Intake of Macromolecular Nutrition Status in Pulmonary Tuberculosis Subjects at the Seputih Raman Health Center, Central Lampung

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Abstract

Background: The condition of pulmonary tuberculosis patients is affected by low nutritional status and this will slow recovery time. The problem of this research is the need to describe the calorie intake of pulmonary tuberculosis patients after receiving education on nutritional patterns high in protein and fat in pulmonary tuberculosis patients at the start of their treatment. In the initial conditions, TB patients generally experience protein and energy deficits, then during the course of treatment for approximately six months, it is necessary to evaluate the nutritional intake profile of TB patients. Therefore the expected goal of this research is to obtain profile data on the intake of energy, protein, fat, and carbohydrates as well as micronutrients.

Methods: Research using a descriptive interview approach using a 24-hour food recall questionnaire and www.nutrisurvey.com analysis in the work area of the Seputih Raman Public Health Center, Central Lampung in 2021.

Results: Based on nutrisurvey data**,** subjects were found to be underweight (60%), with the highest carbohydrate intake deficit (80%) compared to intake of protein (46.67%) and fat (53.33%).

Conclusion: This shows through our result, the need to emphasize the balance of nutritional intake in the nutrition education of Pulmonary Tuberculosis subjects not only protein and fat intake. Thus tuberculosis patients also need to pay attention to a balanced intake of carbohydrates

Keywords: Pulmonary tuberculosis, nutrition intake. Seputih Raman

Abstrak

Pendahuluan : Kondisi pasien tuberkulosis paru dipengaruhi status gizi yang rendah dan hal ini akan memperlambat waktu pemulihan. Permasalahan penelitian ini perlunya gambaran asupan kalori penderita tuberkulosis paru setelah mendapat edukasi pola gizi tinggi protein dan lemak pada pasien tuberkolusis paru pada awal pengobatan mereka. Dalam kondisi awal, pada umumnya pasien Tuberkulosis mengalami defisit protein dan energi kemudian dalam perjalanan pengobatan selama kurang lebih enam bulan, perlu dilakukan evaluasi melihat profil asupan nutrisi pasien Tuberkulosis. Oleh karenanya tujuan yang diharapkan dalam penelitian ini adalah didapatkan profil data asupan energi, protein, lemak dan karbohidrat juga mikronutrien.

Metode: *Penelitian pendekatan deskriptif wawancara dengan alat ukur kuesioner food recall 24 jam dan analisa www.nutrisurvey.com di daerah kerja puskesmas Seputih Raman, Lampung Tengah Tahun 2021.*

Hasil: *Berdasarkan data analisa nutrisurvey, didapatkan 60% pasien status gizi kurus, dengan angka defisit asupan karbohidrat paling tinggi (80%) dibandingkan asupan protein (46,67%) dan lemak (53,33%).*

Kesimpulan: *Melalui hasil penelitian kami, hal ini menunjukkan perlunya menekankan keseimbangan asupan gizi pada edukasi gizi pasien Tuberkulosis Paru bukan hanya pada asupan protein dan lemak, dengan demikian pasien Tuberkulosis juga perlu memperhatikan asupan karbohidrat yang seimbang.*

Kata kunci: *Tuberkulosis paru, asupan nutrisi, Seputih Raman.*

INTRODUCTION

Tuberculosis (TB) will develop into a disease because poor nutrition makes it more difficult for the body to fight TB bacteria. Our bodies produce antibodies from various nutrients, including proteins, lipids, polysaccharides, nucleic acids, lipopolysaccharides, and lipoproteins, which shows a correlation between our eating habits and our immune function. Therefore, someone who is considered malnourished will have a compromised immune system. Malnutrition often occurs in pulmonary subjects due to decreased nutritional status they experience.[1,2] The Indonesian government has a national target of 90% of the treatment threshold, however, the success rate of pulmonary TB treatment in West Nusa Tenggara and Lampung Provinces in 2018 was lower at 87.0%.[3]

