

Body mass index (BMI) of tuberculosis (TB) patients at tamangapa public health center



Hasmi^a  

^aNurse Professional Study Program, STIKES Graha Edukasi Makassar, Indonesia.

Abstract

Background: Tuberculosis (TB) remains a significant public health concern, especially in developing countries, with malnutrition being a major risk factor for its progression. Malnutrition weakens the immune system, making individuals more susceptible to TB infections. The relationship between nutrition and TB treatment outcomes is critical, as nutritional status can influence recovery and overall treatment success. This study aims to analyze the Body Mass Index (BMI) of TB patients at the Tamangapa Health Center and its implications for disease management. **Methods:** This study employed a quantitative approach with a cross-sectional research design, conducted in December 2024 at the Tamangapa Health Center. The study population consisted of 99 active TB patients registered between January and April 2024, all of whom were included through total sampling. Data collection involved direct observation, weight and height measurements, and BMI calculations. Data analysis was performed using descriptive statistics to determine the frequency distribution of BMI among TB patients. **Results:** The study found that the majority of TB patients were male (63.6%) and elderly (47.5%). Most patients had a low BMI (57.6%), while 34.3% had a normal BMI, and 8.1% were overweight. These findings highlight the prevalence of malnutrition among TB patients, which can negatively impact their recovery process. **Conclusion:** Malnutrition remains a common issue among TB patients, with a significant proportion experiencing underweight conditions that can hinder treatment outcomes. Proper nutritional interventions should be integrated into TB treatment programs to improve recovery rates. Addressing nutritional deficiencies through dietary improvements and health education may enhance the effectiveness of TB management strategies.

Keywords: Tuberculosis (TB), Malnutrition, Body Mass Index (BMI), TB treatment outcomes, Nutritional intervention

1. Introduction

In tuberculosis (TB) patients who experience malnutrition, it can reduce a person's immunity so that they will easily get sick, lack of protein and calories and iron can increase the risk of pulmonary tuberculosis. The immune system will function well if the fulfillment of nutrition and food is met properly. In this case, it is necessary to pay attention to the quality of food consumption which is determined by the composition of food types. Poor nutritional conditions can reduce resistance to tuberculosis in both adults and children, while changes in normal or increased body weight are also one of the predictors of successful treatment of pulmonary TB. 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 metabolism begins to improve. (Ernawati, et al., 2018). Tuberculosis (TB) is a serious public health problem that causes increasing morbidity and mortality and is a world concern. Pulmonary tuberculosis is an infectious disease directly caused by TB germs (*Mycobacterium Tuberculosis*), most tuberculosis germs attack the lungs. Pulmonary TB is a chronic disease that has long been known by the general public and is feared because it is contagious (Maulana, 2020). TB is still one of the world's public health problems even though control efforts with the Directly Observed Treatment, Short-course (DOTS) strategy have been established in many countries since 1995. By implementing the DOTS strategy as an effort to stop TB, especially in several high-burden TB countries (high burden countries) in developing countries, including Indonesia (Nizar, 2017). TB treatment takes a long time and will result in drug withdrawal rates, causing widespread transmission to complications such as TB pleural effusion and negative impacts such as germs becoming resistant. TB pleural effusion is a term used to describe the accumulation of fluid in the pleural cavity due to *Mycobacterium tuberculosis* infection. Pleural effusion is the formation of abnormal fluid accumulation in the pleural cavity that occurs due to increased fluid production or decreased fluid absorption. Manifestations of pleural effusion are pleuritic chest pain that increases when breathing and coughing, accompanied by shortness of breath due to excess fluid accumulation. (Calorus, 2017).

World Health Organization (WHO) 2021 Tuberculosis is one of the most common health problems in the world and a major cause of morbidity and mortality in developing countries. The incidence of TB in the world (WHO) reached 10.6 million people and 1.6 million of them died from TB. Tuberculosis is the second highest cause of death in infectious diseases after Covid-19 (World Health Organization (WHO), 2022).

