public Health Center was 13 new cases, where cumulatively up to April 2019 the number of sufferers who underwent OAT treatment was 43 people and those who were temporarily undergoing treatment at the end of the second month were 24. There were 6 people and sufferers who underwent treatment at the end of the sixth month (Pematangsiantar Raya Community Health Center, 2023).

Based on the results of the initial research survey or data collection at the Pematangsiantar Raya Community Health Center in May, there were 30 people suffering from tuberculosis who received anti-tuberculosis treatment, and on average every month those visiting TB sufferers with anti-tuberculosis treatment were 30 people.

OAT is a drug to treat tuberculosis which consists of drugs containing isoniazid, rimfapicin, pyrazinamide, streptomycin and ethambutol.(Carolia, 2019). OAT is one of the drugs used in the therapy process for TB sufferers, because this drug can affect the growth, reproduction and survival of bacteria.(Nahda et al., 2017). OAT treatment is carried out on TB sufferers with the aim of curing the patient, preventing death, preventing relapse, breaking the chain of transmission and preventing germ resistance to OAT drugs.(Dina et al., 2019). Mycobacteria are acid-resistant bacteria which are different from other germs because they grow very slowly and develop resistance very quickly when exposed to one drug.(ABDUL AZISMAN, 2019).

In general, antibiotics work more actively against germs that divide quickly compared to germs that divide slowly(Syaifiyatul et al., 2020). The slow dividing nature of mycobacteria is one of the factors that makes the development of new antimycobacterial drugs much more difficult and slower than other antibacterials. In the Ministry of Health (2015), TB treatment aims to cure patients, prevent death, prevent recurrence, break the chain of transmission and prevent germ resistance to anti-tuberculosis drugs (OAT).

OAT must be given in the form of a combination of several types of drugs, in sufficient quantities and in fixed doses according to the treatment category(HD & Indriati, 2015). Do not use OAT alone (monotherapy). Use of OAT-Fixed Dose Combination (OAT-KDT) is more profitable and is highly recommended(YUANASARI, 2009). TB treatment is given in 2 stages, namely, initial stage (intensive): At this stage, sufferers receive medication every day and need to be monitored directly to prevent drug resistance. If the intensive stage of treatment is given correctly, it is very likely that patients with BTA positive will become BTA negative (conversion) within 2

months.(Nugroho, 2011). Advanced stage: At this stage, sufferers receive fewer types of medication, but over a longer period of time. The next stage is important to kill germs*persister*thereby preventing recurrence.

Most TB sufferers can complete treatment without side effects. However a small percentage may experience side effects, hence monitoring during treatment. The side effects that occur can be mild or severe, if the side effects are mild and can be treated with symptomatic medication then OAT administration can be continued.

Mild side effects can include signs of peripheral nerve poisoning, tingling, burning in the legs and muscle pain(Anam, 2018). This effect can be reduced by administering pyridoxine at a dose of 100 mg per day or with vitamin B complex. In these circumstances treatment can be continued. Other disorders such as pyridoxine deficiency (pellagra syndrome)(Triana, 2006). Severe side effects can include hepatitis which can occur in approximately 0.5% of sufferers. If drug-induced hepatitis or jaundice occurs, stop OAT and treat according to TB guidelines in special circumstances(OKTARINA, 2020).

The main side effect is drug-induced hepatitis (management according to TB guidelines in special circumstances)(Pratama et al., 2019). Joint pain can also occur (give aspirin) and can sometimes cause arthritis attacks. Gout, this is probably due to reduced excretion and accumulation of uric acid. Sometimes fever, nausea, redness and other skin reactions occur.

The main side effect is damage to the eighth nerve which is related to balance and hearing. The risk of these side effects will increase as the dose used increases and the age of the sufferer(OKTARINA, 2020)(NABILA, 2021). Impaired renal excretory function. Symptoms of visible side effects are ringing in the ears (tinnitus), dizziness and loss of balance. This situation can be reversed if the drug is stopped immediately or the dose is reduced by 0.25 grams. If treatment is continued, the damage to the balance becomes more severe and permanent (loss of balance and deafness). Based on this description, the author is interested in conducting research on "The Relationship between Hematocrit Values in Tuberculosis Sufferers Receiving Anti-Tuberculosis Drug Treatment (OAT) at the Pematangsiantar Raya Community Health Center in 2024".

