The 1st International Conference On Health, Social, Sciences, and Technology (ICoHSST 2020)

The Effect of Giving Garcinia Formula as An Alternative Food to Increase Weight and Hemoglobin Levels of Pulmonary Tuberculosis Patients

1st Susyani
Nutrition Department
Politeknik Kesehatan Kemenkes Palembang
Palembang, Indonesia
Email: susyani@poltekkespalembang.ac.id

2nd Nur Sabrina Ismah
Nutrition Department
Politeknik Kesehatan Kemenkes Palembang
Palembang, Indonesia
Email: nursabrinaismah @poltekkespalembang.ac.id

3rd Eddy Susanto
Nutrition Department
Politeknik Kesehatan Kemenkes Palembang
Palembang, Indonesia
Email: eddysusantoo@poltekkespalembang.ac.id

Corresponding author: susyani@poltekkespalembang.ac.id

***Abstract* - Pulmonary tuberculosis is an infectious disease caused by Mycobacterium Tuberculosis which attacks the lungs. Patients with pulmonary TB can be cured with OAT therapy which is consumed regularly for 6 months. There are side effects that cause symptoms such as nausea, vomiting, etc., which causes a little intake of nutrients so that it affects weight loss, and deficiency of protein and iron due to lack of nutrient intake causes hemoglobin levels to decrease. Management of weight loss and hemoglobin levels in patients with pulmonary tuberculosis includes pharmacological and non-pharmacological therapies that can be supported through supplementary feeding such as Formula Garcinia. Objectives: To determine the effect of giving Garcinia Formula as additional food for gaining body weight and hemoglobin levels for pulmonary tuberculosis patients in the Pulmonary Specialty Hospital in South Sumatera. Research Design is a quasi-experiment with a pretest and posttest study design, analysis of data used is the Wilcoxon and Mann Whitney tests. Results. In the Wilcoxon test results were obtained if the treatment group or comparison both had an effect on gaining body weight and hemoglobin levels. Based on the Mann Whitney test showed that there was a significant effect in the administration of the Garcinia Formula for gaining body weight and hemoglobin levels (p = 0.000, p = 0.008) Conclusion. There is an effect of giving Garcinia Formula as additional food for gaining body weight and hemoglobin level for pulmonary tuberculosis patients in the Pulmonary Specialty Hospital in South Sumatera**

Keywords: Pulmonary Tuberculosis, Body Weight, Hemoglobin Level, Formula Garcinia.

I. INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis, which attacks the lungs more often, but can attack other organs. The pathogenesis of TB is multifactorial and includes oxidative stress. In TB patients there is hyperactivation of macrophages due to Mycobacterium tuberculosis infection [1].

The discovery of pulmonary TB cases in Palembang has decreased and increased, in 2010 it was 0.07% and increased to 0.14% in 2011, then decreased in 2012 which was equal to 0, 08% and fell back to 0.07% in 2013, then in 2014, there was an increase again of 0.08% In 2015 the discovery of new TB cases in Palembang 0.08% or 1,324 cases [2].
Results of the study all patients could theoretically be cured, as long as you are diligent in taking medicine until the treatment phase is complete. However, there are side effects resulting from the administration of these drugs, which can cause symptoms such as; nausea and vomiting, diarrhea, joint pain, gastrointestinal disorders, and insomnia, this causes decreased appetite in sufferers which will have an impact on weight loss [3].

Research in 2018 stated that there was a significant relationship between initial nutritional status and current nutritional status with clinical symptoms of pulmonary TB patients. A decrease in nutritional status is often found in patients suffering from TB [4].

Malnutrition in TB patients if not treated promptly will lead to more serious health problems, such as an increase in mortality [5]. Lack of nutrients that play a role in the immune system, such as protein and iron, makes a person susceptible to infectious diseases [6]. Tuberculosis patients with poor nutritional status have lower hemoglobin levels than patients with good nutritional status. Deficiency of iron and other nutrients and the presence of chronic diseases such as tuberculosis can cause anemia.

Increasingly developing science, with various findings such as fruits that contain various kinds of nutrients needed by the body. The findings that have been published have made many people know about the benefits of food ingredients produced by nature, one of which is mangosteen (garcinia mango stone). The combination of mangosteen fruit and mangosteen rind can be used as traditional food. This food formula is called the Garcinia Formula. Garcinia formula is a food additive in the form of pudding made from mangosteen fruit and mangosteen rind as the main ingredient which contains a number of nutritional values, such as Energy 465.8 kcal, Protein 10.1 g, Fat 19.3 g, KH 75.4 g, Fe 3.5 mg, Vit C 48.9 mg, Xanthone 63.9 mg, which helps in the influence and increase of hemoglobin and body weight in patients with pulmonary tuberculosis.

