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The Relationship between Clinical Appearance and Albumin Levels in Pulmonary Tuberculosis (TB) Patients at Dr. M. Djamil General Hospital, Padang, Indonesia

Afriani Afriani^{1*}, Masrul Basyar¹, Yulia Helexandra¹

¹Department of Pulmonology and Respiratory Medicine, Dr. M. Djamil General Hospital, Padang, Indonesia

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*Corresponding author:

Afriani Afriani

E-mail address:

a_friani@yahoo.com

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ABSTRACT

Background: Pulmonary TB is strongly associated with malnutrition. Malnutrition is often found in pulmonary TB patients, especially hospitalized patients, and can worsen the treatment and recovery outcomes of pulmonary TB patients. Pulmonary TB patients can experience a significant decrease in albumin levels, and albumin is the largest protein in blood plasma. This study aimed to determine the relationship between the patient's clinical appearance and albumin levels in pulmonary tuberculosis patients at Dr. M. Djamil General Hospital, Padang, Indonesia. **Methods:** This study was an analytic observational study with a retrospective cohort approach. A total of 177 research subjects participate in this study. Observations on sociodemographic data, clinical data, and laboratory data were carried out in this study. Data analysis was carried out using SPSS version 25 univariate and bivariate. **Results:** Clinical appearance of pulmonary TB patients treated in the pulmonary ward isolation room at Dr. M. Djamil General Hospital, Padang, Indonesia, which is significantly related to albumin levels is BMI (underweight and normal) and complications pneumothorax ($p < 0.05$); while other clinical appearances such as onset and complications of coughing up blood, pleural effusion, hydropneumothorax, and without complications not related to albumin levels ($p > 0.05$). **Conclusion:** BMI (underweight and normal) and complications pneumothorax is a clinical picture related to albumin levels in pulmonary tuberculosis patients at Dr. M. Djamil General Hospital, Padang, Indonesia.

1. Introduction

Pulmonary tuberculosis (TB) is a global health problem and one of the 10 biggest causes of death in the world, and more than 1 million deaths each year. Since 1993, World Health Organization (WHO) has declared pulmonary TB a global emergency for humanity (Global Public Health Emergency). In 2016, WHO reported that as many as 10.4 million people suffered from pulmonary TB and as many as 1.7 million died from pulmonary TB disease (including 0.4 million or 40% of pulmonary TB sufferers with human immunodeficiency virus/HIV). More than 95% of deaths from pulmonary TB occur in low and middle-income countries. In 2020, there were 10 million

people suffering from tuberculosis consisting of 5.6 million men, 3.3 million women, and 1.1 million children. But TB can be cured and prevented. By 2020, the 30 countries with a high TB burden account for 86% of new TB cases. Eight countries accounted for two-thirds of the total, with India leading the tally, followed by China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa.¹⁻⁴

Pulmonary TB is strongly associated with malnutrition. Malnutrition is often found in pulmonary TB patients, especially hospitalized patients, and can worsen the treatment and recovery outcomes of pulmonary TB patients. Several studies have also shown that malnutrition is a risk factor for

death in pulmonary TB patients. Pulmonary TB patients can experience a significant decrease in albumin levels, and albumin is the largest protein in blood plasma. When an infection occurs, there is a decrease in blood plasma values. Decreased total protein values and albumin levels can be caused by decreased appetite in pulmonary TB patients, so anorexia, malnutrition, and malabsorption often occur, which can worsen treatment.⁵⁻⁸ Other studies have proven the hypothesis that low albumin levels at the time of admission to the hospital can predict the death of hospitalized pulmonary TB patients. The results of this study indicated that hypoalbuminemia (≤ 2.7 g/dL) was strongly and independently associated with in-hospital death due to pulmonary TB (OR 3.38; 95% CI 1.51-7.59), although there were several confounding factors. Factors such as age, comorbidities, HIV infection, and history of previous treatment. This suggests that albumin levels can be used as a prognostic indicator of pulmonary TB patients who are hospitalized.⁹⁻¹³ This study aimed to determine the relationship between the patient's clinical appearance and albumin levels in pulmonary tuberculosis patients at Dr. M. Djamil General Hospital, Padang, Indonesia.

2. Methods

This study was an analytic observational study with a retrospective cohort approach and used secondary data from medical records at the medical records installation of Dr. M. Djamil General Hospital, Padang, Indonesia. A total of 177 research subjects were included in this study, where research subjects met the inclusion criteria. The inclusion criteria in this study were pulmonary TB patients aged ≥ 17 years who were in the inpatient room of Dr. M. Djamil General Hospital, Padang, Indonesia, for the period January 2016 to December 2018, as well as pulmonary TB patients who were treated with the number the same or repeated medical records in the pulmonary ward of Dr. M. Djamil General Hospital, Padang, Indonesia for the period January 2016 to December 2018, was included in the study when

patients were treated in the pulmonary ward who had hypo albumin conditions. This study was approved by the medical and health research ethics committee at Dr. M. Djamil General Hospital, Padang, Indonesia.

This study made observations on sociodemographic data and clinical and laboratory data on research subjects. Data analysis was carried out using SPSS software version 25. Data analysis was performed using univariate and bivariate methods. Univariate analysis was performed to present the data distribution of each test variable. Bivariate analysis was carried out to determine the relationship between the test variables with a p-value < 0.05 .

