



The Effect of Ronggeng Shrimp Coconut Shredded on Weight Gain in Malnourished Adult Pulmonary TB Patients in Sibolga City

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Abstract

Pulmonary TB disease causes high morbidity for sufferers and results in malnutrition. Providing nutritious local foods and zinc supplements can support patients' weight gain, which is often lost due to infection and treatment. This study aims to analyze the effect of

providing local food and zinc supplementation on weight gain in adult pulmonary TB sufferers who are malnourished. The research design is quasi-experimental with a sample size of 45 people obtained using random sampling techniques. Bivariate data analysis used the paired sample t test and ANOVA test. The results of the study showed that there was an effect of giving coconut shredded ronggeng shrimp on the weight gain of adult pulmonary TB sufferers who were malnourished. The conclusion of the research results is that there is an effect of providing local food on weight gain in adult pulmonary TB sufferers who are malnourished. It is recommended for TB sufferers to consume local food consistently as recommended and it is hoped that sufferers always adopt a healthy lifestyle, including avoiding habits that can worsen TB.

keywords: Tuberculosis, malnutrition, local food, shredded ronggeng shrimp.

Introduction

Tuberculosis (TB) is a contagious disease caused by the Mycobacterium tuberculosis bacteria. The main symptoms include a persistent cough lasting more than two weeks, often accompanied by phlegm and sometimes blood, fatigue, shortness of breath, weight loss, loss of appetite, night sweats without physical activity, malaise (easy tiredness), and fever lasting more than one month. Pulmonary TB leads to high morbidity and frequently results in malnutrition (Lazulfa, Pratiwi, & Sari, 2016).

According to the World Health Organization (WHO), pulmonary TB is a significant global medical challenge. It has been the second-leading cause of death after COVID-19 since 2022, affecting over 10 million people annually. If not promptly treated, the mortality rate can reach



approximately 50%. In 2022, pulmonary TB caused around 1.3 million deaths globally. WHO reports that 85% of pulmonary TB cases are treatable. In 2022, 7.5 million people were diagnosed with pulmonary TB worldwide. Thirty countries accounted for 87% of global TB cases, with two-thirds of these cases concentrated in eight countries: India (27%), Indonesia (10%), China (7.1%), the Philippines (7%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%), and the Democratic Republic of Congo (3%). Demographically, 33% of TB cases were among women, 55% among men, and 12% among children aged 0–14 years (Global TB Report, 2023).

In North Sumatra Province, the number of TB cases with positive acid-fast bacilli (BTA+) has increased significantly in recent years. In 2017, 15,715 cases were recorded, which rose to 26,418 in 2018 and 33,779 in 2020. According to data from the North Sumatra Central Statistics Agency (BPS), three regions with the highest TB prevalence were West Nias Regency (718 per 100,000 population), Medan City (531 per 100,000), and Sibolga City (528 per 100,000) (North Sumatra Provincial Health Service, 2019). The Sibolga City Health Service reported 416 drug-sensitive TB (DS-TB) cases and seven drug-resistant TB (DR-TB) cases in 2023. Between January and September 2024, 320 pulmonary TB cases were recorded across five health centers in Sibolga City (Sibolga City Health Service, 2024).

Pulmonary TB often coexists with malnutrition, characterized by deficiencies in macro- and micronutrients such as zinc, protein, vitamins A and C, and iron. Approximately 87% of pulmonary TB patients suffer from malnutrition, with body weights ranging between 30–50 kg among adults (Durry, Wirjatmadi, & Adriani, 2015). The risk of TB increases by 13.8% for every unit decrease in body mass index (BMI). Malnutrition is now recognized as a leading risk factor for pulmonary TB, surpassing even HIV, and caused 2.3 million cases in 2019. The relationship between TB and malnutrition is bidirectional, as TB can lead to malnutrition due to cachexia, anorexia, malabsorption, and inflammation (Kiazyk & Ball, 2017).

Malnutrition reduces immune strength, increasing susceptibility to infections. Active pulmonary TB further exacerbates nutritional deficiencies, as shown by studies conducted in India, Indonesia, Japan, and the UK. Serum albumin levels among malnourished TB patients are significantly low. Improving nutritional status is essential for infection prevention and TB eradication. Poor nutritional status increases the risk of contracting pulmonary TB (Ernawati et al., 2018).

Administering shredded coconut meat combined with deep-sea ronggeng shrimp can significantly aid in patient recovery by improving immunity and supporting chemotherapy. Ronggeng shrimp is a type of crustacean with high nutritional content, including 43.91% protein, 12.35% fat, and 16.01% fiber (Nopia, Rahman, & Sari, 2017). The shrimp's protein is composed of essential and non-essential amino acids, while its fats are rich in omega-3 unsaturated fatty acids, which support brain development and reduce the risk of coronary artery disease (Dini & Ratna, 2013).