Cases of Tuberculosis in Indonesia in 2022 were in second place with the largest number of TB sufferers in the world. In Indonesia, TB cases are estimated at 969,000 TB cases (one person every 33 seconds). This figure increased by 17%, namely 824,000 cases. The incidence of TB cases in Indonesia is 354 per 100,000 population, which means that out of every 100,000 people in Indonesia, 354 people suffer from TB. This confirms that cases of pulmonary TB are still increasing at various ages and genders. (Ministry of Health, 2022).

There are several factors that cause tuberculosis, one of which is socio-economic, which greatly influences the level of consumption and also plays an important role in nutritional adequacy. Insufficient consumption and food intake usually cause malnutrition, making it easier for germs to enter the body and cause the disease to be infected. The macronutrient intake of tuberculosis sufferers is still very lacking, which will affect the improvement of healing and nutritional status of tuberculosis sufferers. The important role of food intake consumed is closely related to the healing factor. Through good communication, bad habits will change, which will ultimately change eating patterns. Through the selection of food that is adjusted to the quality and quantity needed, which will support the healing of pulmonary tuberculosis (Fadillah, et al., 2022).

Based on the facts and things described above, the author is interested in researching the "body mass index (BMI) of Tuberculosis (TB) patients at the Tamangapa Health Center".

2. Materials and Methods

This study uses a quantitative approach with a cross-sectional research design, namely a study that measures independent and dependent variables simultaneously at one time (Nursalam, 2020). The study was conducted in December 2024 at the Tamangapa Health Center. The population in this study were active Tuberculosis patients registered at the Tamangapa Health Center from January to April 2024, totaling 99 people. The entire population was sampled using the total sampling technique, so the number of samples in this study was 99 respondents (Sugiono, 2019).

The inclusion criteria in this study included active Tuberculosis patients at the Tamangapa Health Center, patients who were willing to sign an informed consent, patients registered at the Tamangapa Health Center, and patients aged 17–70 years. Meanwhile, the exclusion criteria included patients who were unwilling to sign an informed consent and Tuberculosis patients who did not experience changes in body weight after being sick (Amruddin et al., 2022).

The instruments used in this study consisted of observation sheets, analog/digital scales, stadiometers, and Body Mass Index (BMI) calculators to measure the weight of Tuberculosis patients. Data collection techniques were carried out through direct observation, where researchers observed, recorded, and measured changes in the patient's body mass index. The research data consisted of primary data, namely the results of direct measurements of the weight and BMI of Tuberculosis patients, and secondary data, namely information from the Tamangapa Health Center, journals, and relevant reference books (Saryono & Anggraeni, 2017).

Data processing was carried out through several stages, namely editing, to ensure that the data collected was correct; coding, to give numeric codes to the data; data entry, namely entering data into the master table and computer database; and data analysis, which included univariate analysis to describe the characteristics of the research variables (Hidayat, 2017). Data analysis used descriptive statistics to present the results in the form of tables and frequency distributions.

3. Results

3.1 Respondent Characteristics

Table 1 Distribution of Characteristics of Respondents with TB Patients at Tamangapa Health Center, Makassar

Respondent Characteristics	Frequency (f)	Presentation (%)
Gender		
Male	63	63.6
Female	36	36.4
Age		
Teenager	8	8.1
Adult	44	44.4
Elderly	47	47.5
Weight		
32-38	16	16.2
39-45	33	33.3

46-52	24	24.2
53-60	19	19.2
61-70	7	7.1
<hr/>		
Height		
<156.9	28	28.3
157-162	33	33.3
>162.5	38	38.4
<hr/>		
Total	99	100

Based on table 1, showed that the tuberculosis patients who were the most respondents were male, namely 63 (63.3%), and the respondents who were female were 36 (36.4%). In terms of age characteristics, the most TB sufferers were elderly with the most respondents being 46-79 years old with a total of 47 (47.5%) respondents, with an average weight and height of sufferers being 39-45 kg as many as 33 (33.3%) and the most height being >162.5 cm with 38 (38.4%) respondents.