II. METHOD

This research was a quasi-experiment with a pretest and posttest design with a control group. The independent variable in this study

was the provision of Garcinia formula twice a day and the dependent variable was an increase in body weight and hemoglobin levels.
The subjects of this study were patients with pulmonary tuberculosis who had low body weight and low hemoglobin levels who were outpatients at the Special Hospital for the Lung of South Sumatra. The study was conducted in January - March 2019. The inclusion criteria for this study were aged> 19 years, low body weight, low hemoglobin levels, receiving OAT therapy from the hospital.

The determination of the respondents was done by using the purposive sampling method. The number of respondents each 25 for each group. The treatment group received the Garcinia formula 200 grams/cup 2 times a day for 7 days of administration and consumed OAT from the hospital, while the control group received no treatment but still consumed OAT from the hospital.

Bodyweight and hemoglobin levels before the intervention, body weight measurements, and hemoglobin levels were checked, then measured again after being given the intervention for 7 days. Weight data can be obtained using anthropometric measurements, and hemoglobin levels using a hemoglobin meter, while data on respondent characteristics can be obtained using the respondent's identity form by direct interview.

The normality test used the Kolmogorov-Smirnov test. Respondent characteristics were analyzed using descriptive analysis. Differences in body weight, hemoglobin levels before and after the intervention of the two groups were analyzed using the Wilcoxon and Mann Whitney statistical test.

III. RESULTS

Respondent characteristics consist of gender and age are presented in Table 1

Table 1. Characteristics of Respondents

Characteristics of Respondent	Treatment		Control	
	n	%	n	%
Gender				
Male	16	64	17	68
Female	9	36	8	32
Age				
Late Youth	6	24	8	32
Early Adult	5	20	3	12
Late Adult	2	8	8	8
Early Elderly	6	24	6	24
Late Elderly	6	24	6	24

The frequency distribution based on nutrient intake during the intervention, consisting of energy, protein, fat, carbohydrates, Fe, vitamin C, is presented in table 2.

Table 2. Frequency of nutrient intake

Intake	Perlakuan		Kontrol	
	n	%	N	%
Energy				
Good	18	72,0	14	56,0
Not good	7	28,0	11	44,0
Protein				
Good	8	32,0	7	28,0
Not good	17	68,0	18	72,0
Fat				
Good	15	60,0	15	60,0
Not good	10	40,0	10	40,0
KH				
Good	21	84,0	15	60,0
Not good	4	15,0	10	40,0
Iron				
Good	17	68,0	5	20,0
Not good	9	32,0	20	80
Vit C				
Good	13	52,0	3	12,0
Not good	12	48,0	22	80,0

The mean body weight and hemoglobin levels before and after the intervention are presented in table 3.

Table 3. Differences in Average Body Weight and Hemoglobin Levels Before and After

	Group	Initial Mean ± SD	Final Mean ± SD	P
BB	Treatment	45,072 ± 5,1998	46,108 ± 5,2647	0,000
	Control	45,792 ± 6,1455	46,672 ± 5,2806	0,000
HB	Treatment	11,564 ± 0,8256	12,148 ± 0,9129	0,000
	Control	11,396 ± 0,7882	11,652 ± 0,8412	0,000

The effect of giving Garcinia formula on the increase in body weight and hemoglobin levels is presented in table 4.

Table 4. The effect of giving Garcinia formula on increasing body weight and hemoglobin levels

	Group	Mean rank	p
BB	Treatment	34,08	0,000
	Control	16,92	
HB	Treatment	30,94	0,008
	Control	20,06	

IV. DISCUSSION

The characteristics of the respondents in this study were mostly male and included in the early elderly and late elderly categories.

This is because men smoke more and consume alcohol and men's habits are outside which can reduce immunity so that they are more susceptible to pulmonary TB [7]. Results Prediction of the risk of getting pulmonary tuberculosis lies in the productive age and the elderly [8]. In the age group classified as the elderly tend to have decreased immunity along with the aging process, all organ functions have decreased, the ability to fight Microbacterium Tuberculosis is weak so that young germs enter the body of the elderly.

The results showed that body weight increased in both the treatment and comparison groups. The mean increase in body weight in the treatment group was 1.0360 kg and the mean increase in body

weight in the comparison group was 0.8800 kg. The results of the test (Mann Whitney test) found that the p-value in the treatment group and the comparison group <0.05, namely 0.000, so it can be concluded that there is an effect of giving Garcinia formula along with regular OAT consumption on weight gain in the treatment group and there was an effect of routine OAT consumption on weight gain in the comparison group.