Tuberculosis sufferers are susceptible to changes in appetite, a condition when the body cannot fully absorb nutrients from the food consumed. Moreover, tuberculosis treatment can also affect the work of the digestive system. It is not uncommon for people with tuberculosis to experience nausea, vomiting, and cramps in the abdomen due to the side effects of antituberculosis drugs. Therefore, it is important for TB sufferers to adopt a healthy and regular diet by consuming foods that can speed up the healing process. Puspitasari et al. found a direct and statistically significant relationship between the nutritional status of subjects and their treatment recovery from pulmonary tuberculosis. Recovery is possible with adequate nutrition.[4] In cases of active pulmonary TB, increased catabolic processes usually begin before the patient is diagnosed, whereas the basal metabolic rate or resting energy expenditure increases, resulting in increased energy requirements to meet the basic demands for bodily functions. At the same time, energy consumption tends to decrease as a result of anorexia. This combination resulted in drastic weight loss. TB infection increases the need for energy to maintain normal body function, which is characterized by an increase in energy use at rest resting energy expenditure (REE). This increase reaches 10-30% of the energy needs of normal people.[5,6,7]

An increase in REE will result in an increased lipolysis, but consumption of nutrition intake will decrease which causes malnutrition. Anorexia also occurs due to the increased production of leptin which reduces food intake and causes malabsorption. Protein and carbohydrate degradation and fat breakdown are accelerated in tuberculosis subjects. When metabolic and dietary disturbances inhibit endogenous protein and fat synthesis, the result is an increase in REE. A deficiency of energy building blocks is associated with this wasting process which ultimately results in nutritional deficiencies (anabolic blocks). Every TB patient receives nutrition education when receiving TB treatment, and will continue to be evaluated during treatment. Based on the importance of nutritional status in improving the condition of pulmonary tuberculosis subjects, the researchers are interested in knowing the description of nutritional status (based on nutritional intake) of pulmonary tuberculosis sufferers in the working area of the Seputih Raman Health Center, Central Lampung in 2021. As part of the educational evaluation of TB patient nutritional intake, researchers want to provide suggestions for educational patterns of nutritional intake of TB subjects.[5,6,7]

METHODS

Research planning with a quantitative descriptive approach was carried out for two to four weeks, in December 2021 at the Seputih Raman Health Center in Central Lampung. The design of this study analyzed the intake of macronutrients and micronutrients in Tuberculosis patients. The research was carried out in the Seputih Raman Centre of Lampung, the subjects of this study amounted to 30 pulmonary tuberculosis subjects at the Seputih Raman Health Center, Central Lampung. This research was carried out based on institutional permission number 1034/UKI.F5/D.PP.5.2/2021.

Population and Sampling

Based on Krejcie and Morgan formula, the smallest sample was 28 subjects, therefore, in this study, the number of samples used was 30 subjects from TB subjects in Seputih Raman Health Center. Inclusion criteria subjects were still being treated for tuberculosis at the Seputih Raman Health Center, Central Lampung, where at the beginning of treatment they received patient nutrition education, aged 19-80 years, male or female.

Data collection and food analysis instrument

Evaluation of the patient's nutritional status parameters Body Mass Index, while the 24-hour food recall method is used to evaluate the patient's diet food recall form and then analyzed with http://www.nutrisurvey.de/ The food consumed is converted by the interviewer/enumerator into units of weight (grams) or by URT estimates. The nutritional

parameters measured were the adequacy of calories, macromolecules (carbohydrates, protein, fat), micromolecules (Vitamins A, B6, C, E), fe, folic acid, and selenium (se). Macronutrient and micronutrient nutritional adequacy based on the reference of the Minister of Health No. 28 of 2019 (Good 100-119% moderate: 80-99% Low 70-80%, Deficit <70%). Data analysis, frequency distribution, and percentage details are provided, SPSS 22 was used to help analyze data for this research.[8] Based on food recall interviews and nutrisurvey analysis, the nutritional adequacy rate was obtained based on energy, protein, fat, and carbohydrates. Energy requirements for TB sufferers per 10 years will decrease by 5%. Energy output that is not proportional to the amount of energy input will result in an energy imbalance resulting in weight loss and the ideal body weight will not be achieved.[9]

RESULTS

Anthropology data

The population of pulmonary TB subjects in the service area served by the Seputih Raman Health Center, 53.33% of the samples were male and 46.67% were female. Most of them were 14 subjects (40%) aged 41-60 years old, the other side 9 subjects (30%) were aged 19-40 years old, and 9 subjects (30%) were aged 61-80 years old. In terms of education, most of them (50) graduated from high school, while the rest had elementary school education (20%), junior high school (26.67%), and bachelor's degree (33.33%). Based on the profession data most of them were farmers 13 (43.33%), 8 (26.67%) were housewives, 4 (13.33%) were business owners, 3 (10%) were students, and 2 (6.67%) were government employees, as indicated by the distribution results.

