Analysis of the Effect of Taking Anti-Tuberculosis Drugs (ATD) on Blood Glucose Levels and Urine Protein Levels in Tuberculosis Sufferers at the Dasan Tapen Community Health Center, West Lombok

Leni Wahyuni[1], Agrijanti[2], Lalu Srigede[3]

[1] Department of Applied Bachelor of Medical Laboratory Technology, Poltekkes Kemenkes Mataram
[2] Jalan Prabu Rangkasari Dasan Cermen, Sandubaya, Mataram, Indonesia
*Email : leniwahyuni121@gmail.com

Article Info

ABSTRACT

Tuberculosis is a contagious infectious disease caused by the bacteria *Mycobacterium tuberculosis* or often called Acid-Fast Bacteria (AFC). Tuberculosis positive patients must undergo treatment by administering category 1 Anti-Tuberculosis Drugs (ATD) for approximately 6-8 months. Anti-Tuberculosis Drugs (ATD) are divided into two phases, namely the intensive phase and the advanced phase. Consuming Anti-Tuberculosis Drugs (ATD) for a long period of time can cause the drug to become toxic in the body, so that it can affect body organs such as the kidneys and pancreas. The aim of this study was to measure blood glucose levels, measure urine protein levels and analyze blood glucose levels and urine protein levels in tuberculosis sufferers who took Anti-Tuberculosis Drugs (ATD). Using analytical observational research methods with a cross sectional research design. Tuberculosis sufferers are checked for blood glucose and urine protein, first and second collection. The results of research on 24 tuberculosis patients who took Anti-Tuberculosis Drugs (ATD) at the Dasan Tapen Community Health Center, West Lombok showed that the blood glucose levels of tuberculosis patients who took intensive phase ATD, namely of the 14 patients, 9 patients experienced an increase. Meanwhile, in the continuation phase, of the 10 patients, there were 6 patients who experienced improvement. The urine protein levels of tuberculosis sufferers who consumed ATD in the intensive and follow-up phase of the first examination were positive (+1) in 1 sample while negative (-) in 23 samples. In the second examination, 2 samples were positive (+1), while 22 samples were negative (-). The conclusion of this study is that there is no relationship between the first and second examination of random blood glucose levels and random urine protein levels.

INTRODUCTION

Tuberculosis (TB) is a contagious infectious disease that is still a public health problem in the world. Tuberculosis is caused by the bacteria Mycobacterium tuberculosis or often called Acid-Fast Bacteria (AFB). This bacteria infects humans through droplets in the air when an active tuberculosis patient coughs or sneezes. Bacteria will enter through the respiratory tract and then spread to parts of the lungs known as Pulmonary Tuberculosis (TB), these bacteria can also attack other organs through the circulatory system, lymph channels or spread directly to other parts of the body known as Tuberculosis (TB) Extra Pulmonary (Nufus et al., 2023).

In 2022, Indonesia will be ranked second with the most tuberculosis cases after India and China in third place with a total of 969,000 cases, this figure is up 17% from 2020 with 824,000 cases and 93,000 deaths per year or the equivalent of 11 deaths per hour (Cordova et al., 2023). Data on suspected tuberculosis cases in West Nusa Tenggara Province in 2022 will reach 112,482 cases. East Lombok Regency is in first place with 2,084 cases, then West Lombok Regency is in second place with 1,264 cases (NTB Satu Data, 2023). West Lombok Regency has 20 health centers spread across 119 villages, Dasan Tapen health center is one of the existing health centers, this health center carries out examination and treatment of tuberculosis. According to data, in the last 12 months the number of tuberculosis cases recorded reached 767 cases.

