DESCRIPTION OF *SERUM GLUTAMIC OXALOACETIC TRANSAMINASE* (SGOT) IN LUNG TUBERCULOSIS ADVANCED STAGE TREATMENT IN THE REGION THE WORK OF THE KABILA PUSKESMAS IN 2020

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ABSTRACT

Tuberculosis is a contagious infectious disease caused by the bacteria *Mycobacterium tuberculosis*. The incidence of tuberculosis is a serious problem, especially the side effects of the drugs *Isoniazid* and *Rifampicin*. This could potentially lead to an increase in SGOT levels, so monitoring liver function needs to be done as an additional measure in routine examination of tuberculosis patients.

The purpose of this study was to describe the levels of *Serum Glutamic Oxaloacetic Transaminase* (SGOT) in advanced stage treatment of pulmonary tuberculosis in the Kabila Public Health Center in 2020. This research is descriptive using a quantitative approach. The population involved in this study were all patients who have been obtaining the advanced treatment of pulmonary tuberculosis. The total of these samples were 28 people. The sampling method uses total sampling. Examination of SGOT levels used the IFCC kinetic method and was checked using a tool Spectrophotometer CHEM-7. Data were analyzed by univariate. The results show that 5 samples (17,9%) and 23 samples (82,1%) are abnormal levels of SGOT. SGOT levels that do not increase or are declared normal are because pulmonary tuberculosis patients consume OAT regularly and adopt a healthy lifestyle.

The conclusion is that patients with advanced treatment pulmonary tuberculosis experienced an increase in SGOT levels less than normal. The need to maintain a healthy lifestyle such as adequate rest during treatment for pulmonary tuberculosis sufferers so as not to experience an increase in SGOT levels.

Keywords: Pulmonary Tuberculosis, Advanced Treatment, SGOT.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. These bacteria are called Acid Resistant Bacilli (BTA), because the cell walls contain fat which is connected to arabinogalactants and peptidoglycan underneath [4].

Mycobacterium tuberculosis bacteria are straight or slightly bent, measuring 1-10 μm long and 0,2 - 0,6 μm wide. The wall of the *Mycobacterium tuberculosis* bacteria is very complex, which consists of a fairly high fat layer (60%). The main constituents of the walls of *Mycobacterium tuberculosis* are mycolic acid, a complex wax layer, and Mycobacterium sulfolipids which play a role in virulence. *Mycobacterium tuberculosis* bacteria can survive for 8-10 hours in dark and humid places, and in body tissues, these bacteria can remain

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dormant for several years [19].

The taxonomy of the bacteria *Mycobacterium tuberculosis* is as follows [18]:

Kingdom : Plant
Phylum : Scizophyta
Class : Scizomycetes
Ordo : Actinomycetales
Family : Mycobacteriaceae
Genus : Mycobacterium
Species : *Mycobacterium tuberculosis*

A person can be infected if the droplets are inhaled into the respiratory tract, as long as the *Mycobacterium tuberculosis* bacteria enter the human body through breathing, the *Mycobacterium tuberculosis* bacteria spreads from the lungs to other parts of the body, through the circulatory system, lymph system, respiratory tract, or direct spread to other parts of the body. other body parts [16].

The transmissibility of a tuberculosis patient is determined by the amount of bacteria released from the lungs. The higher the positive degree of sputum examination results, the more infectious the *Mycobacterium tuberculosis* bacteria is. The likelihood of a person being infected with tuberculosis is determined by the concentration of droplets in the air and the length of time inhaling the air [16].

The cause of tuberculosis consists of tuberculosis patients with smear positive, there is a greater risk of infection than smear negative. The higher the number of bacteria in the sputum splash, the greater the risk of transmission. The longer and more frequent exposure to germs, the greater the risk of infection [16].