Nutrition status

The nutritional and energy needs of the food can be observed through anthropometric measurements. In adults over the age of 18, body mass index (BMI) is a direct method of assessing a person's nutritional status by comparing their weight and height. Subjects with diseases and cases such as ascites, hepatomegaly, infants, children, adolescents, athletes, and pregnant women were excluded from BMI measurements.

Table 1. Nutrition Status Tuberculosis Subject

No	Categori	frequency	Percentage
1	**Underweight**	**18**	**60**
2	Normal	11	36,67
3	Obese	1	3,33
Total		30	100

From Table 1, the majority, eighteen TB subjects (60%) are in the category of underweight (<18.5) while the rest are in normal (18.5-24.9) categories (36.67%), and interestingly, there is one subject who is included in the obese (25-29.9) category.

Adequacy of energy and nutrition intake (macronutrient and micronutrient)

Based on food recall interviews and nutrisurvey analysis, the nutritional adequacy rate was obtained based on energy, protein, fat, and carbohydrates. The nutritional adequacy rate is determined based on an analysis of age relations (remembering that each age has a different value) and also refers to the provisions of the ministry of health regarding nutritional adequacy rates. As we see on Tables 2,3 and 4 below.

Table 2. Adequacy of Energy Intake*

No	Category	Frequency	Percentage
1	Good	0	0
2	Moderate	3	10
3	Low	3	10
4	**Deficit**	**24**	**80**
Total		30	100

*Subject

From Table 2, most of the subjects (80%) during the treatment process had energy deficits, and we will continue to explore what kind of nutrient (carbohydrate, protein, lipid, and also micronutrient) profile deficiency in TB subjects.

Table 3 showed that most of the subjects were deficient in carbohydrates (80%) more than in protein (46.67%) and lipids (53,33%) deficiency. This condition is slightly different from the initial condition of the subjects who are generally protein deficit.

Table 3. Macronutrient Adequacy Intake

No	Category	Value	Subject*		
			Protein	Lipid	Carbohydrat
1	Good	110-100	1(3,33%)	3(10%)	0
2	Moderate	99-80	7(23,33%)	7(23,33%)	3(10%)
3	Low	79-70	8(26,67%)	4(13,33%)	3(10%)
4	**Deficit**	69-0	**14(46,67%)**	**16(53,33%)**	**24(80%)**
Total			30 (100%)	30 (100%)	30 (100%)

*total number subject(percentage)

Table 4. Micronutrient Adequacy Intake (mg)

Age	Vit. A	Vit. B6	Vit, C	Vit, E	Fe	Folic acid	Se
19-40	463.87	0.7111	61.744	2.628	6.183	103.444	38.311
41-60	766.42	0.8375	64.821	3.621	7.667	108.535	36.7
61-80	647.55	0.7222	75.172	3.8	6.333	115.211	40.822

Based on the mapping of micronutrient adequacy figures, globally it is seen that the age group of 21-40 years old had higher micronutrient adequacy rates than the age group 19-20 and 41-60 years old.

DISCUSSIONS

Subjects with pulmonary tuberculosis usually have lower energy intake because respondents do not eat the right foods, which are high in calories and high in protein and also fat and carbohydrate. Furthermore, eating habits and socioeconomic status can contribute to low energy and nutrient intake in TB subjects.[9] The results of the TB prevalence survey corroborate national TB control guidelines, which state that males are more likely to be exposed to TB than females. woman. Compared to women, men are far more likely to be involved in extracurricular activities, which increases their exposure to people who may be infected with pulmonary tuberculosis. This is in line with data on the age distribution of TB subjects and the results of Salsabela and Octavia studies where the majority are in the productive age range, one of which is their high mobility. The risk of contracting pulmonary tuberculosis decreases with increasing education levels. Higher education increases health literacy, which in turn increases individual awareness and motivation to take part in health improvement initiatives. Most people with pulmonary TB work as farm or factory laborers, as shown by this study, which is in line with a 2018 study by Susilawati. Economic difficulties are generally an obstacle to the difficulty in obtaining access to medicine and a balanced diet.[10,11]

