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Effect of Giving Cohi Fish Biscuits and Vitamin C on the Weight of Patients with Pulmonary Tuberculosis in Percut Sei Tuan District in 2019

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ABSTRACT

The condition of patients with pulmonary tuberculosis (TB) with poor nutritional status will slow down the healing period. Overcoming malnutrition in pulmonary tuberculosis patients is carried out by providing supplementary food (PMT), especially those based on local food ingredients. In addition to needing additional foods rich in macro nutrients, TB sufferers also need micronutrients that can trigger increased body immunity, such as vitamin C. This study aims to see the effect of giving Cohi fish biscuits and vitamin C on the weight of patients with pulmonary tuberculosis in Percut Sei Tuan District in 2019. The design of this study was a quasi experimental pretest-posttest control group design which was carried out in Percut Sei Tuan District, Deli Serdang Regency, North Sumatra starting from May-July 2019. Subjects were 52 new cases of pulmonary tuberculosis patients with malnutrition who were divided into three groups: 16 people in the first group who received 100 g/day of Cohi fish biscuits, 16 people in the second group who received 100 g/day of Cohi fish biscuits and 500 mg/day of vitamin C, and 20 people in the control group. The treatment was carried out for 30 days. Giving 100 grams of Cohi fish biscuits contributed 583.29 kcal of calories, 15.32 grams of carbohydrates, 25.54 grams of protein and 46.65 grams of fat. Statistical test using one-way ANOVA, the results obtained were no difference in pre-test weight of patients with pulmonary TB (p=0.616), there was no difference in post-test body weight of patients with pulmonary TB (p=0.674), there was a difference in changes in patient weight. Pulmonary TB (p=0.00). There was an increase in body weight in the second group of 0.7 kg, and even though there was no increase in body weight in the first group, giving Cohi fish biscuits was able to withstand the weight loss compared to the control group. The conclusion of this study is that Cohi fish biscuits and vitamin C can be an alternative to PMT to increase the weight of patients with TB.

Keywords: Cohi Fish Biscuits, Vitamin C, Pulmonary Tuberculosis (TB)

INTRODUCTION

Tuberculosis (TB) is the leading cause of disability and death in most countries around the world. Mortality and morbidity due to TB increases with age, in adults it is higher in adult men. The morbidity of TB is higher among the poor and urban blood when compared to rural areas (Chin, 2009).

Based on World Health Organization (WHO) data in 2017, TB is still one of the top ten causes of death worldwide. In 2016, there were 10,400,000 TB sufferers and 1,700,000 of them died. It is estimated that 1,000,000 children suffered from TB in 2016 and 250,000 of them died from TB. More than 95 percent of deaths from TB occur in low- and middle-income countries. Globally, the incidence of TB decreases by about 2 percent per year, but it still requires a lot of special handling to be able to end the TB epidemic in order to achieve the target of the Sustainable Development Goals (SDGs) by 2030.

It is estimated that 53,000,000 people were saved through TB diagnosis and treatment between 2000 and 2016. The factors that cause the rapid transmission of TB infection are low immunity, including HIV/AIDS infection and malnutrition. Malnutrition and tuberculosis are interrelated problems. Poor nutritional status will affect immunity and will reduce body resistance so that it is prone to infection which later becomes TB. Conversely, TB disease can affect food intake and cause weight loss which affects nutritional status. The condition of TB patients with malnutrition status will slow down the healing period and will increase the mortality rate compared to TB patients with normal nutritional status.

The magnitude of the influence of nutritional status on the success of TB treatment, makes improving nutrition one of the efforts to reduce transmission and prevention of TB disease in Indonesia. However, so far not much research has been done on the relationship between TB and nutrition or vice versa. Additional supplementation and special additional food in addition to treatment needs to be done for TB patients, especially those with malnutrition status at the beginning of treatment.

Inadequate nutrition can damage cellular immunity and increase the severity of TB disease. Moderate to severe malnutrition increases the risk of TB-related death and this is consistent in adults and children, and in patients with susceptible drugs and drug-resistant TB. Weight less than 35 kg is associated with a nearly fourfold risk of death in South India compared to those over 35 kg (World Health Organization, 2017).

There are three mechanisms of TB that can lead to weight loss in sufferers. The first is decreased intake due to anorexia (which is a side effect of OAT) and it correlates with clinical disease severity. The second is that TB increases the basal metabolic rate due to fever, although this increase is offset by reduced energy expenditure as activity decreases before clinical improvement is initiated as a result of treatment. And third, TB causes protein catabolism with the resulting negative nitrogen balance, with muscle damage due to the effect of the acute phase response (World Health Organization, 2017).