As for the individual factors related to the incidence of tuberculosis, first, namely malnutrition which will reduce the body's resistance, so that it can reduce resistance to various diseases including tuberculosis. If a person's immune system decreases because of old age, pregnant women, malnutrition, people with diabetes mellitus, if they are infected with the *Mycobacterium tuberculosis*, they will be more easily exposed. The two tuberculosis patients mostly attacked people from low socio-economic conditions. The state of low nutrition, knowledge about his health is low, so that the environmental health is poor and his health status is poor. Third, the low education of a tuberculosis patient can influence someone to seek health services. Several studies have concluded that someone who has a low level of education is 5,5 times more likely to experience a cure than someone who has a higher level of education. Fourth, the behavior of someone who is easily infected/contracted by the *Mycobacterium tuberculosis* bacteria, for example the habit of not being diligent in drying pillows and mattresses, not covering their mouths when coughing or sneezing, spitting carelessly, smoking, and not being used to cleaning the house. Coughing and how to dispose of sputum in tuberculosis patients that are not ethical will increase the exposure to germs and the risk of transmission. [16].

Tuberculosis remains the top 10 cause of death in the world and the prevalence of new tuberculosis cases is estimated to be around 10 million people falling i'll with tuberculosis worldwide, as many as 5,7 million in men, 3,2 million for women, and 1,1 million for children, so that WHO declared tuberculosis cases as a world emergency (*Global Health Emergency*). Southeast Asia is the region with the largest number of new cases due to tuberculosis with 44%, followed by Africa with 24% new cases and the West Pacific with 18% new cases. WHO reports that Indonesia is one of the countries with the largest burden of tuberculosis among 8 countries, namely India 27%, China 9%, Indonesia 8%, Philippines 6%, Pakistan 5%, Nigeria 4%, Bangladesh 4% [17].

Tuberculosis cases in Indonesia were

1,017,290. Gorontalo Province ranks 32nd out of 34 provinces in Indonesia with 4,547 cases, while West Papua Province with 3,588 people and North Kalimantan 2,733 people [9].

The highest number of tuberculosis cases was in Gorontalo Regency with 1417 people, Gorontalo City came in second with 732 people, and Bone Bolango Regency was in third place with 639 people [2].

The highest number of tuberculosis cases was at Kabila Health Center with 86 people, and in 2020, data from January-June totaled 28 people undergoing advanced treatment [3].

First-line (main) tuberculosis treatment can result in quite high hepatotoxicity (impaired/damaged liver function), particularly the drugs *Isoniazid* and *Rifampicin*. Both types of drugs can potentially cause ATDH which can lead to an increase in one of the liver enzymes, namely SGOT (*Serum Glutamic Oxaloacetic Transaminase*) [15].

SGOT is a liver enzyme found in liver parenchyma cells. AST levels will increase in the blood if there is damage to liver cells. SGOT is generally measured clinically as part of a diagnostic liver function test to determine liver health [6].

Transaminases are a group of enzymes that are catalysts in the process of transferring amino groups between an alpha amino acid and an alpha keto acid. The enzymes associated with hepatocellular damage are aminotransferases that are catalyzed by one amino group between an amino acid and an alpha keto acid. This function is essential for the proper formation of amino acids required for the preparation of proteins in the liver [14].

Monitoring of liver function is very important as an additional measure in routine examination of tuberculosis patients, to determine the level and elevation of the SGOT enzyme. *According to the American Association for the Study of Liver Disease* (AASLD), stipulates that the parameter to see the increase in liver enzymes SGOT is considered an indicator of liver damage, therefore if there is damage (necrosis) of liver cells, these enzymes will be released from the liver cells. and into the blood, the more liver cells are damaged, the higher the SGOT levels are measured in the blood [16].

There were more elevated SGOT levels than SGPT levels in tuberculosis patients at the end of the intensive (initial) phase, namely, of the 28 samples studied, 5 samples with abnormal SGOT examination and 23 normal sample [11]. There is a strong relationship between SGOT and SGPT levels after the initial (intensive) 2-month OAT treatment with the results of the Spearman's rho test and the value of ρ = 0.000 <0.05 was obtained [13].

Tuberculosis patients who are undergoing initial (intensive) treatment, receive 3 or 4 drugs at once every day for 2 months, namely by using *Isoniazid* in combination with *Rifampicin*, *Pyrazinamide* and *Etambutol*. Tuberculosis patients undergoing the maintenance phase (continued) only received 2 drugs with a longer period of time, usually 4 months, the drugs used were *Isoniazid* and *Rifampicin* [4].