Ronggeng shrimp, also known as **Harpiosquilla raphidea**, has economic potential but remains underutilized in Indonesia. This shrimp species contains 17 amino acids, including eight essential and nine non-essential amino acids, giving it a complete protein profile (Mahdiah, 2016).



A preliminary study involving 90 pulmonary TB patients in Sibolga City revealed that 11 patients (12.22%) had severe undernutrition, with an average BMI of 15.0, while 28 patients (31.11%) had mild undernutrition, with an average BMI of 17.8. Dietary recall interviews with 50 malnourished TB patients indicated an average energy intake of 2137 calories per day, which is below the recommended 2100–2650 calories depending on age and gender. Zinc intake was also insufficient at an average of 6 mg per day, 2–5 mg below the recommended levels outlined in the Indonesian Ministry of Health Regulation No. 28 of 2019.

Based on this background, the researchers are interested in studying the effect of shredded coconut meat combined with ronggeng shrimp on weight gain among malnourished adult pulmonary TB patients in Sibolga City.

Methods

This study is a quasi-experimental design in which researchers aim to measure the effect of a treatment on a specific variable without using a control group that does not receive the treatment or intervention. The intervention involved observing the impact of shredded coconut meat combined with ronggeng shrimp on the body weight of adult pulmonary TB patients suffering from malnutrition in Sibolga City. The effects of the shredded coconut meat and ronggeng shrimp were analyzed using a Paired Sample T-Test. This research was based on data obtained from three health centers with the highest pulmonary TB cases in Sibolga City, involving a population of 176 registered pulmonary TB cases from January to September 2024. The sample size for this study consisted of 15 individuals selected based on the following criteria: a) Patients aged 18–59 years diagnosed with pulmonary TB. b) Patients with malnutrition, defined as a BMI of $\leq 18.5 \text{ kg/m}^2$. c) Patients undergoing intensive or advanced TB treatment for a duration of 1–4 months. d) Patients willing to participate in the study by signing informed consent.

Results and Discussion

Characteristics of Respondents

The characteristics of respondents in this study include age and gender.

Table 1. Frequency Distribution of Respondents Based on Characteristics

Characteristics of Respondents	n	%
Gender		
Man	9	60.0
Woman	6	40.0
Age		
12-25 Years	3	20.0
26-45 Years	6	40.0
46-65 Years	6	40.0



The characteristics of respondents studied in this research included age and gender. In the intervention group that received shredded coconut and ronggeng shrimp, there were 9 males (60%) and 6 females (40%). Based on age, the distribution of respondents was as follows: **12–25 years:** 3 participants (20%), **26–45 years:** 6 participants (40%), **46–65 years:** 6 participants (40%).

Nutritional Content of Shredded Coconut and Ronggeng Shrimp. The nutritional content of shredded coconut and ronggeng shrimp used during the four-week intervention for adult pulmonary TB patients with malnutrition is presented in Table 2.

Table 2. Nutritional Content of Shredded Coconut and Ronggeng Shrimp

Parameter	Unit	Test Results
Carbohydrate	%	7.31
Protein	%	22.2
Total Fat	%	41.0
Zinc (Zn)	mg/kg	53.5

Source : Medan Industrial Standardization and Services Center (2024)

Bivariate Analysis

Normality Test

A normality test was conducted on the variable of weight gain in adult pulmonary TB patients experiencing malnutrition. The Shapiro-Wilk test was used because the sample size was fewer than 50 participants. This test compares the empirical data distribution with the expected normal distribution. The difference in weight gain before and after the intervention was analyzed using a parametric statistical test, specifically the dependent samples t-test (also called the paired samples t-test), with a 95% confidence level. The Shapiro-Wilk test results showed a p-value greater than 0.05, indicating that the data for the weight gain variable was normally distributed. The results are presented in Table 3.

Table 3. Normality Test Results Using the Shapiro-Wilk Test for the Weight Gain Variable

Variables	n	Sig	A	Information
Provision of Shredded Coconut and Ronggeng Shrimp				
Weight Before	15	0.120	0.05	Normal
Weight After	15	0.312	0.05	Normal

Hypothesis Testing. The difference in the effect of the intervention involving shredded coconut and ronggeng shrimp was assessed by comparing the body weight before and after the intervention for each group. The results of the Shapiro-Wilk normality test indicated that the data were normally distributed. Therefore, hypothesis testing was conducted using a parametric statistical test, specifically the dependent samples t-test (also known as the paired samples t-test),



with a 95% confidence level. Difference in Body Weight Before and After the Intervention The analysis of weight differences before and after the intervention with shredded coconut and ronggeng shrimp showed an average weight before intervention of 46.11 kg and an average weight after intervention of 47.22 kg. This indicates an average weight increase of 1.11 kg.

The results of the paired t-test, as shown in Table 4, reveal a p-value of 0.003. Since the p-value is less than 0.05, the null hypothesis (H_0) is rejected. Thus, it can be concluded that the provision of shredded coconut and ronggeng shrimp has a significant effect on increasing body weight in adult pulmonary TB patients experiencing malnutrition.