The tendency for tuberculosis sufferers to lose weight is a result of symptoms of anorexia which causes poor nutritional status (BMI <18.5). This condition can lead to poor nutritional status if it is not balanced with a proper diet. Malnutrition that occurs will aggravate the infectious disease, so that nutritional status is the main cause of failure of treatment conversion in tuberculosis patients.

Supplementary food provision should be based on local food ingredients that are adapted to local conditions so that the possibility of the program being sustainable is greater because it allows food to be always available and easy to obtain. Prioritizing food sources of calories and protein without neglecting other sources of nutrients such as: tubers, nuts, fish, green vegetables, or coconut and their processed products (Kementerian Kesehatan, 2014).

Many studies related to PMT for TB sufferers have been carried out, including using boiled eggs, goat's milk, tempeh biscuits and yogurt. Research that has often been done for PMT is biscuits. Biscuits are a type of food made from wheat flour with the addition of other food ingredients such as fat, sugar and developer materials with a molding and heating process. Currently the biscuit recipe has been adapted to the taste and availability of food in certain local communities.

Providing additional food based on local food ingredients such as Cohi fish which is a local food in Percut Sei Tuan District, Deli Serdang Regency, North Sumatra. Cohi fish is a mixture of various types of small fish caught by fishermen that have been sorted and cannot be sold anymore because they are too small. Cohi fish are mostly used for animal feed or not used at all (thrown away). Cohi fish has

good nutritional content which is expected to be able to help meet the shortage of daily intake for TB sufferers. Cohi fish has nutritional value which is rich in energy, protein, vitamin A and fiber. The nutritional value of Cohi fish that is processed into biscuits will be better than Cohi fish that is consumed fresh.

In addition to needing additional foods that are rich in macro nutrients, TB sufferers also need micronutrients that can trigger increased body immunity. There are several types of vitamins and minerals that function as antioxidants that can trigger a large immune system including vitamins A, B1, C, E, minerals, selenium and zinc. These vitamins and minerals are found in very limited quantities in food ingredients, so the deficiency needs to be added through supplements. Vitamin C is a very effective antioxidant in small amounts, vitamin C can protect molecules that are needed in the body such as proteins, lipids, carbohydrates and nucleic acids. The main function of Vitamin C is in the synthesis of collagen, proteoglycans of other intercellular matrix organic substances, for example in bones, teeth, capillary endothelium.

Vitamin C which acts as an antioxidant is very important for TB sufferers, where this vitamin C acts on the fibroblastic connective tissue which functions as an oxidative. Based on the results of the study, it shows that giving vitamin C 500 mg/day for 5-10 days can increase body weight, reduce TB lesions and can significantly reduce the frequency of coughs and sputum.

Giving vitamin C in the form of oral supplementation to TB patients affects the immune system of TB sufferers. Research by Nugroho (2014) concluded that there was an effect of vitamin C on increasing lymphocyte levels in TB patients. With the increased immunity in TB patients, it affects the acceleration of healing and the increase in body weight of TB patients.

This study aims to see the effect of giving Cohi fish biscuits and vitamin C on the weight of patients with pulmonary tuberculosis in Percut Sei Tuan District in 2019.

RESEARCH METHODS

This type of research is a quantitative approach with an experimental approach. The quasi experimental design in this study was the pretest-posttest control group design. The study was conducted by comparing the case group and the control group.

The third study used three groups, namely the first experimental group (P1), the second experimental group (P2) and the control group (P0). Subjects were 52 new cases of pulmonary tuberculosis patients with malnutrition who were divided into three groups: 16 people in the first group who received 100 g/day of Cohi fish biscuits, 16 people in the second group who received 100 g/day of Cohi fish biscuits and 500 mg/day of vitamin C, and 20 people in the control group.

This research was conducted in Percut Sei Tuan District, Deli Serdang Regency during April-May 2019. The experiment was carried out for 30 days starting from the first day the respondents were weighed for the pretest.

The variables of this study were body weight, giving Cohi fish biscuits and giving vitamin C. The tools in this study were scales to weigh body weight, interview guides, checklists to determine the provision of Cohi fish biscuits and vitamin C.

The analysis was carried out in research with univariate and bivariate analysis. Univariate analysis that is descriptive using a frequency distribution table. Bivariate analysis was performed using the ANOVA test.

RESULT AND DISCUSSION

The results of the univariate analysis can be seen in the table below:

Table 1 shows that the number of respondents in this study were 52 new pulmonary TB patients, 23 (44.2%) men and 29 (55.8%) women. While the largest age is 31-40 years.