Tuberculosis treatment given to tuberculosis patients has purposes other than to prevent death, relapse, resistance to OAT, and break the chain of transmission. The need for treatment needs to be defined in advance based on the location of tuberculosis, severity of disease, bacteriological examination results, sputum smear, and previous treatment history [4].

Based on the background description above, the researchers wanted to know about the levels of *Serum Glutamic Oxaloacetic Transaminase* (SGOT) in advanced pulmonary tuberculosis treatment in the Kabila Health Center Work Area in 2020, which is expected to provide information to be taken into consideration

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in enforcing additional examinations.

RESEARCH METHODOLOGY

This research is descriptive with a quantitative approach. The research site was conducted at the Kabila Health Center, Bone Bolango Regency. When the research was carried out on August 26 to September 15 2020.

The population in this study were all patients with pulmonary tuberculosis with advanced treatment in the Kabila Community Health Center, Bone Bolango District, Gorontalo Province in 2020, namely 28 people, with the sampling method using total sampling.

The sample in this study was based on inclusion criteria, including the patient's age of at least 15 years, and patients with pulmonary tuberculosis without comorbidities in the Kabila Community Health Center, Bone Bolango Regency, Gorontalo Province in 2020.

Samples based on exclusion criteria include pregnant women suffering from pulmonary tuberculosis, and pulmonary tuberculosis patients who consume drugs other than OAT.

The variables of this study consisted of pulmonary tuberculosis patients undergoing advanced treatment and SGOT levels.

The operational definition in this research is that patients with tuberculosis in the advanced phase are patients who continue treatment after the intensive phase. The number of drugs given in the advanced phase is only 2 types of drugs (*Rifampicin* and *Isoniazid*) and is given every day for 4 months, and the level of *Serum Glutamic Oxaloacetic Transaminase* which is an examination of enzymes in the blood, due to liver cell damage (necrosis) or impaired permeability cell organelles.

The tools used in this research are 1000 µl micropipette and 100 µl yellow and blue tip, test tube, test tube rack, Spectrophotometer CHEM-7, 3 ml syringe, tourniquet, and centrifuge. The research materials used were 70% alcohol cotton, dry cotton, serum, and SGOT reagent.

The research procedure carried out is to prepare the patient to wear a mask when entering the patient's room and wash their hands after leaving the room or patient's room. The method of examination is Kinetic - IFCC (*International Federation of Clinical Chemistry and Laboratory Medicine*)

Venous blood sampling begins by preparing the tools and materials used including personal protective equipment, a tourniquet attached to the upper arm and asking the patient to clench and open the palms repeatedly so that the veins are clearly visible, the area of the elbow crease to be pierced is cleaned with alcohol cotton 70 % and let it dry, the patient's skin is pricked with a needle and syringe until the needle tip enters the venous lumen, the tourniquet is slowly released while pulling the syringe suction until the desired amount of blood is obtained, a dry cotton swab is taken and placed on the needle, then the syringe is removed, then the patient is asked to press a cotton swab over the puncture mark, after which the needle is removed from the syringe and blood flows into the red tube through the tube wall.

The sample used in this study was blood without anticoagulant which was allowed to stand for a while and centrifuged at 3000 rpm for 10 minutes until serum was formed, whereas before carrying out the examination, first made the working reagent by mixing the 1 SGOT reagent and 2 SGOT reagent with a ratio of 4: 1 (2000 µl + 500 µl).

How to perform an SGOT examination, namely, two test tubes were prepared, the first tube as a blank (aquadest) and the second tube as a sample, 1000 µl of distilled water was piped and put into the tube labeled blank (B), the work reagent SGOT 1000 µl was piped and

put into each tube labeled sample (S), 100 µl serum is piped and inserted into the sample tube, then homogenized, then the absorbance of the sample is measured to find out the enzyme level on the Spectrophotometer CHEM-7 by means of, on the screen, the main menu appears, select a measure then press enter the test program menu will appear, then various kinds of inspection parameters will appear, select the "SGOT" check, press enter, "measure reagent blank" appears on the screen, enter aquadest as a blank on the hose while touching the cyper,then the aquadest will be sucked in and the absorbance results are 0,0, after that put the sample in the hose and let it inhale then enter the patient's identity, wait for the tool to run and record the absorbance of the sample, the results will be listed on the tool display and recorded on the prepared sheet.