Table 4. Paired T-Test Results: Body Weight Before and After Providing Shredded Coconut and Ronggeng Shrimp

Provision of Shredded Coconut and Ronggeng Shrimp	n	Mean	SD	p.value
Weight Before	15	46.11	1,430	0.003
Weight After	15	47.22	1,540	

Based on the research results, it is evident that the provision of shredded coconut and ronggeng shrimp significantly influences the increase in body weight in adult pulmonary TB patients experiencing malnutrition, with a p-value of 0.003 ($p\text{-value} < 0.05$). The study also showed a weight increase, with the average body weight before the intervention being 46.11 kg, and after the intervention, it increased to 47.22 kg.

The average difference in body weight increase in adult pulmonary TB patients experiencing malnutrition after the intervention is as follows: Respondents receiving shredded coconut and ronggeng shrimp had an average weight increase to 47.22 kg. Respondents receiving zinc supplements had an average weight increase to 47.51 kg. Respondents receiving both shredded coconut and ronggeng shrimp along with zinc supplements had an average weight increase to 49.16 kg. In summary, the group receiving shredded coconut and ronggeng shrimp along with zinc supplements showed the highest average weight increase. Based on the ANOVA test, the p-value was found to be 0.642 ($p\text{-value} > 0.05$). Therefore, it can be concluded that the average weight increase across the three intervention groups was not significantly different.

Table 5. Differences in Weight Gain in Adult Pulmonary TB Patients Who Experienced Malnutrition After the Intervention

Variables	Group Intervention	Mean	SD	p.value
Weight After Intervention	Coconut and Ronggeng Shrimp	47.22	5,967	0.642
	Zinc Supplements	47.51	6,728	
	Shredded Coconut			
	Ronggeng Shrimp and Zinc Supplement	49.16	5,418	



Ronggeng shrimp is a type of crustacean with a high nutrient content, including 43.91% protein, 12.35% fat, and 16.01% crude fiber (Nopia, Rahman & Sari, 2017). Ronggeng shrimp offers good nutritional value, as it contains protein made up of both essential and non-essential amino acids, and fat that is predominantly composed of Omega-3 unsaturated fatty acids, which are beneficial for brain development and can reduce the risk of coronary artery disease (Dini & Ratna, 2013). Protein is an essential substance for the body, serving both as a building block and a regulatory compound. It is a complex substance made up of amino acids connected by peptides, containing carbon (C), hydrogen (H), oxygen (O), and nitrogen (N) elements (Sudiono, 2017).

Fadlilah and Romadhoni (2024) noted that the shredded coconut and ronggeng shrimp product has the advantage of utilizing local ingredients that enhance its nutritional value, and it can be used as a long-lasting side dish. Overall, providing nutritious local foods rich in micronutrients such as zinc, vitamin A, and protein can serve as an additional strategy for managing tuberculosis. These foods help accelerate the healing process and improve the nutritional status of patients. This aligns with the findings of Nuri et al. (2023), who emphasize the importance of combining chemotherapy, supplements, and increased food supply to boost the body's immunity and improve the healing rate of TB patients.

According to Pratomo et al. (2012), malnutrition in tuberculosis patients can prolong the healing process and increase the mortality rate compared to those without malnutrition. Malnutrition in TB patients is linked to delayed healing, higher mortality rates, relapse risks, and the occurrence of hepatitis due to anti-tuberculosis drugs (OAT). Relapse rates are higher in patients with a BMI <18.5. Therefore, increasing food consumption is essential. Naga (2012) explained that insufficient food intake leads to deficiencies in calories, protein, vitamins, and other nutrients, which negatively affects a person's nutritional status and immune system. This makes individuals more susceptible to diseases, including tuberculosis.

In the field, shredded coconut and ronggeng shrimp are well accepted by respondents due to their savory and familiar taste. Good acceptance of this food can increase overall food intake, contributing to weight recovery. Empirical data shows that TB patients who consume shredded coconut and ronggeng shrimp regularly exhibit a significant trend of weight gain. This suggests that this local food is an effective nutritional supplement for malnourished TB patients. Shredded coconut and ronggeng shrimp can be locally produced with ingredients available in the surrounding environment, making it a sustainable solution. Its affordable price also makes it accessible to low-income groups, especially TB patients. The use of local foods like shredded coconut and ronggeng shrimp also supports the preservation of local eating traditions while providing relevant nutritional solutions for TB patients. This makes shredded coconut and ronggeng shrimp a promising option for nutritional intervention to support weight gain in malnourished TB patients. However, it is important to support these findings with further research, including clinical trials and long-term studies, to ensure its safety and effectiveness in various conditions.



Conclusion

The difference in weight before and after giving shredded coconut and ronggeng shrimp is reflected in the average weight, which was 46.11 kg before and 47.22 kg after the intervention. There is a significant effect of giving shredded coconut and ronggeng shrimp on increasing body weight in adult pulmonary TB patients who experience malnutrition, with a p-value of 0.003.

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