Table 1: The Frequency Distribution of Respondents According to Gender and Age

Characteristics of Respondents	n = 52	%
Gender		
Men	23	44.2
Women	29	55.8
Age		
<20 Years	4	7.6
20-30 Years	15	28.8
31-40 Years	17	32,6
41- 50 Years	12	23.4
>50 Years	4	7.6

The results of the bivariate analysis can be seen in Table 2:

Table 2: Distribution of Frequency Change in Body Weight of Patients with Pulmonary TB after Intervention

Group Experiment	N=52	Pre test	Post-Test	ΔPretest-Post Test	P-Value
P1	16	48.62	47.27	1.5	0.00
P2	16	46.87	48.09	0.7	
P0	20	49.72	45.88	3.3	

The average weight change in the first experimental group was -1.5 kg, which means there was a decrease in body weight for some respondents even though they had been given an intervention in the form of 100 grams of Cohi fish biscuits every day for one month, this was possible because of the side effects of drinking. OAT taken in the morning, causing nausea and vomiting throughout the day, resulting in reduced food intake that has been consumed.

The average change in body weight in the second experimental group was 0.7 kg, this indicates that there was an increase in body weight in the respondents in the intervention group of Cohi fish biscuits and vitamin C with the most weight gain of 2.2 kg. Meanwhile, in the third group (control) the average change in body weight of the respondents was -3.3 kg, which means that there was a decrease in the respondent's body weight during the study period.

Based on the results of the ANOVA test, it is known that there is no difference in the post-test results of pulmonary tuberculosis patients in the three experimental groups after the intervention, but based on the results of the ANOVA test, it is known whether or not there is a difference in body weight changes of respondents in the three experimental groups after the intervention. There was an effect of giving Cohi fish biscuits and vitamin C on changes in the weight of TB patients. The Bonferroni post hoc test results can be seen in the Table below:

Table 3: The Results of the Bonferroni Post Hoc Test on the Respondent's Body Weight after the Intervention

Group	P1	P2	P3
P1	-	0.75	1.8*
P2	0.75	-	2.6*
P3	1.8*	2.6*	-

Based on the results of the Bonferroni post hoc test, it was found that couples who had a significant difference in mean weight change ($p<0.05$) were: the P1 group and the control group (P0); and group P2 and group P0.

Respondents of this study were 52 new pulmonary TB patients, 23 (44.2%) men and 29 (55.8%) women. More women who became research respondents were because women were more obedient in taking medicine and it was easier to get approval to become research respondents than men, especially those who were working.

This result is in line with the research of Ningsih (2018) which shows that of the 78 respondents, the most dominant is female as many as 54 respondents (69.2%) and male as many as 24 people (30.8%). This may occur because women mostly stay in the house which is rarely exposed to the sun and are too tired from their daily activities to take care of household chores.

According to the results of the univariate analysis it is known that the age of the respondents for this study was between 17 years and 61 years with the average age of the respondents being 37 years. The largest age group is the age group 31-40 years (32.6%).

Stated that the individual factors that discuss age state that the age group most vulnerable to contracting TB is the young adult age group who is also the productive age group.

Normal weight change is also a predictor of the success of pulmonary TB treatment. The nutritional status of TB patients will generally improve during treatment. This can be caused by several

factors including increased food intake and appetite, and the body's metabolic processes begin to improve.

Anti-tuberculosis (OAT) drugs with a strong antibiotic spectrum, causing damage to the digestive tract in the intestinal macroflora, decreased absorption of nutrients, decreased immune response accompanied by decreased nutritional status and appetite for sufferers and causes nausea, vomiting, diarrhea, loss of appetite, increased body temperature and decreased intestinal macroflora. Pulmonary tuberculosis patients experience a decrease in nutritional status due to the level of behavior towards food and health, especially adequate energy and protein, long suffering from lung disease, and the patient's per capita income. Improving nutrition is an effort to break the chain of transmission and eradication of tuberculosis. (Widiastuti, Darmono and Sofro, 2019).

Tuberculosis sufferers experience decreased appetite due to side effects of OAT which must be consumed regularly because it causes nausea, vomiting and headaches. The diet of tuberculosis sufferers is disrupted due to the side effects of OAT which causes a reduction in the amount of food consumption, if usually the patient is able to spend 100 grams of rice once in a plate of each meal, they are now only able to spend one-third of it. This is one of the main causes of weight loss in tuberculosis sufferers. Food texture also has an important role in helping tuberculosis sufferers to eat more. Tuberculosis sufferers who consume porridge can eat more of their food because they are swallowed younger than when they eat rice. In addition, the frequency of eating also affects the amount of food that can be consumed by tuberculosis sufferers who have only eaten three times a day with a portion of one third of the usual day so that the total calories obtained from daily consumption are not sufficient according to the RDA.

One of the efforts to improve nutrition can be done by giving PMT. Supplementary food is food given to someone to help meet the need for nutritional substances.