The aim of this research is to determine the description of the results of Hematocrit examinations in TB sufferers who received OAT treatment at the Community Health Center.Raya Pematangsiantar, to see the results of Hematocrit examinations in TB sufferers who are on OAT therapy at the end of the sixth month, to see the results of Hematocrit examinations in TB sufferers who are on OAT therapy at the end of the sixth month.

It is hoped that this research can add to and expand knowledge, especially in the field of Hematology regarding hematocrit examination and can be used as a reference for future researchers. Increase insight, experience and knowledge as well as materials in the application of research methods, especially regarding hematocrit examination. As additional information for the public in following the OAT treatment process

RESEARCH METHOD

The type of research used in this research is descriptive, namely to obtain a relationship between the results of hematocrit examinations in TB sufferers who received OAT treatment at the Pematangsiantar Raya Community Health Center.The sampling location was carried out at the Pematangsiantar Raya Community Health Center. The location for sample examination was carried out at the Pematangsiantar Public Health Center Laboratory.

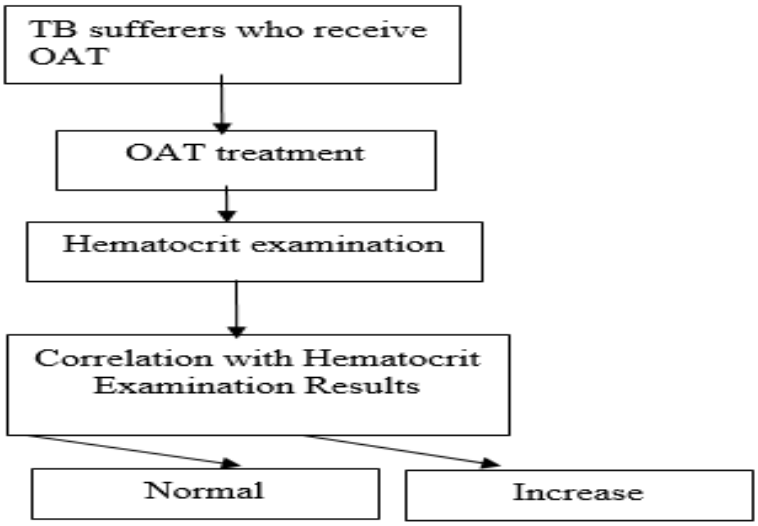

Figure 1. Research flow

The population in this study were all patients suffering from TB who came to visit and receive treatment at the Pematangsiantar Raya Community Health Center until May 2024, totaling 30 people. The sample is representative of the population, taken in this study were TB sufferers on OAT therapy who underwent hematological examination. The sampling technique in this research uses techniques*purposive sampling,* where taking patients who are undergoing OAT therapy at the Pematangsiantar Raya Community Health Center with the following criteria: a) Research Inclusion Criteria: Patients suffering from pulmonary TB, willing to be respondents, undergoing OAT therapy for 2 months and 6 months. b) Research Exclusion Criteria: Referral pulmonary TB patients, unwilling to be respondents, Dropping out of OAT therapy. The variables in this research areHematocrit examination results in TB sufferers undergoing OAT treatment.at the Pematangsiantar Raya Community Health Center.

RESULTS AND DISCUSSIONS

The new Puskesmas Raya building was built in 1979 on a land area of 4640 m2 with a building area of 170 m2 which has undergone several building repairs. The working area is 73.5 km2 which includes four sub-districts, namely Timbanggalung Subdistrict, Teladan Subdistrict, Proklik Subdistrict and Dwikora Subdistrict. Geographically, Puskesmas Raya is located in West Siantar District. Puskesmas Raya has 2 sub-district health centers.

Table 1. The composition of health workers at Puskesmas Raya a is 33 people consisting of various elements of the profession as follows

No	Description type	What's there now
1.	General practitioners	2
2.	Dentist	1
3.	Biomedicine	15
4.	SKM	1
5.	Pharmacist	-
6.	Ass. Pharmacist	2
7.	Bachelor's Degree in Nursing	1
8.	D3 Nursing	4
9.	Nurse	8
10.	Dentist	1
11.	Midwife	1

No	Description type	What's there now
12.	D3 Nutrition	2
13.	Sanitary	1
14.	Laboratory analyst	1
14.	LCPK	-
	Total	40

The research was carried out in the Public Health Center laboratory, starting January 2024, on outpatients from the pulmonary polyclinic with a diagnosis of pulmonary TB, at the end of the 2nd and 6th months of treatment and undergoing routine blood tests (Hematocrit). A sample of 30 people was obtained, namely 24 people undergoing OAT therapy at the end of the second month and 6 people undergoing OAT therapy at the end of the sixth month. The results of the research can be seen in the table as follows.