This is in line with research in [9]. which stated that the results of the nonparametric analysis of the Wallis Crucifix with a significance value (p-value) of 0.000 so that it was concluded that there was an effect between giving mangosteen peel extract on the bodyweight of mice infected with M. Tuberculosis H37Rv which were given isoniazid. As for the comparison group, [10]. stated that there was an increase in body weight by an average of 2.3 kg after more than 4 weeks of treatment.

The results of the study proved that both giving Garcinia formula along with routine OAT consumption in the treatment group or only consuming OAT routinely in the comparison group can both increase body weight.

From the two groups, the increase in the treatment group was more influential and significant when compared to the comparison group who only consumed OAT regularly. This happens because the ingredients for the Garcinia formula consist of coconut milk and brown sugar which contain high calories and the addition of eggs adds to the protein value in the Garcinia formula accompanied by the respondent still consuming OAT regularly.

This study is in line with a study conducted by [11]. in which the study compared pulmonary TB patients who received OAT therapy and high-energy and protein supplements with pulmonary TB patients who received OAT therapy without being given high-energy and high-calorie supplements. The results of his research showed that there was an increase in body weight by an average of 2.6 kg and 0.8 kg for 6 weeks. Abnormal nutritional status is one of the effects of pulmonary tuberculosis.

The nutritional status of pulmonary tuberculosis patients is related to body weight, weight loss due to mycobacterium tuberculosis infection will reduce the nutritional status of these patients.

In addition to the additional intake of Garcinia Formula, the intake that comes together with the consumption of Garcinia formula after a 1x24 hour recall for 7 days shows that macro intake such as Energy, Fat, and Carbohydrates can be said to be good, while protein intake is still somewhat less good, this is because the level of protein consumption is still low, even if using animal and vegetable side dishes only in small portions.

The increase in body weight in respondents can be influenced by the presence of additional food from the Garcinia Formula and balanced with the consumption of energy, fat, and carbohydrate intake from other food sources.

The provision of Garcinia Formula as an additional food is expected to help improve the nutritional status of patients with pulmonary tuberculosis by increasing body weight. In this study, the Garcinia formula, apart from containing food ingredients from mangosteen and mangosteen rind, also added coconut milk and brown sugar, which added to the energy value of this formula feeding.

Garcinia formula has high energy and protein nutritional value, namely; energy 465.8 kcal and protein 10.1 g in 1-time administration. This is in accordance with the principles of the TKTP diet which is intended for patients with infection or those who have a bodyweight that is less than normal standards.

Respondents were given Garcinia Formula 2 times a day for 7 days so that in 1 day the respondent received a nutritional intake of 931.6 kcal of energy, and 20.2 g of protein a day from consumption of Garcinia formula. can increase body weight by an average of 1.0360 kg for 7 days.

However, in this study, the increase in body weight was not necessarily due to the consumption of the Garcinia formula, this was because the level of energy intake of the respondents could be categorized as sufficient, so there was a contribution from the consumption of foods other than the Garcinia formula.

The rapid weight gain in this study was thought to be due to edema which was not examined by the investigators. It is suspected that the edema occurs in respondents due to the side effect of this type of OAT, namely Rifampin.

The Garcinia formula which is given for 1 week by the researchers has not seen the impact of the changes so this administration within 1 week is an effort to reduce the symptoms and pain caused by this disease, if the symptoms that have appeared have decreased, efforts to increase the weight the body can be done because the intake that is consumed and absorbed by the body will focus on increasing fat and muscle mass. The Garcinia Formula can be continued in the following week until the impact of increasing body weight is seen.

The test results (Mann Whitney test) found that the p-value in the treatment group and the comparison group <0.05, so it can be concluded that there was an effect of giving Garcinia formula and OAT consumption on the increase in hemoglobin levels in the treatment group and there was an effect of OAT consumption. routinely to increased hemoglobin levels in the comparison group.

This is in line with research [12] in his research the results of the One Way Anova analysis had a p-value of 0,000 which stated that there was an effect of mangosteen peel extract on increasing hemoglobin levels in mice. Whereas in the comparison group, according to [13]. there was a relationship between the length of time taking anti-tuberculosis drugs in pulmonary TB patients to anemia, in their research OAT consumed by patients with pulmonary TB had side effects on hematological levels such as hemoglobin at the start of treatment. However, after entering treatment at month 6 there was an increase in hemoglobin levels,

from 12.73 g / dl at month 2 and increased to 13.28 g / dl at month 6.