Yusuf and Nurleli found a correlation between malnutrition and the development of pulmonary tuberculosis. Research conducted by Yuniar and Oktavia found that compared to those who were adequately nourished, those who were malnourished had a 3.4-16.7% increased risk of developing pulmonary tuberculosis. Loss of appetite and subsequent weight loss can negatively impact nutritional status, especially if the patient has a weakened immune system due to pulmonary tuberculosis infection. Several factors such as socioeconomic status, level of knowledge about good nutritional intake, sufficient energy, and protein intake, and duration of illness can affect nutritional status.[4,12] Pulmonary TB subjects do not comply with the dietary rules of pulmonary TB subjects, resulting in insufficient caloric intake and an inability to improve nutritional status. Loss of appetite is a common side effect of the response. Subjects with pulmonary tuberculosis usually have lower energy intake because respondents do not eat the right foods, which are high in calories and high in protein. The Director General of Health Services of the Republic of Indonesia recommends that the standard calorie

requirement that must be consumed by tuberculosis sufferers is 40-45 kcal of body weight.[9]

Even though hemoglobin was not measured in this study, it is assumed that low nutritional status also correlates with the possibility of anemia. As Indonesia is the moment worldwide donor to the recently analyzed tuberculosis, and dynamic aspiratory tuberculosis patients are frailer, tuberculosis additionally contributes to the expanding chance of anemia. [13]

Particularly, deficiency in micronutrients contributes to the impairment of an immune system through several mechanisms. For example, vitamin deficiency could reduce the phagocytosis of macrophages, as well as the production of antibacterial peptides like cathelicidin, which are important for the intracellular killing of mycobacteria. On the other hand, Zn and Cu deficiency limited the killing of mycobacteria through the mechanism of metal poisoning in phagosomes.[14] In pulmonary tuberculosis subjects, high protein intake is needed to replace damaged cells and increase low serum albumin levels. Subjects with pulmonary TB need to consume more protein than the average person because protein aids recovery from TB infection. In subjects with pulmonary TB who experience shortness of breath, fat can be given higher because the fat will not raise CO_2 levels in the blood. In tuberculosis subjects Lung carbohydrate intake is low, this is due in general, to subjects with pulmonary tuberculosis experiencing shortness of breath. If the intake of carbohydrates is high, then the CO_2 levels in the blood will increase so that sufferers of pulmonary tuberculosis will experience shortness of breath getting worse.[15,16]

Interestingly, in our study, we found that the number of subjects who experienced carbohydrate deficits (80%) was very much different than protein (46,67%) and fat deficits (53,33%). This is what we focus on as part of the evaluation of nutrition management education on tuberculosis subjects. it seems that the emphasis on the need for high energy and protein has more or less affected the subject's lack of attention to carbohydrates. This condition is in line with research by Rina et al and several other studies which found that the mean difference in carbohydrates was more significant than protein and fat in BTA (+) and BTA (-) sputum. Muchtadi (2014) argues that Carbohydrates are the cheapest main energy source because the glucose they produce is the main source of energy for the network of nerves and lungs. The relationship between carbohydrates and fat in the diet is reciprocal because a diet rich in fat has levels of low carbohydrates, and vice versa.[9]

Vitamins and minerals can play an imperative part in the treatment of tuberculosis. In a trial among 110 modern cases of active tuberculosis, subjects got tuberculosis chemotherapy alone, or in expansion to injectable thiamin, vitamin B6, and vitamin C, or a verbal multivitamin supplement. All bunches getting any vitamin supplementation had significantly superior lymphocyte expansion responses than the bunch accepting no supplement. Another trial showed that vitamins C and E were compelling in improving immune reactions to tuberculosis when given as adjuvant to multidrug tuberculosis therapy. The supplementation with vitamin A and zinc made strides in the viability of the antituberculosis drugs within the, to begin with, two months. The improved result was shown by the higher number of patients with sputum negative for bacilli and significantly lower mean injury range within the lung.[17]