After being declared positive for tuberculosis, the patient must undergo treatment by administering Anti-Tuberculosis Drugs (ATD). ATD therapy takes place in two stages, namely the intensive stage and the advanced stage, with the total duration in category 1 being 6 months and for category 2 being 8 months. The intensive phase is the initial stage of treatment by consuming ATD 4 Fixed Dose Combinations (FDC) consisting of Rifampicin (R), Isoniazid (H), Ethambutol (E) and Pyrazinamide (Z) every day for 2 months under supervision. The continuation phase is an advanced stage of treatment by consuming ATD 2 Fixed Dose Combinations (FDC) consisting of Rifampicin (R) and Isoniazid (H) every day for 4 months (Mursyaf et al., 2018).

Based on the conditions of TB treatment which have a long duration of drug administration and many types of drugs, there will be a high risk of side effects or toxicity (Pratiwi et al., 2018). Potential side effects of Anti-Tuberculosis Drugs (ATD) can be caused by taking the drug regularly, taking the drug in combination or polypharmacy and using the drug over a long period of time. The side effects of ATD when consumed over a long period of time are nephrotoxicity which can result in risk factors for kidney disorders with characteristic early symptoms of acute kidney failure such as fever, arthralgia, rash and gastrointestinal disorders (Sons, 2019).

In tuberculosis patients, drugs that have side effects on the kidneys are Rifampicin (R), Isoniazid (H) and Streptomycin. Therefore, it is necessary to carry out early examination regarding kidney disorders in TB patients. Urine examination using a reagent strip (dipstick) is an examination carried out to detect kidney disorders (Kementerian Kesehatan, 2011). One of the urine examination parameters is protein, where in tuberculosis patients the presence of proteinuria is a potential marker of acute and chronic kidney damage caused by the toxic effects of drugs (Al-Naimi et al., 2019).

Apart from having side effects on the kidneys, ATD also has side effects on the pancreas. One of the antibiotics used in the treatment of TB can cause hyperglycemia, especially isoniazid (H) because it can inhibit the explicit step of the Kreb's cycle which requires NAD+ and can increase the release of glucagon (Pratama A , 2021). Hyperglycemia is a condition where blood glucose levels are higher than normal limits. The increase occurs due to insulin insufficiency due to damage to beta (β) cells in the pancreas. The characteristic characteristic of pancreatic beta (β) cells is their ability to respond to glucose with increased insulin secretion (Brereton et al., 2016).

Most studies have not determined how many TB patients experience increased blood glucose levels due to ATD consumption. TB treatment over a long period of time can cause stress hyperglycemia, this can occur in patients who have acute and chronic disease. In addition, blood glucose checks are not carried out on patients newly infected with TB, to determine whether TB patients suffer from pre-existing hyperglycemia or diabetes. Clinical studies are needed to monitor glucose levels periodically during TB treatment and for several months after recovery from TB infection (Harries et al., 2010).

MATERIALS/METHOD

This research uses an analytical observational method with a *cross sectional research design* . Analytical observational research is research that explains the relationship between variables through hypothesis testing. The population in this study were all patients suffering from tuberculosis who took Anti-Tuberculosis Drugs (ATD) at the Dasan Tapen Health Center, West Lombok. The sample size in this study was 24 samples obtained from calculations using the Lameshow formula. The sampling technique used in this research was *purposive sampling* . *Purposive sampling* technique is a sampling technique that is based on considerations, such as the characteristics or properties of a population. So the sample that will be used is a sample that already has considerations and criteria as a research sample.

RESULTS AND DISCUSSION

In this study, the criteria for respondents were TB patients who had not or had taken Anti-Tuberculosis Drugs (ATD) who were treated at the Dasan Tapen Health Center, West Lombok. Respondents were willing to have their blood glucose levels and urine protein levels checked twice with an interval of one month after the first collection.

