

THE RELATIONSHIP BETWEEN TREATMENT PHASE AND NUTRITIONAL STATUS IN ADULT TUBERCULOSIS PATIENTS AT PUBLIC HEALTH CENTERS IN JAMBI CITY

Putri Sari Wulandari¹, Maria Estela Karolina², Hanina³, Lipinwati⁴

^{1,2,3,4}Microbiology-Parasitology Department, Faculty of Medicine and Health Sciences, Jambi University

e-mail: putrisari.w@unja.ac.id

ABSTRACT

Background: Tuberculosis (TB) is a chronic infectious disease caused by *Mycobacterium tuberculosis*. Treatment of tuberculosis consists of two phases, the intensive phase for 2 months and the continuation phase for 6-12 months. One of the factors associated with tuberculosis is nutritional status. If the patient has poor nutritional status, the risk of being infected with tuberculosis will increase. Likewise, if a patient is infected with tuberculosis, the risk of suffering from malnutrition will increase due to the side effects of taking anti-tuberculosis drugs and increased metabolism from *Mycobacterium tuberculosis* infection. This has a huge influence on the patient's recovery.

Objective: This study aimed to investigate the relationship between treatment phase and nutritional status in adult tuberculosis patients at Public Health Centers in Jambi City.

Methods: This study is an analytic type of research using a cross sectional design. This research was conducted in several Public Health Centers in Jambi City from July to October 2022. Nutritional status was assessed based on the value of Body Mass Index (BMI). The relationship between treatment phase and nutritional status was analyzed using the chi-square test.

Results: The number of samples in this study were 71 patients consisting of 90.1% pulmonary TB patients and 9.9% extra pulmonary TB patients. A total of 59.2% of patients were in the intensive phase of treatment and the majority of patients had underweight nutritional status (60.6%). The results of statistical analysis obtained p value < 0.001 .

Conclusion: There is a relationship between treatment phase and nutritional status in adult tuberculosis patients at the Public Health Centers in Jambi City.

Keywords: tuberculosis, nutritional status, treatment phase, Jambi

INTRODUCTION

Tuberculosis (TB) is one of the top ten causes of death and infectious diseases. According to the World Health Organization (WHO) report in 2019, eight countries account for two-thirds of the total TB in the

world and Indonesia is in second place. Globally, the incidence of TB is decreasing by around 2% every year.¹ The incidence of TB in Indonesia will be 312 out of 100,000 people in 2021. Over the last three years, the incidence of TB in Indonesia has decreased.²

Based on data from the Regional Government of Jambi Province in 2019, the Case Detect Rate (CDR) of TB cases was 35.62% with the highest CDR in Merangin Regency (62.40%) and Jambi City is ranked eighth with a CDR of 30.66%.³

Many TB cases are associated with five risk factors including alcohol use disorders, diabetes, HIV infection, smoking, and malnutrition.⁴ Infectious diseases such as TB and malnutrition are interrelated where TB can cause malnutrition and malnutrition can also increase the risk of TB infection.⁵ TB patients experience loss of appetite, nausea, vomiting, abdominal pain, diarrhea, and changes in metabolism caused by the course of the disease.⁶ This is the cause of accelerated malnutrition due to insufficient intake, so the impact on the immune system becomes weaker and makes it easier to get sick, if not treated immediately, the nutritional status will quickly decline. Therefore, the need for maintaining nutritional health includes achieving and maintaining normal body weight, correcting lost nutritional deficiencies, and strengthening the body's resistance is needed to accelerate the TB healing process.⁷

Administering anti-tuberculosis drugs is the most important component in TB management and is the most efficient way of preventing TB transmission. Anti-tuberculosis drugs administration includes two phases of treatment, the intensive phase

or the initial stage and the continuation phase. In the intensive phase, anti-tuberculosis drugs is given every day for two months with the aim of rapidly reducing the number of *Mycobacterium tuberculosis* present in the patient's body and minimizing the risk of transmission. The continuation phase ranges from 4-6 months which aims to kill the remaining *Mycobacterium tuberculosis* from the previous stage to prevent recurrence.⁸