Efforts are made to PMT in TB sufferers to increase body weight. In this study, the intervention in the form of PMT which was given was Cohi fish biscuits which had a high protein content given to the first and second experimental groups which were expected to be able to provide additional intake of calories, carbohydrates, protein and fat so that they could meet the recommended amount according to the RDA. Giving 100 grams of Cohi fish biscuits contributed 583.29 kcal of calories, 15.32 grams of carbohydrates, 25.54 grams of protein and 46.65 grams of fat.

The average weight change in the first experimental group was-1.5 kg, which means there was a decrease in body weight for some respondents even though they had been given an intervention in the form of 100 grams of Cohi fish biscuits every day for one month, this was possible because of the side effects of drinking. OAT taken in the morning, causing nausea and vomiting throughout the day, resulting in reduced food intake that has been consumed.

This study is in line with research conducted by Martin and Sabina (2009) in Dili, East Leste on adults with TB with high-energy local food intake for 8 months where at the beginning of the intervention month there was no change in the average weight gain. the intervention group but after eight months in the intervention group were able to gain more weight than the group that was only given nutrition education.

The average change in body weight in the second experimental group was 0.7 kg, this indicates that there was an increase in body weight in the respondents in the intervention group of Cohi fish biscuits and vitamin C with the most weight gain of 2.2 kg. Meanwhile, in the third group (control) the average change in body weight of the respondents was -3.3 kg, which means that there was a decrease in the respondent's body weight during the study period.

The most respondents' weight loss occurred in the third group by ten

kilograms, this is because the third group had an average calorie intake that was not sufficient according to the RDA and did not get any intervention so they did not get the additional nutrients needed to meet daily intake.

This study is in line with the research of Setiawan and Nugraha (2016) who gave PMT to tuberculosis patients in the form of additional food of 150 g of steamed tempeh every day given to patients with active pulmonary TB for four weeks showing an increase in body weight of 1.2 kg.

A study by Paton et al (2004) who conducted nutritional interventions for new tuberculosis patients showed that patients in the nutritional supplement group (who received PMT) had a significantly greater weight gain (2.57±1.78) compared to control subjects at week six. During subsequent follow-up, weight gain remained greater in the nutritional supplement group.

Supplementary nutrition accelerates restoration of nutritional status and restores physical function more rapidly in the early phases of TB treatment. A recent Cochrane systematic review article shows that macronutrient supplementation plus micronutrient supplementation in patients with active TB can result in increased body weight and improved physical function (Sinclair et al, 2011).

Studies show a link between vitamin C deficiency and TB disease. Vitamin C supplementation can kill the bacteria Mycobacterium tuberculosis. Malnutrition is associated with micronutrient deficiencies that can impair immune function, allowing it to provide access to pathogens thereby reducing the ability of the host to eliminate pathogens once they enter the body. Thus, malnutrition predisposes to infection. Therefore supplementation with vitamins especially those which are antioxidants such as vitamin C has been shown to be beneficial (Madhavi et al, 2009).

Vitamin C which is useful for preventing infectious diseases can also be seen from the number of respondents who contracted the flu during the intervention period less than respondents in the first group (P1) and the third group (P0).

Giving vitamin C 500 mg/day for 5-10 days can increase body weight, reduce TB lesions and can reduce the frequency of cough and sputum significantly.

Another study by Nugroho (2014). Giving vitamins to respondents given as much as 500 mg per day orally for 10 days can increase lymphocyte levels and body weight of pulmonary tuberculosis patients.

Based on the results of the Anova test, it is known that there is no difference in the post-test results of pulmonary tuberculosis patients in the three experimental groups after the intervention, but based on the results of the Anova test, it is known whether or not there is a difference in body weight changes of respondents in the three experimental groups after the intervention. There was an effect of giving Cohi fish biscuits and vitamin C on changes in the weight of TB patients.

Based on the results of the Bonferroni Post Hoc Test, it was found that couples who had a significant difference in mean weight change ($p < 0.05$) were: the P1 group and the control group (P0); and group P2 and group P0. In other words, the intervention giving Cohi fish was able to withstand the weight loss of tuberculosis patients to be smaller than not given anything and the intervention by giving Cohi fish and vitamin C was able to increase the body weight of TB sufferers.

CONCLUSION

The conclusion from this study can be said that the intervention of Cohi fish biscuits 100 grams/day and vitamin C 500 mg/day carried out for 30 days can be concluded that the provision of Cohi fish biscuits with or without vitamin C supplements affects the weight of patients with pulmonary tuberculosis. The intervention giving Cohi fish biscuits was able to withstand the weight loss of pulmonary tuberculosis patients so that it did not decrease as much as the control

group and the intervention by giving Cohi fish and vitamin C was able to increase the body weight of tuberculosis sufferers.

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