3. Results

Table 1 shows that most pulmonary TB patients in this study were found in patients aged 46-55 years, with a total of 41 patients (23.16%), followed by ages 26-35 years with 36 patients (20.35%); while the least was in the age group of 17-25 years, amounting to 23 patients (12.99%). Pulmonary TB patients were dominated by the male gender, with as many as 129 patients (72.88%). The highest educational level of pulmonary TB patients was in senior high school, with 76 patients (42.94%), followed by tertiary institutions (35.03%), while the least were elementary school students (6.21%). Pulmonary TB patients in this study mostly worked with as many as 120 patients (67.78%). Pulmonary TB patients in this patient found the results of sputum smear examination showed that most of the patients (88.70%) showed positive results. This study found that most of the patients (64.97%) had no previous history of pulmonary TB. In the study, there were 100 patients (56.50%) with comorbidities consisting of the most pneumonia (35.59%), followed by DM with 10.17%, kidney disorders as much as 4.53%, and liver disorders with as much as 6.21%. Pulmonary TB patients with HIV, in this patient, were found to be as much as 5.08%. The majority of pulmonary TB patients in this study (71.75%) showed a length of stay of more than 1 (one) week.

Table 1. Characteristics of pulmonary TB patients treated in the pulmonary ward of Dr. M. Djamil General Hospital, Padang, Indonesia.

Characteristics	Frequency	Percentage (%)
Age		
17-25 years	23	12,99
26-35 years	36	20,35
36-45 years	24	13,56
46-55 years	41	23,16
56-65 years	26	14,69
> 65 years	27	15,25
Gender		
Male	129	72,88
Female	48	27,12
Level of education		
Primary school	11	6,21
Junior high school	28	15,82
Senior high school	76	42,94
College	62	35,03
Occupation		
Working	120	67,78
Not working	57	32,22
AFB sputum examination results		
Positive	157	88,70
Negative	20	11,30
Prior history of pulmonary TB		
Yes	22	35,03
No	155	64,97
Comorbid		
Diabetes mellitus	18	10,17
Kidney disorders	8	4,53
Liver disorders	11	6,21
Pneumonia	63	35,59
No comorbid	77	43,50
HIV		
Yes	9	5,08
No	168	94,92
Length of treatment		
≤ 2 weeks	50	28,25
> 2 weeks	127	71,75

Table 2. Relationship between the clinical appearance of pulmonary TB patients and blood albumin levels.

Clinical appearance	N	Hypoalbuminemia		Normal albumin		P
		f	(%)	f	(%)	
Onset of symptoms						
< 3 weeks	21	8	38,10	13	61,90	0,127
≥ 3 weeks	156	87	55,77	69	44,23	
BMI						
Underweight (< 18,5)	76	51	67,11	25	32,89	0,001*
Normal (18,6 – 24,9)	92	39	42,39	53	57,61	0,002*
Overweight (25 – 29,9)	5	3	60,00	2	40,00	1,000^
Obese (≥ 30)	4	2	50,00	2	50,00	1,000^
Complications						
Coughing up blood	39	19	48,72	20	51,28	0,482*
Pleural effusion	37	25	67,57	12	32,43	0,057*
Pneumothorax	31	8	25,81	23	74,19	0,001*
Hydropneumothorax	10	7	70,00	3	30,00	0,343^
No complications	60	36	60,00	24	40,00	0,227*

* = Chi-squares test, ^ = Fisher exact test.

Table 2 shows that pulmonary TB patients with the most hypoalbuminemia lots with the onset of symptoms more than 3 weeks, which is equal to 55.77%. The BMI group showed underweight most commonly found hypo albumin, that is 67.11%, and based on complications that occur in pulmonary TB patients found, 70% of hypoalbuminemia patients hydropneumothorax. Study This study obtains the clinical appearance of pulmonary TB patients treated in the pulmonary ward isolation room at Dr. M. Djamil General Hospital, Padang, Indonesia, which is significantly related to albumin levels in BMI (underweight and normal) and complicated pneumothorax ($p < 0.05$); whereas other clinical appearances such as onset and complications of coughing up blood, pleural effusion, hydropneumothorax, and without complications were not related to albumin levels ($p > 0.05$).

4. Discussion

The relationship between the clinical appearance of pulmonary TB patients and albumin levels in this study was found in the BMI group (underweight and normal) and complications of pneumothorax ($p < 0.05$), while other clinical appearances such as onset and complications of coughing up blood, pleural effusion, hydropneumothorax, and without complications were not related to albumin levels ($p > 0.05$). Pulmonary TB patients who had a BMI of less than 18.5 and had hypo albumin in other studies found that 77.9% and 64.3% had normal albumin levels. Patients who have normal BMI who have hypoalbuminemia were found to be 22.1%, and 35.7% have normal albumin. BMI characteristics in this study had a significant relationship because the p-value was 0.027 ($p < 0.05$).^{14,15}

Another study found that in pneumothorax patients, hypo albumin was found the most, with 188 patients (97.92%), with 97.87% not having recurrent pneumothorax and 2.13% having recurrent pneumothorax. Meanwhile, there were 4 patients (2.08%) who experienced pneumothorax with normal albumin, and these patients did not experience

recurrent pneumothorax. Other studies reported that there was no significant relationship between albumin levels and pneumothorax, with a p-value of 1 ($p < 0.05$). Malnutrition in a patient with a pneumothorax can complicate the treatment of pneumothorax because it can lead to delayed wound healing which means a prolonged air leak will occur.¹⁶⁻¹⁸

This research has several limitations. First, this research only evaluated treated patients and did not evaluate outpatients. Second, the albumin level assessed in this research is only the albumin level when the patient enters, but during treatment, the albumin level is not assessed. Third, the sample size in this research is not large. Fourth, this study did not evaluate external and pulmonary TB patients with albumin levels.

5. Conclusion

BMI (underweight and normal) and complications pneumothorax is a clinical picture related to albumin levels in pulmonary tuberculosis patients at Dr. M. Djamil General Hospital, Padang, Indonesia.

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