The treatment phase is often associated with the nutritional status of TB patients. Research by Prayitami et al (2012) regarding the relationship between the phases of treatment and the nutritional status of children with TB at Dr. H. Soewondo Kendal for the period January 2011 – September 2011 reported that most children were in the advanced phase (54.7%) and the majority of children had normal nutritional status (61.5%) and there was a relationship between the treatment phase and the nutritional status of children with TB.⁹ Kusumaningroh et al (2018) also reported that there was a relationship between physical activity and treatment phase with nutritional status in TB patients at BBKPM Surakarta where the treatment phase had a 0.382 times greater chance of influencing nutritional status than physical activity.¹⁰ Meanwhile, Amalia et al (2022) reported that there was no relationship between the treatment phase and the nutritional status of

pulmonary TB patients at the Cakranegara Health Center, Mataram City.¹¹

Based on the background and the high number of TB case findings in Jambi City, the researchers conducted a study on the relationship between the treatment phase and the nutritional status of adult TB patients at Public Health Center in Jambi City. The objective of this study is to determine the relationship between the treatment phase and the nutritional status of adult TB patients at Public Health Center in Jambi City.

METHODS

A cross-sectional study was implemented. This study was conducted in three Jambi City Public Health Centers from July to November 2022. The nonprobability sampling with consecutive sampling approach was used to select TB patient from the selected Public Health Centers. The sample in this study were 71 adult TB patients who underwent outpatient care at Putri Ayu, Kenali Besar, and Paal V Public Health Centers in Jambi.

The nutritional status data were collected by measuring anthropometric indicators. Weight and height of each study participant were measured by research team. Digital weight scale was used to measure the weight of each study participant and weight was measured to the nearest 0.1 kg. Height was measured using the vertical

measuring rod to the nearest 0.1 cm. Nutritional status is determined based on the calculation of body mass index (BMI). BMI was computed as = weight (in kilogram)/ (height in meter)². The Indonesian Ministry of Health classify BMI classification, a) BMI < 18.5: underweight, b) BMI 18.5 – 25.0: normal, and c) BMI > 25.0: overweight.¹² The characteristics (sex, age, site of infection, smoking history, and treatment phase) were retrieved from patient interview and medical records.

Ethical clearance for this study was obtained from the Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Jambi, Indonesia. Written informed consent was obtained by the each participants.

Descriptive statistics were used to identify the proportion of sex, age, site of infection, smoking history, treatment phase, and nutritional status. The correlation between treatment phase and nutritional status was analyzed using SPSS software version 20 using the chi-square test. Variable with a p-value less than 0.05 was considered to indicate a statistically significant difference.

RESULTS

Based in this study, we found a total of 71 TB patient for the final analysis. Profile of TB patients in this study are shown in Table 1. The mean age of study participants

was 41 years, 18 and 72 year was the youngest and the oldest age of study participants. The majority of the participants were male (63.4%), pulmonary TB patients

(90.1%), without smoking history (54.9%), and in the intensive phase (59.2%). The prevalence of underweight among TB patients was 60.6%

Table 1. Profile of TB patients (n = 71)

<i>Population profile</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Sex</i>		
<i>Male</i>	45	63.4
<i>Female</i>	26	36.6
<i>Age, y</i>		
18 – 40	38	53.5
41 – 60	23	32.4
>60	10	14.1
<i>Site of infection</i>		
<i>Pulmonary TB</i>	64	90.1
<i>Extra-pulmonary TB</i>	7	9.9
<i>Smoking history</i>		
Yes	32	45.1
No	39	54.9
<i>Treatment phase</i>		
<i>Insentive phase</i>	42	59.2
<i>Continuation phase</i>	29	40.8
<i>Nutritional status</i>		
<i>Underweight</i>	43	60.6
<i>Normal</i>	25	35.2
<i>Overweight</i>	3	4.2

Table 2 showed that the majority of TB patients who were undergoing incentive phase treatment had underweight nutritional status (83.3%), in contrast to patients who were in the continuation phase had normal to obese nutritional status (72.4%). The results of statistical analysis using the chi-square test obtained p value <0.001 which indicated

that there was a significant relationship between the treatment phase and nutritional status in adult TB patients at the Jambi Public Health Center. Adult TB patients who were undergoing intensive phase treatment will be at risk of 3.021 times experiencing underweight nutritional status (PR 3.021, 95% CI 1.65 – 5.53).