Table 1. Blood glucose test results for examination 1 and examination 2

No	Sample Code	Duration of Treatment	Current Blood Glucose Levels (mg/dL)	
			Take 1	Take 2
1	Mr. S	2-3 months	131	103
2	Mr. DKN	1-2 months	79	99
3	Mrs. m	2-3 months	193	102
4	Mr. AR	1-2 months	168	142
5	Mrs. N	2-3 months	83	104
6	Mr. SP	1-2 months	280	369
7	Mrs. IJ	1-2 months	165	128
8	Mr. HS	5-6 months	65	84
9	Mrs. I	4-5 months	77	102
10	Mr. S	1-2 months	136	151
11	Mrs. IS	5-6 months	83	120
12	Mr. S	2-3 months	66	100
13	Mrs. BY	5-6 months	151	132
14	Mr. m	2-3 months	142	130
15	Mrs. A	17 days	280	439
16	Mr. A.M	17 days	98	110
17	T.D	20 days	102	114
18	Mrs. S	16 days	132	142
19	Mr. M.S	10 days	112	108
20	Mr. H	6 days	186	167
21	Mr. S	6 days	154	123
22	Mrs. J	1-2 months	84	103

No	Sample Code			
23	Mrs. N	1-2 months	135	165
24	Mr. S	2-3 months	106	112

The results showed that between taking 1 and taking 2 of 24 samples, 15 samples experienced a temporary increase in blood glucose levels and 9 samples experienced a temporary decrease in blood glucose levels.

Table 2. Results of urine protein examination for examination 1 and examination 2

No	Sample Code	Duration of Treatment	Current Urine Protein Levels (mg/dL)	
			Take 1	**Take 2**
1	Mr. S	2-3 months	Neg	Neg
2	Mr. DKN	1-2 months	Neg	Neg
3	Mrs. m	2-3 months	Neg	Positive 1 (+1)
4	Mr. AR	1-2 months	Neg	Neg
5	Mrs. N	2-3 months	Neg	Neg
6	Mr. SP	1-2 months	Positive 1 (+1)	Positive 1 (+1)
7	Mrs. IJ	1-2 months	Neg	Neg
8	Mr. HS	5-6 months	Neg	Neg
9	Mrs. I	4-5 months	Neg	Neg
10	Mr. S	1-2 months	Neg	Neg
11	Mrs. IS	5-6 months	Neg	Neg
12	Mr. S	2-3 months	Neg	Neg
13	Mrs. BY	5-6 months	Neg	Neg
14	Mr. m	2-3 months	Neg	Neg
15	Mrs. A	17 days	Neg	Neg
16	Mr. A.M	17 days	Neg	Neg
17	T.D	20 days	Neg	Neg
18	Mrs. S	16 days	Neg	Neg
19	Mr. M.S	10 days	Neg	Neg
20	Mr. H	6 days	Neg	Neg
21	Mr. S	6 days	Neg	Neg
22	Mrs. J	1-2 months	Neg	Neg
23	Mrs. N	1-2 months	Neg	Neg
24	Mr. S	2-3 months	Neg	Neg

The results showed that in the first collection there was 1 sample that showed positive urine, namely 1 positive (+1) while negative (-), namely 23 samples out of 24 samples. In the second collection, there were 2 samples that showed positive urine, namely 1 positive (+1) while negative (-), namely 22 samples out of 24 samples.

CONCLUSIONS

The results of blood glucose levels in tuberculosis sufferers who consumed OAT taking 1 and 2 were that 15 samples experienced an increase and 9 samples experienced a decrease. Results of urine protein levels in tuberculosis sufferers who consumed OAT,

taking 1, namely positive + (1+) for 1 sample and taking 2, namely positive + (1+) for 2 samples. There was no relationship between examination 1 and examination 2 of blood glucose levels during and urine protein levels when suffering from tuberculosis at the Dasan Tapen Health Center, West Lombok.

Based on the description above, it can be said that there is no relationship between examination 1 and examination 2, because the results of the examination are not all increasing (linear). This can be caused because the sample is heterogeneous. The sample has the possibility of having an influence if the examination is carried out using a larger number of homogeneous samples. So it can be seen whether there is an effect of taking Anti-Tuberculosis Drugs (OAT) based on the same duration of treatment. This lack of influence can also be caused by using random blood sugar samples which can be influenced by consuming food or having a previously unknown history of diabetes mellitus

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