3.2 Univariate Analysis

Table 2 Frequency Distribution of Body Mass Index of TB Patients at Tamangapa Health Center

Body Mass Index (BMI)	Frequency (f)	Presentation (%)
Not enough	57	57.6
Normal	34	34.3
Excessive Weight	8	8.1
<hr/>		
Total	99	100

Based on table 2 on shows a picture of the body mass index of tuberculosis patients, it was found that 57 (57.6%) respondents had a low BMI, in the normal category there were 34 (34.3%) respondents, while in the overweight category there were 8 respondents with a presentation (8.1%).

4. Discussion

Tuberculosis (TB) is an infectious disease that is affected by the immune system. Weak immunity can be caused by nutritional imbalances, such as being underweight or a body mass index (BMI) that does not match height, increasing the risk of TB infection (Rinawati, 2021).

Based on the characteristics of TB sufferers, the majority of patients are male. The results of the study showed that 63.6% of TB sufferers were male, while women were 36.4%. This finding is in line with the research of Agustian, Masria, & Ismawati (2022), which found that 52.4% of TB sufferers were male compared to 47.6% of women from a total of 206 samples. The high number of TB cases in men is thought to be due to higher smoking habits than women, which causes respiratory tract secretion disorders and increases the risk of Mycobacterium tuberculosis infection.

In addition to gender, age also plays a role in the risk of TB. This disease is often found in productive age (15-50 years), but the elderly (>55 years) have a higher risk due to a decrease in the immune system (Sikumbang, Eyanoe, & Siregar, 2021). The results of the study showed that the majority of TB sufferers came from the elderly group (47.5%), followed by adults (44.4%), and adolescents (8.1%). This is different from Rahmadani's study (2022), which found that TB sufferers were more likely to be <46 years old (18 respondents) than >46 years old (17 respondents). Age factors contribute to the immune system, where the elderly are more susceptible to infection due to a weakened immune system.

The nutritional status of TB sufferers also plays an important role in the development of the disease. Weight loss is a common symptom in TB sufferers due to low food intake and increased body energy needs due to infection. This process is triggered by the secretion of pro-inflammatory cytokines that disrupt the body's metabolism (Mahendrani, Subkhan, Nurida, Prahasanti, & Levani, 2020). In this study, the majority of respondents weighed 39-45 kg (33.3%) and 46-52 kg (24.2%). These results are in line with the research of Kubiak et al. (2019), which showed that 61.4% of TB patients were underweight, while 28.9% had normal weight, and only 9.7% were obese.

In addition to weight, height also affects BMI, which is used to determine the nutritional status of TB patients. The majority of respondents were >162.5 cm (34.4%), followed by 157-162 cm (33.3%), and <156.9 cm (28.3%). The majority of TB patients had a BMI <18.5 kg/m² (57.6%), which indicates malnutrition. These results are in line with the research of Aryani, Syahputra, Sulistiawati, & Aulia (2023), which found that 53.85% of TB patients had a BMI <18.5 kg/m², 23.075% had a normal BMI, and 23.075% had a BMI >35 kg/m². Malnutrition in TB patients causes decreased immunity, increases the risk of infection,

and worsens the patient's condition (Yuniar & Lestari, 2017). Mycobacterium tuberculosis infection increases body catabolism, inhibits protein formation, and reduces levels of the hormone leptin which regulates appetite, causing anorexia and further weight loss (Mahendrani et al., 2020).