Table 2. Result of statistical analysis

<i>Treatment phase</i>	<i>Nutritional status</i>				<i>Total</i>	<i>PR (95%CI)</i>	<i>p value</i>
	<i>Underweight</i>		<i>Normal to overweight</i>				
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>			
<i>Insentive phase</i>	35	83.3	7	16.7	42	100	3.021 (1.65 – 5.53)
<i>Continuation phase</i>	8	27.6	21	72.4	29	100	
<i>Total</i>	43	60.6	28	39.4	71	100	

DISCUSSION

In this study, the proportion of underweight among the TB patients was 60.6%. Our finding was also compatible with the reports from previous study in Amhara regional state of Ethiopia (57.17%).¹³ Nutritional status is significantly lower in active pulmonary TB compared with healthy controls in different studies in Indonesia, England, India, and Japan.¹⁴ In TB patients, a reduction in appetite, nutrient malabsorption, micronutrient malabsorption, and altered metabolism leads to wasting.¹⁵

Our study also found that there was a significant relationship between the treatment phase and nutritional status in adult TB patients at the Jambi Public Health Center which in line with a study conducted in Surakarta.¹⁶ In this study, adult TB patients who were undergoing intensive phase treatment will be at risk of 3.021 times experiencing underweight nutritional status. This result was lower than Kusumaningroh et al (2018) study, which found that there was a relationship between treatment phase and nutritional status in TB patients and the patients who were in the early stages of treatment (intensive phase) risk 3.246 times greater for have a very thin or thin nutritional status.¹⁰ In contrast to findings from study in Mataram, the present study found no significant association between treatment phase and nutritional status in TB patients at the Cakranegara Public Health Center.¹¹

The relationship between TB and malnutrition consists of two interactions, the effect of TB on nutritional status and the effect of malnutrition on the incidence and clinical manifestations of TB.¹⁷ Tuberculosis disease exacerbates nutritional conditions by increasing metabolic needs and reducing appetite. TB patients experience decreased appetite, nutritional intake and malabsorption of micronutrients due to changes in the patient's metabolic system caused by the disease.¹⁸

The micronutrients that most influence TB disease are vitamin A, vitamin D, and zinc.¹⁹ An experimental evidence conducted in India reported that TB patients often showed weight loss due to suboptimal protein intake, muscle catabolism caused by inflammation during infection and gastrointestinal symptoms caused by acute phase.²⁰

TB is an important risk factor for malnutrition. Therefore, effective TB management requires a detailed assessment of nutritional status as it can help to manage complications of the disease and also understand the impact.¹⁸ In India, handling malnutrition along with TB treatment has been shown to improve treatment outcomes and reduce the risk of recurrence. Nutrition counselor can help to ensure adequate energy intake and promote weight loss.²⁰

CONCLUSION

In conclusion, the prevalence of underweight among TB patients at Public Health Center in Jambi City was 60.6%. There was a significant relationship between the treatment phase and nutritional status in

adult TB patients at the Jambi Public Health Center. Adult TB patients who were undergoing intensive phase treatment will be at risk of 3.021 times experiencing underweight nutritional status.