Table 2. Characteristics of pulmonary TB sufferers with hematocrit values inRaya Health Center

Respondent Characteristics	Hematocrit			
	Normal		Low (<37%)	
	n	%	n	%
Age				
20-30 Years	3	10		
31-40 years old	2	6.7		
41-50 years old	2	6.7	4	13.2
51-60 years old			8	26.7
>61 years			11	36.7
Total	7	23.4	23	76.6
Gender				
Man	9	30	10	33.3
Woman			11	36.7
Total	9	30	21	70
Work				
Employee	7	23.4	6	20
Self-employed			9	30
Trader	2	6.7	4	13.2
Student	2	6.7		
Total	11	36.8	19	63.2
OAT therapy				
Second Month	9	30	15	50
VI Month			6	20
Total	9	30	21	70

The table above shows that of the 30 respondents, respondents aged 20-30 years with normal hematocrit were 3 respondents (10%), aged 31-40, namely 2 respondents (6.67%), aged 41-50, namely 2 respondents. (6.7%), while respondents who had a low hematocrit value <37% were 4 respondents (13.2%) aged 41-50, 8 respondents aged 51-60 (26.7%), aged >61, namely 8 respondents (6.7%). 11 respondents (36.7%).

The table above shows that of the 30 respondents, respondents based on occupation were employees with normal hematocrit, namely 7 respondents (23.4%), employees with low hematocrit <37% were 6 respondents (20%), self-employed respondents with low hematocrit <37% were 9 respondents (30%), 2 respondents (6.7%) were traders with normal hematocrit, 4 respondents (13.2%) were traders with low hematocrit <37% and 2 respondents (6.7%) were students with normal hematocrit.

The table above shows that of the 30 respondents based on gender, 9 respondents (30%)

were men with normal hematocrit, 10 respondents (33.3) were men with low hematocrit <37%, while all women had low hematocrit <37% as many as 11 respondents (36.7%). The table above also shows that 9 respondents (30%) had normal hematocrit values in the second month of OAT therapy and 15 respondents (50%) had low hematocrit <37%, while in the sixth month of OAT therapy all had hematocrit values. low <37% as many as 6 respondents (20%).

In research conducted at the Pematangsiantar Raya Community Health Center in 2024, regarding the relationship between hematocrit values in TB sufferers who received OAT treatment at the Pematangsiantar Raya Community Health Center using the Automatic Hematology Analyzer method, research results were obtained, namely from 30 TB sufferers who received OAT treatment who were examined during the research, 24 were obtained (80%) of patients in treatment at the end of the second month with examination results, 15 respondents (62.5%) had low hematocrit values, while in TB patients who received treatment at the end of the sixth month who were examined during the study, 6 (20%) patients had The examination results showed that 6 (100%) of these patients had low hematocrit values. This is in accordance with previous research which states that consuming OAT has side effects which cause the hematocrit value to decrease, this is because the side effects of the drug cause blood cells such as hemoglobin to be low, resulting in anemia in sufferers. The occurrence of anemia in sufferers indicates that the hematocrit value is low. The side effects of OAT and bacteria in the body can result in a decrease in the normal value of blood cells in the body(Hanindiya et al., 2020).

Most of the subjects of this research were male. This is in accordance with previous research which states that men tend to suffer from TB more than women because this may be due to men's social and occupational status which has a high potential for a decrease in hematocrit values.(Cahyati, 2019).

The decrease in hematocrit values in TB sufferers who received OAT treatment at the end of the second and sixth months mostly occurred in men and those aged 50 years and over. With many decreases in hematocrit values occurring in men, this is due to the men's smoking habits. Meanwhile, the decline that occurs at the age of 50 years and over is due to the fact that in old age the body's immune response and endurance begin to decrease, making it susceptible to tuberculosis bacterial infections and the length of time it takes OAT as stated in Wahyu's (2015) research.