The reference value for SGOT examination for men is ≤ 35 U/L and women ≤ 31 U/L.

The data were processed by univariate analysis to calculate the frequency and characteristics of the research sample, and presented in tabular form and reported as a percentage. The formula used is:

$$P = \frac{f}{N} \text{ x } 100\%$$

Information:

P   : Percentage.
F   : Frequency / number of samples whose SGOT levels are not normal.
N   : The total number of samples.
100% : Fixed number.

RESEARCH FINDINGS

Table 1.
Frequency Distribution of SGOT Levels in Advanced Treatment for Pulmonary Tuberculosis Patients

SGOT Level Results	Frequency	Percentage (%)
Abnormal	5	17.9
Normal	23	82.1
Total	28	100.0

Source: Primary Research Data, (2020).

Table 2.
Frequency Distribution of Advanced Treatment for Pulmonary Tuberculosis Patients by Gender

Gender	Frequency	Percentage (%)
Male	10	35.7
Women	18	64.3
Total	28	100.0

Source: Primary Research Data, (2020).

Table 3.
Frequency Distribution of Advanced Treatment for Pulmonary Tuberculosis Patients Based on the Duration of OAT Consumption

Duration of Treatment	Frequency	Percentage (%)
3 months	18	64.3
4 months	5	17.9
5 months	2	7,1
6 months	3	10.7
Total	28	100.0

Source: Primary Research Data, (2020).

Table 4.
Frequency Distribution of Advanced Treatment for Pulmonary Tuberculosis Patients Based on Lifestyle

Lifestyle	Frequency	Percentage (%)
Lack of sleep	5	17.9
Normal Sleep	23	82.1
Total	28	100.0

Source: Primary Data Research, (2020).

DISCUSSION

Pulmonary tuberculosis is transmitted by inhalation of droplets containing *Mycobacterium tuberculosis* bacteria from an infected patient, then enters the Alveolar space, and evokes a reaction from

polymorphonuclear leukocytes, these leukocytes phagocyte bacteria, but do not destroy them, and within a few days will be replaced by macrophages, tuberculosis strain cells The lungs are able to enter into macrophages, in macrophages, these bacteria manipulate the endosome by changing the pH and stopping the maturation of the endosome, by changing the pH, the formation of effective phagolysosomes will be disrupted, so that these bacteria can proliferate uncontrollably [4].

Mycobacterium tuberculosis, which has lived and multiplied in the cytoplasm of macrophages, can spread to other parts of the body, while bacteria that remain in the lung tissue [4].

Serum Glutamic Oxaloacetic Transaminase (SGOT) is a mitochondrial enzyme that mediates the transfer of amino groups between aspartic acid and alpha-ketoglutamic acid to form glutamic and oxaloacetic acids. SGOT is present in tissues with high metabolic activity and catalyzes the conversion of nitrogenous amino acids into energy. As much as 20% of SGOT is present in the cytoplasm and 80% in the mitochondria. SGOT is found in the heart, liver, skeletal muscle and kidney, if the tissue is acutely damaged, the SGOT level in serum will increase, this is due to the release of intracellular enzymes from the damaged cells into the blood circulation. The SGOT levels are elevated, suggesting that there is hepatocellular necrosis or myocardial infarction [7].

The sample used in this study is serum, which is a blood fluid that does not contain blood clotting factors (fibrinogen, prothrombin, factors VIII, V and XIII, which are factors XII, XI, IX, X, and VII) and do not contain cells. - blood cells. Serum is obtained from blood specimens that are not added with anticoagulants, so that the blood will clot within 15 to 30 minutes. The clotting blood is centrifuged, so that there is a separation between the fluid and blood cells, the yellow liquid from the centrifuge is called blood serum. Most laboratories use serum as a specimen for blood chemistry testing. These serum specimens are usually accommodated in a conventional test tube without anticoagulant and a vacuum tube with a gel separator [10].