CONCLUSION

The results obtained from this study are that most nutritional status of TB patients is underweight (60%) and deficit (80%) energy intake consumed per day by pulmonary TB subjects. Interestingly, most TB subjects have carbohydrate deficits, compared with protein and lipid deficiencies. This study provides an overview of the nutritional education evaluation of TB patients at the start of treatment with an emphasis on a protein and high-energy diet, therefore this study illustrates the need for an evaluation with an emphasis on balanced nutrition including a carbohydrate diet on TB patients in the working area of the Seputih Raman Health Center

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REFERENCES

1. Suspendeani A. Systematic review: Faktor Risiko terhadap Kejadian Tuberkulosis Paru. Skripsi Ilmu Kesehatan Masyarakat FKM Universitas Sriwijaya. 2021; 33p
2. Siswanto, Budisetyawati, Ernawati F. Peram Beberapa Zat Gizi Mikro dalam Sistem Imunitas Gizi Indonesia. 2013; 36(1):57–64.
3. Kementrian Kesehatan Republik Indonesia. Profil Kesehatan Indonesia Tahun 2019. ISBN 978-602-416-977-0.

4. Fatriany E. Herlina N. Hubungan antara Status Gizi dengan Kejadian Tuberkulosis Paru di Puskesmas : Literature Review. 2020; 2(1):158–65.

5. Toding WDM. Penatalaksanaan Nutrisi pada Tuberkulosis. Program Pendidikan Dokter Spesialis Bagian Ilmu Gizi Klinis. FK Universitas Hasanuddin. 2017: 73p.

6. Nasution SD. Malnutrisi dan Anemia Pada Penderita Tuberkulosis Paru. Majority. 2015; 4(8): 29–36.

7. Pratomo IP, Burhan E, Tambunan V. Malnutrisi dan Tuberkulosis. Artikel Pengembangan Pendidikan Keprofesian Berkelanjutan (P2KB). 2016; 8(1): 7p

8. Peraturan Menteri Kesehatan Republik Indonesia nomor 28 Tahun 2019. Angka Kecukupan Gizi yang Dianjurkan. Tahun 2019.

9. Danny DR.Sefriantina S. Hubungan Asupan Energi, Asupan Protein dan Status Gizi terhadap Kejadian Tuberkulosis pada Anak. Journal of Nutrition amd Food Science. 2021; 2(2): 58-68.

10. Wasesa R, Lazulfa A, Wirjatmadi B, Adriani M. Tingkat kecukupan Zat Gizi Makro dan Status Gizi Pasien Tuberkulosis dengan sputum BTA (+) dan Sputum BTA (-). Media Gizi Indonesia. 2013;11(2): 144–52.

11. Oktavia S, Mutahar R, Destriatania S. Analisis Faktor Risiko Kejadian TB Paru di Wilayah Kerja Puskesmas Kertapati Palembang. Jurnal Ilmu Kesehatan Masyarakat. 2016; 7(2): 124-38

12. Salsabela FE, Suryadinata H, Farisa I, Arya D. Gambaran Status Nutrisi pada Pasien Tuberkulosis di Rumah Sakit Umum Pusat Hasan Sadikin Bandung Hasan Sadikin General Hospital Bandung. 2016; 2:84–9.

13. Yuniar I, Lestari SD. Hubungan Status Gizi dan Pendapatan terhadap Kejadian Tuberkolusis Paru. Jurnal Pewarat Indonesia. 2017; 1(1): 18-25

14. Yusuf VN, Nurleli. Hubungan Status Gizi dengan Kejadian TB Paru. Jurnal Kesehatan Saintika Meditory. 2020; 1(1): 11p.

15. Xiong K, Wang J, Zhang J, Hao H, Wang Q, et al. Association of Dietary Micronutrient Intake with Pulmonary Tuberculosis Treatment Failure Rate : A Cohort Study. Nutrients. 2020; 12(2491): 1-11

16. Anastasya, Prikhatina RA. Asupan zat Gizi, Penatalaksanaan Pemberian Makanan Tambahan (PMT) serta Perubahan Berat Badan pada Pasien Tuberkulosis Paru di Puskesmas Kecamatan Makassar Jakarta Timur Tahun 2014. (studi kasus) 2016; 8(1): 6p.

17. Wagnew F, Alene KA, Eshetie S, Wingfield T, Kelly M, Gray D. Effects of zinc and vitamin A supplementation on prognostic markers and treatment outcomes of adults with pulmonary tuberculosis : a systematic review and meta- analysis. BMJ Global Health. 2022; 7:e008625