The increase occurred because the frequency of taking the drug was not as frequent as in the first and second months. In this study, most respondents had entered the 4th to 5th month of treatment [14]. This study is in line with [13]. where there can be an increase in hemoglobin in patients with pulmonary TB during the treatment period. Either giving Garcinia formula accompanied by routine OAT consumption in the treatment group or only consuming OAT regularly in the comparison group can both increase hemoglobin levels.

From the two groups, the increase in the treatment group was greater and more significant when compared to the comparison group who only consumed OAT regularly. This is in line with [12]. in her research the results of the One Way Anova analysis had a p-value of 0.000 which stated that there was an effect of mangosteen peel extract on increasing hemoglobin levels in mice.
This happens because the ingredients for making Garcinia formula consist of mangosteen peel extracted and mangosteen fruit which contains 63.9 grams of xanthones. Xanthones are powerful antioxidants, which are needed to balance pro-oxidants in the body, known as free radicals [15].

Xanthone compounds contained in mangosteen peel have high antioxidants and are immunomodulators that can stabilize cells in the body and can also help in the process of forming erythrocytes and Hb [16]. In addition, there are additional ingredients from eggs in the Garcinia formula to enrich the nutritional value of protein at feeding this formula.

The increase in hemoglobin in the respondents, apart from coming from Formula D`garcinia, was caused by a good intake of Fe and Vit C. An increase in body weight in respondents is the effect of an increase in hemoglobin levels.

Low hemoglobin levels in chronic diseases such as TB have atypical clinical symptoms. In general, anemia in TB patients is found in one-third of cases, namely microcytic hypochromic anemia, which indicates chronic iron deficiency [16].

The process of iron absorption is so low that it requires additional vitamin C to help absorption by changing the form of ferric to ferrous in the small intestine so that it is easily absorbed [17].

The Garcinia formula contains 63.9 mg of Xanthone, 3.5 mg of iron, and 43.9 mg of vitamin C contained in the Garcinia formula. In this study, respondents received the Garcinia formula 2 times a day for 7 days. From the research that has been done, the Garcinia formula accompanied by continuing to consume OAT can increase hemoglobin by an average of 0.580 g / dl.

V. CONCLUSIONS

Giving Garcinia Formula 2 times a day for 7 days shows that there is an effect on the increase in body weight and hemoglobin levels in patients with pulmonary tuberculosis, but the increase is not necessarily due to the provision of Formula Garcinia, this is the intake of other nutrients to support it. resulting in an increase in body weight and hemoglobin levels in patients with pulmonary TB.

VI. SUGGESTIONS

It is hoped that the next researchers will be able to research in the long term and examine other factors that can support this research so that the impact of giving Formula Garcinia can be described.

VII. ACKNOWLEDGMENTS

Thank you to the South Sumatra Special Lung Hospital for giving permission to my research.

REFERENCES

[1] Misnadiarly dan Sunarno. *Tuberkulosis Paru dan Analisis Faktor- Faktor yang Mempengaruhi Tingginya Angka Kejadiannya di Indonesia Tahun 2007*. Availablefrom : http://ejournal.litbang.kemkes.go.id/index.php/BPK/article/viewFile/2194/1092 (Diakses pada 13 Juli 2018)

[2] Kemenkes RI .2017. *Profil Kesehatan Indoneisa 2016*. Available from ; http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-Indonesia-2016.pdf (diakses pada 13 juli 2018)

[3] Melati Sri, Nawas Arifin, dkk. 2010.*Pengamatan Pasien Tuberkulosis Paru dengan Multidrug Resistant (TB-MDR) di Poliklinik Paru RSUP Persahabatan*.Universitas Indonesia. Available from : https://www.researchgate.net/profile/Dianiati_Kusumo_Sutoyo/publication/283479338_Pengamatan_Pasien_Tuberkulosis_Paru_dengan_Multidrug_Resistant_TB-MDR_di_Poliklinik_Paru_RSUP_Persahabatan/links/5639be8508ae4624b75f2b96.pdf (diakses pada 10 Agustus 2018)

[4] Andini Fatma Trinata,dkk. 2018. *Analisis Faktor- Faktor Yang Mempengaruhi Gejala Klinis Pasien TB Paru Di Puskesmas Kota Palembang*. Universitas Sriwijaya