Based on the results of this study, SGOT levels were obtained from 28 samples of pulmonary tuberculosis patients, namely 5 samples (17,9%) who experienced an increase, while 23 samples (82,1%) did not experience an increase in AST levels. The results showed that most of the respondents had normal SGOT levels. This study is in line with previous research conducted, where the results showed that more pulmonary tuberculosis patients who were treated with OAT had normal SGOT levels, namely 23 samples from 28 samples of pulmonary tuberculosis patients had SGOT levels normal with a percentage of 82,14%, and 5 samples experienced an increase in SGOT levels with a percentage of 17.86% [11].

Patient Pulmonary tuberculosis advanced treatment based on gender, as many as 10 samples were male (35,7%), there were no patients who had elevated SGOT levels, and as many as 18 samples were female (64,3%), there were 5 samples (17,9 %) patients who showed SGOT levels above normal values and 13 samples (46,4%) had normal SGOT levels. This study is in line with the research conducted, the results of the study show that women experience increased levels of SGOT more than men, namely from 8 samples (40%) of women there are 2 samples (10%) patients who showed an increase in SGOT levels, whereas from 12 samples (60%) of male patients, 1 sample (5%) of patients showed an increase in SGOT levels [8].

There were 18 samples of pulmonary

tuberculosis patients who underwent OAT treatment for 3 months (64,3%), 4 samples (14,3%) had elevated SGOT levels and 14 samples (50%) had normal SGOT levels, 4 months of treatment were 5 samples (17,9%) did not get elevated SGOT levels, 2 samples (7,1%) of 5 months of treatment, 1 sample (3,6%) increased and 1 sample (3,5%) normal, and treatment for 6 months as many as 3 samples (10,7%) had normal SGOT levels. This research is in line with research conducted, where pulmonary tuberculosis patients showed the most elevated levels of the transaminase enzyme in the treatment category in the early weeks of OAT therapy after undergoing the intensive phase, namely 16 samples (33,3%) of 48 samples had high levels of the transaminase enzyme after OAT administration and more frequently occurs in weeks to months rather than days to weeks [1].

Based on the lifestyle lived by patients with advanced treatment for pulmonary tuberculosis, there were 5 samples (17,9%) of patients who were sleep deprived and 23 samples who slept normally during OAT therapy. By looking at some of the symptoms that result from the side effects of using OAT, including 23 samples who experienced itching and 19 samples who experienced dizziness, this could affect the pattern. sleep from the patients themselves, so they will potentially experience elevated SGOT levels during treatment [14].

SGOT levels that do not increase or are declared normal are because pulmonary tuberculosis patients consume OAT regularly and adopt a healthy lifestyle, but a small proportion of pulmonary tuberculosis patients experience an increase in SGOT levels.

Elevated AST levels can be caused by the side effects of OAT, irregular lifestyles such as lack of sleep, or accompanied by extensive liver necrosis such as prolonged circulation collapse, so monitoring of elevated levels is necessary SGOT during treatment [5].

CONCLUSION

Based on this research, it can be concluded that:

Percentage of AST levels in advanced stage treatment of pulmonary tuberculosis patients in the Kabila Health Center Work Area in 2020, 28 samples obtained abnormal levels of *Serum Glutamic Oxaloacetic Transaminase* (SGOT), namely 5 samples (17,9%) and 23 normal samples (82,1%), so more pulmonary tuberculosis patients did not experience an increase in SGOT levels during treatment.

Based on the characteristics of patients with advanced pulmonary tuberculosis, it is known that:

a. Patients with male gender were 35,7% normal and female patients were 64,3%, of which 17,9% were abnormal and 46.4% were normal.

b. Patients with 3 months of treatment were 64,3%, of which 14,3% were abnormal and 50% were normal, 4 months 17,9% were normal, 5 months was 7,1%, where the abnormal and normal results were 3,6%, and 6 months 10.7% of patients were normal.

c. Patients who lacked sleep were 17,9% and those who slept normally 82,1%.

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