5. Conclusions

The incidence of tuberculosis is influenced by a weak immune system, which is often associated with poor nutritional status. In this study, TB patients were mostly male (63.6%), who are more vulnerable due to exposure to cigarette smoke. The elderly are the largest group (47.5%), due to a decreased immune system. The majority of patients have low body weight (39-45 kg as much as 33.3%) and BMI <18.5 kg/m² (57.6%), indicating a close relationship between malnutrition and TB. Mycobacterium tuberculosis infection increases the body's energy expenditure, causing weight loss and decreased endurance. Therefore, improving nutritional status is key in the prevention and treatment of tuberculosis.

Conflict of Interest

There is no conflict of interest

References

- Agustian, M. D., Masria, S., & Ismawati. (2022). *Hubungan Usia, Jenis Kelamin dan Tingkat Pendidikan dengan Kejadian TB Paru di Wilayah Kerja Puskesmas Cibadak Kabupaten Sukabumi*. Bandung Conference Series: Medical Science.
- Aryani, W., Syahputra, M. B., Sulistiawat, A. C., & Aulia. (2023). *Hubungan Indeks Massa Tubuh Dengan Kejadian TB Paru Di Puskesmas Bangun Purba Kabupaten Rokan Hulu Riau*. Jurnal Kedokteran dan Kesehatan-Fakultas Kedokteran Universitas.
- Ernawati, dkk, K. (2018). *Perbedaan Status Gizi Penderita Tuberkulosis Paru antara Sebelum Pengobatan dan Saat Pengobatan Fase Lanjutan di Johar Baru, Jakarta Pusat*. Majalah Kedokteran Bandung, 50(2), 74-78.
- Fadillah, dkk, R. J. (2022). *Pendidikan Kesehatan Tentang Pemenuhan Diet pada Penderita Tuberkulosis Paru di Rumah Sakit Tk II Putri Hijau Medan*. Jurnal Keperawatan Flora, 46-59.
- Kemendes. (2022). *Kementerian Kesehatan Indonesia*.
- Mahendrani, C. R., Subkhan, M., Nurida, A., Prahasanti, K., & Levani, Y. (2020). *Analisis Faktor Yang Berpengaruh Terhadap Konversi Sputum Basil Tahan Asam Pada Penderita Tuberkulosis*. Jurnal Berkala Ilmiah Kedokteran.
- Manurung, N., & Widoyono. (2018). *Asuhan Keperawatan Sistem Respiratory & Penyakit Tropis Epidemiologi Penularan & Pemberantasannya*. Jakarta: Erlangga.
- Rahmadani, E. (2022). *Hubungan Usia dan Jenis Kelamin dengan TB MDR*. Jurnal Kesehatan Masyarakat.
- Rinawati, S. A. (2021). *Indeks Massa Tubuh (IMT) Pasien Tuberkulosis Resistensi Obat dan Kecenderungannya Terhadap Efek Samping Pengobatan*. Jurnal Teknologi Kesehatan.
- Sikumbang, R. H., Eyanoer, P. C., & Siregar, N. P. (2021). *Faktor-Faktor Yang Berhubungan Dengan Kejadian TB Paru Pada Usia Produktif di Wilayah Kerja Puskesmas Tegal Sari Kecamatan Medan Denai Tahun 2018*. Jurnal Kedokteran dan Kesehatan-Fakultas Kedokteran Universitas Islam Sumatera Utara, 21.
- WHO (2022). *WHO Global Tuberculosis Report*.
- Amane, & Laali. (2022). *Metode Penelitian*. Jakarta: Insan Cendekia.
- Hidayat, A. A. (2017). *Metodologi Penelitian Keperawatan dan Kesehatan*. Jakarta: Salemba Medika.
- Nursalam. (2020). *Metodologi Penelitian Ilmu Keperawatan: Pendekatan Praktis Edisi 5*. Jakarta: Salemba Medika.
- Saryono, & Anggraeni, D. (2017). *Metodologi Penelitian Kualitatif dan Kuantitatif dalam Bidang Kesehatan*. Yogyakarta: Nuha Medika.
- Sugiono. (2019). *Metode Penelitian Kualitatif, Kuantitatif dan R&D*. Bandung: Alfabeta.