[5] Dargie, B., Tesfaye, G., & Worku, A. (2016). Prevalence and associated factors of undernutrition among adult tuberculosis patients in some selected public health facilities of Addis Ababa, Ethiopia: a cross-sectional study. BMC Nutrition, 2(1), 7. https://doi.org/10.1186/s40795-016-0046-x

[6] Dahlan, Ahmad, 2001. *Faktor-faktor yang Berhubungan dengan Kejadian Penyakit TB Paru BTA (+), Studi Kasus Kontrol di Jambi Tahun 2000–2001*, tesis, Program Pascasarjana, FKM Universitas Indonesia, Jakarta

[7] Jendra F, dkk. 2015. *Hubungan Faktor Risiko Umur, Jenis Kelamin dan Kepadatan Hunian dengan Kejadian Penyakit TB Paru di Desa Wori Kecamatan Wori*.Fakultas Kedokteran Unversitas Sam Ratulangi Manado. Available from : https://ejournal.unsrat.ac.id/index.php/JKKT/article/view/7773/7336 (diunggah pada 16 april 2019)

[8] Andayani Sri, Astuti Yuno. 2017. *Prediksi Kejadian Penyakit Tuberkolosis*
Paru Berdasarkan Usia di Kabupaten Ponorogo Tahun 2016-2020. Ponorogo. available from : http://journal.umpo.ac.id/index.php/IJHS/article/view/482(diakses pada : 16 april 2019)

[9] Stevanio da Lopez TL. 2018. *Pengaruh Pemberian Ekstrak Kulit Manggis Terhadap Berat Badan Tikus yang di Infeksi M. Tuberculosis H37Rv yang Diberi Isoniazid.* Fakultas Kedokteran Universitas Wijaya Kusuma. Surabaya.available from : http://erepository.uwks.ac.id/3398/1/eripository%20vian%2009700163.pdf (diakses pada : pada 17 april 2019)

[10] Wahyuningrum Tri,M. 2018. *Hubungan Kepatuhan Minum Obat Anti Tuberkulosis (OAT) dengan Status Gizi Pasien TBC Paru Fase Intensif di BBKPM Surakarta*. Fakultas Ilmu Kesehtaan Universita Muhamadiyah Surakarta. Available from :

[11] Paton, NI, et al. 2004. *Randomized controlled trial of nutritional supplementation in patients with newly diagnosed tuberculosis and wasting*. Singapura. available from : https://academic.oup.com/ajcn/article/80/2/460/4690333 (diakses pada : 17 April 2019)

[12] Rahmawati Nur, R. 2016. *Pengaruh Pemberian Ekstrak Kulit Buah*
Manggis (Garcinia mangostana) terhadap Jumlah Eritrosit, Leukosit, Hemoglobin (Hb) dan Gambaran Histologik Jantung Mencit (Mus musculus) yang Terpapar Asap Rokok. Universitas Negeri Yogyakarta. availble from:https://eprints.uny.ac.id/47158/1/RAGIL%20NUR%20RAHMAWATI.pdf (diakses pada 10 april 2019)

[13] Thuraidah Anny, dkk. 2017. Anemia dan Lama Konsumsi Obat Anti Tuberculosis.Jurusan Analis Kesehatan Poltekkes Kemenkes
Banjarmasin. available from : http://www.ejurnal-analiskesehatan.web.id/index.php/JAK/article/view/157/64
(diunggah pada 17 april 2019)

[14] Sari Diana,I, dkk. 2014. *Studi Monitoring Efek Samping Obat Antituberkulosis FDC Kategori 1 di Provinsi Banten dan Provinsi Jawa Barat.* Pusat Teknologi Intervensi Kesehatan Masyarakat,
Badan Litbangkes, Kemenkes RI, Jl. Percetakan Negara No. 29 Jakarta, Indonesia. available from : http://ejournal.litbang.depkes.go.id/index.php/MPK/article/view/3484/3446 (diakses pada 17 april 2019)

[15] Yatman Edi. 2012. Kulit Buah Manggis Mengandung Xanton yang Berkhasiat Tinggi. Universitas borobudur. Available from : http://e-journal.jurwidyakop3.com/index.php/majalah-ilmiah/article/view/23 (diakses pada 23 juli 2018)

[16] Pramono Ardi. Meida Shani N. 2003. *Anemia Pada Tuberkulosis Paru*.
Bagian Biokimia FK universitas Muhammadiyah Yogyakarta. (diunggah pada 18 April 2019) available from : http://journal.umy.ac.id/index.php/mm/article/view/1545/1591

[17] Almatsier, Sunita., 2009. *Prinsip Dasar Ilmu Gizi*. Jakarta: Gramedia Pustaka Utama.