The decrease in the hematocrit value in TB sufferers who receive OAT treatment is also influenced by the type of work carried out by the patient. Patients with a large decrease in the hematocrit value are approximately 50% of sufferers who work as farmers, because heavy work or activity can cause blood cells to shrink. in the body becomes abnormal so that it can affect the Hematocrit value, and cigarette consumption while working also greatly affects red blood cells and cigarette consumption can result in a decrease in the HB value or anemia occurs, causing a decrease in the hematocrit value, this is in line with research conducted Sei Won Lee et al. Of the 281 patients (31.9%) who had a decrease in hematocrit values, 133 patients were men (28.2%), and 148 patients (36.3%) were women. According to Hiswani, quoted from WHO, TB sufferers tend to be higher in men than women. In men, this disease is higher because smoking tobacco reduces the body's defense system.

A decrease in hematocrit in TB sufferers who received OAT treatment was caused by blood cell disorders, namely anemia, thrombocytopenia and leukopenia as well as consumption of anti-tuberculosis drugs. If hematological abnormalities are still found (decreased hematocrit value) at the end of the treatment period, the patient will be given vitamins to return the cells to normal.(Hutauruk, 2021)(Nurhayati et al., 2023).

The results of this study also showed that of the 30 TB sufferers who were receiving OAT treatment, at the end of the second month of treatment there were 24 sufferers, the results of the examination found normal hematocrit values, namely 9 (37.5%) sufferers. This is due to age, the duration of drug consumption and the body's defense system which is still able to fight bacteria

that cause problems with blood cells in the body. It is suspected that the body's defense system is able to fight tuberculosis bacteria, causing the blood cells in the body to also become normal(Hutauruk, 2021).

(Ahsan et al., 2020)states that someone who is still young and who has recently consumed medication will not have an effect on the blood cells in the body.

With the body's defenses still being strong against bacteria that attack internal blood cells so that the blood cells in the body do not experience abnormalities, especially in hematocrit, it is known that if blood cells experience abnormalities or decrease in normal values such as hemoglobin, this will affect the hematocrit value.(Suprapti et al., 2023).

In the hematocrit examination of TB sufferers who received OAT treatment at the end of the sixth month, 6 (20%) patients showed abnormal or low results, this was due to the age factor of those undergoing OAT treatment, namely over 50 years so they were no longer able to resist or fight the bacteria. enters the body which causes a decrease in the hematocrit value in the body. This is also influenced by the duration of taking OAT so that blood cells such as Hemoglobin and Thrombocytopenia decrease so that the hematocrit value also decreases.(Susilowati, 2014).

The hematocrit value is normal if there are no blood cell abnormalities in the body, because hematocrit is closely related to blood cells so that normally blood cells also show normal hematocrit values(Roosleyn, 2016).

CONCLUSION

Respondent characteristicsthose aged 20-30 years with normal hematocrit were 3 respondents (10%), aged 31-40, namely 2 respondents (6.67%), aged 41-50, namely 2 respondents (6.7%), while respondents who had low hematocrit values <37%, namely 4 respondents (13.2%) aged 41-50, 8 respondents (26.7%) aged 51-60, 11 respondents (36.7%) aged >61.Characteristicsrespondents based on occupation, namely employees with normal hematocrit, namely 7 respondents (23.4%), employees with low hematocrit <37% as many as 6 respondents (20%), self-employed respondents with low hematocrit <37% as many as 9 respondents (30%), respondents with traders working with normal hematocrit as many as 2 respondents (6.7%), traders with low hematocrit <37% as many as 4 respondents (13.2%) and students with normal hematocrit as many as 2 respondents (6.7%).Respondent characteristicsbased on gender consisting of men with normal hematocrit as many as 9 respondents (30%), men with low hematocrit <37% as many as 10 respondents (33.3), while all women with low hematocrit <37% as many as 11 respondents (36.7%).Response characteristicswith OAT therapy in the second month with normal hematocrit values as many as 9 respondents (30%) and 15 respondents with low hematocrit <37% as many as 15 respondents (50%), while in the sixth month of OAT therapy all had low hematocrit values <37% as many 6 respondents (20%).Hematocrit examination of TB patients with OAT therapy at the end of the second month was 15 respondents (62.5%) with low hematocrit values and normal hematocrit values of 9 respondents (37.5%). Hematocrit examination of TB sufferers with OAT therapy at the end of the sixth month was 6 respondents (100%) with low hematocrit.

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