REFERENCES

1. World Health Organization (WHO). Tuberculosis. Geneva : World Health Organization; 2021. <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
2. World Health Organization (WHO). Incidence of tuberculosis (per 100 000 population per year). Geneva : World Health Organization; 2021. [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/incidence-of-tuberculosis-\(per-100-000-population-per-year\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/incidence-of-tuberculosis-(per-100-000-population-per-year))
3. Pemerintah Daerah Provinsi Jambi. Profil Kesehatan Provinsi Jambi Tahun 2019. <https://dinkes.jambiprov.go.id/file/informasi publik/MTYxNTE2NDQyOA Wkt1615164428 XtLnBkZg.pdf>
4. World Health Organization (WHO). Global Tuberculosis Report 2020. Geneva : World Health Organization; 2020. <https://apps.who.int/iris/bitstream/handle/10665/336069/9789240013131-eng.pdf>
5. Nyoman SID, Bakri B, Fajar I. Penilaian Status Gizi. Jakarta : EGC; 2016. p. 70-72.
6. Das S, Sen S, Debnath A, Basuthakur S, Saha PK, Biswas C. A study of nutritional assessment of newly diagnosed tuberculosis patients in a tertiary care hospital of Tripura, India. *Int J Res Med Sci.* 2018;6:1382–7.
7. Nuraini, Ngadiarti I, Moviana Y. Bahan Ajar Gizi Dietika Penyakit Infeksi. Jakarta : Kementerian Kesehatan Republik Indonesia; 2017.
8. Perhimpunan Dokter Paru Indonesia (PDPI). Tuberculosis Pedoman Diagnosis dan Penatalaksanaan di Indonesia. Jakarta : Perhimpunan Dokter Paru Indonesia. p. 33-34.
9. Prayitami SP, Dewiyanti L, Rohmani A. Hubungan Fase Pengobatan dan Status Gizi Tuberculosis Anak Di Rumah Sakit Umum Daerah Dr. H. Soewondo Kendal Periode Januari 2011 – September 2011. *Jurnal Kedokteran Muhammadiyah.* 2012;1(1):20-24.
10. Kusumaningroh D, Susilowati T, Wulandari R. Hubungan Aktivitas Fisik dan Fase Pengobatan TB Dengan Status Gizi Pada Pasien TB Paru. *Jurnal Ners dan Kebidanan.* 2018;5(1):1-7.
11. Amalia R, Lestari R, Cholidah R. Hubungan Fase Pengobatan Tuberculosis dengan Status Gizi Pasien Tuberculosis Paru di Puskesmas Cakranegara. *Lombok Medical Journal.* 2022;1(2):106-111.
12. Kementerian Kesehatan Republik Indonesia. Tabel Batas Ambang indeks Massa tubuh (IMT). Jakarta: Kementerian Kesehatan Republik Indonesia; 2019. <https://p2ptm.kemkes.go.id/infographicp2ptm/obesitas/tabel-batas-ambang-indeks-massa-tubuh-imt>
13. Feleke BE, Feleke TE, Biadglegne F. Nutritional status of tuberculosis patients, a comparative cross-sectional study. *BMC Pulmonary Medicine.* 2019;19:182.
14. Karyadi E, Schultink W, Nelwan RH, Gross R, Amin Z, Dolmans WM, et al. Poor micronutrient status of active pulmonary tuberculosis in Indonesia. *J Nutr.* 2000;130:2953-8.

15. Paton NI, Castello-Bramco LR, Jennings G, Ortigao-de-Sampaio MB, Elia M, Costa S, et al. Impact of tuberculosis on the body composition of HIV-infected men in Brazil. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1999;20:265-71.
16. Mursudarinah, Sari DNI. Hubungan Tingkat Pendidikan dan Fase Pengobatan Tuberkulosis Paru Dengan Status Gizi Penderita Tuberkulosis Paru di Balai Besar Kesehatan Paru Masyarakat Surakarta. *Prosiding Nasional Seminar Manajemen Informasi Kesehatan Nasional "Rekam Medis, Informasi Kesehatan, Dan Informatika Kesehatan"*. 2019. <http://ojs.udb.ac.id/index.php/smiknas/article/view/700/672>
17. Macallan DC. Malnutrition in tuberculosis. *Diagn Microbiol Infect Dis.* 1999;34:153–157.
18. Muse AI, Osman MO, Ibrahim AM, Wedajo GT, Daud FI, Abate KH. Undernutrition and Associated Factors Among Adult Tuberculosis Patients in Jijjiga Public Health Facilities, Somali Region, East, Ethiopia. *Research and Reports in Tropical Medicine.* 2021;12:123–133.
19. Téllez-Navarrete NA, Ramón-Luing LA, Muñoz-Torrico M, Osuna-Padilla IA, Chávez-Galán L. Malnutrition and Tuberculosis: the gap between basic research and clinical trials. *J Infect Dev Ctries.* 2021;15(3):310–319.
20. Kant S, Gupta H, Ahluwalia S. Significance of nutrition in pulmonary tuberculosis. *Crit Rev in Food Sci Nutr.* 2015;55(7):955–963.