



The Correlation between Tuberculous Lymphadenitis and Nutritional Status in Children

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A B S T R A C T

Tuberculous lymphadenitis may cause weight loss and lead to malnutrition in children. This study analyzes the correlation between tuberculous lymphadenitis and nutritional status in children. It was an analytic observational study with a cross-sectional design. The population was pediatric patients under 18 years old with lymphadenitis, outpatient and inpatient admitted from January 2018 to December 2020 in dr. Soebandi public hospital, Jember, Indonesia. The samples were 76 respondents with total sampling. There were 52 tuberculosis lymphadenitis patients in the case group, while 24 were non-tuberculosis in the control group. The body weight data was from the medical record when the first diagnosis of lymphadenitis. Instruments were weight-for-age z-score curves (WHO, 2007) for under 60 months old children, while CDC Growth Charts 2000 for more than five-year-old children. Then, data analysis used the Chi-square test. Mostly, tuberculous lymphadenitis patients were girls (65.4%), 12-17 years old (67.3%), not underweight (61.5%), and lived in rural areas (73%). Furthermore, all of them were given isoniazid, rifampicin, and pyrazinamide. In addition, 100% of them had successful treatment. Meanwhile, most of the non-tuberculous lymphadenitis patients were boys (54.2%), 6-11 years old (58.3%), lived in the rural areas (79%), and were not underweight (66.7%). Treatment of the non-tuberculous lymphadenitis group consisted of antibiotics, analgesics, vitamins, and symptomatic medicine. The Chi-square test results obtained $p=0.667$ ($p>0.05$). In conclusion, tuberculosis lymphadenitis in the early incubation period does not correlate with nutritional status among children under 18 years old.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* (Kementerian Kesehatan RI, 2018). Its categories are pulmonary and extrapulmonary TB. The most prevalent extrapulmonary TB is tuberculous lymphadenitis (Suhariani, Wizri en Hanang, 2015). Tuberculous lymphadenitis needs special attention because the case is a severe health problem globally. Data from the World Health Organization (WHO) explained that extrapulmonary TB incidents in 2018 were 6.4 million cases or 14% of all TB incidents in 2017 (World Health Organization, 2018). Unfortunately, its number continues to increase. In 2018, extrapulmonary TB cases were 15% of the 7 million TB cases (World Health Organization, 2019). A study by Gautam et al. revealed that globally individuals with TB were 9.6 million. In addition, 35% of them had tuberculous lymphadenitis with 60% - 90% in cervical lymph nodes (Gautam *et al.*, 2018). Tuberculous lymphadenitis does not only attack adults but also children under 18 years old. The research explained that the most tuberculous lymphadenitis patients were 5-9 years and boys (66.7%). In addition, they had poor nutritional status (82.8%)(Noviarisa, Yani, and Basir, 2019).

Nutritional status in children can be influenced by food intake consisting of carbohydrates, proteins, and lipids. Several factors that can affect a child's nutritional status include the amount of food, the type of food, the frequency of eating, and a history of infectious disease. Infectious diseases can cause decreased appetite to malnutrition conditions (Dewi and Adhi, 2014). Malnutrition can interfere with endogenous protein and fat synthesis. This event triggers an increase in proteolysis and lipolysis and leads to a wasting condition, namely a decrease in muscle mass and fat (Nunjannah and Sudana, 2018). This study analyzes the correlation between tuberculous lymphadenitis and nutritional status in children at dr. Soebandi Regional Public Hospital.

METHOD

This paper was an analytic observational study with a cross-sectional design. It received ethical approval from the ethics committee of the Faculty of Medicine, the University of Jember, with the number: 1.524/H25.1.11/KE/2021. The data was secondary data from outpatient and inpatient medical records from January 01 January 2018 to December 31, 2020, in dr. Soebandi Regional Public Hospital, Jember, East Java, Indonesia. This research was conducted from May to July 2021 in dr. Soebandi Regional Public Hospital, Jember. The population was pediatric patients with lymphadenitis disease. Meanwhile, the samples were 76 respondents with total sampling. There were 52 tuberculosis lymphadenitis patients in the case group, while 24 were non-tuberculosis in the control group.

Furthermore, the independent variable was tuberculous lymphadenitis. Meanwhile, the dependent variable was nutritional status. Inclusion criteria were (1) patients under 18 years; (2) respondents were diagnosed with tuberculous lymphadenitis or non-tuberculous lymphadenitis histopathological; (3) respondents with a history of chronic disease (HIV, malignancy, thalassemia, and diabetes mellitus). Meanwhile, the exclusion criteria were incomplete medical record data. The body weight data was from the medical record when the first diagnosis of lymphadenitis. Instruments were weight-for-age z-score curves for under 60 months old children, while CDC Growth Charts 2000 for more than five-year-old children. The measurement scale was the underweight nutritional status (skinny and poor nutrition) and not underweight (normal and overnutrition). Then, data analysis used the Chi-square test to determine the correlation between both variables.

RESULTS

Mostly, tuberculous lymphadenitis patients were girls (65.4%), 12-17 years old (67.3%), not underweight (61.5%), and lived in rural areas (73%). Furthermore, all of them were given isoniazid, rifampicin, and pyrazinamide. In addition, 100% of them had successful treatment. Meanwhile, most of the non-tuberculous lymphadenitis patients were boys (54.2%), 6-11 years old (58.3%), lived in the rural areas

(79%), and were not underweight (66.7%). Treatment of the non-tuberculous lymphadenitis group consisted of antibiotics, analgesics, vitamins, and symptomatic medicine (see Table 1).

Table 1. The characteristics of respondents

Characteristic	Tuberculous Lymphadenitis patients		Non-Tuberculous Lymphadenitis patients	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Sex				
Boy	18	34.6	13	54.2
Girl	34	65.4	11	45.8
Age				
0-5 years	9	17.3	10	41.7
6-11 years	8	15.4	14	58.3
12-17 years	35	67.3	0	0
Nutritional Status				
Underweight	20	38.5	8	33.3
Not Underweight	32	61.5	16	66.7
Residence				
Urban area	14	27	5	21
Rural area	38	73	19	79
Treatment				
Isoniazid (H), rifampicin (R), pyrazinamid (Z).	52	100	0	0
Analgesic, corticosteroids, metamizole sodium.	0	0	5	21
Multivitamins, antibiotics, metamizole sodium, antitussive.	0	0	12	50
Multivitamin, ambroxol, pseudoephedrine	0	0	7	29
Result of treatment				
Successfull	52	100	24	100
Failed	0	0	0	0

The Chi-square test results obtained $p=0.667$ ($p>0.05$). Thus, there was no significant correlation between tuberculosis lymphadenitis and nutritional status among children aged under 18 years in dr. Soebandi Regional Public Hospital (See Table 2).

Table 2. Chi-square test of the correlation of tuberculous lymphadenitis and nutritional status in children aged under 18 years

Tuberculous Lymphadenitis	Underweight Nutritional Status				Total		p
	Yes		No		N	%	
	N	%	N	%			
Yes	20	38.5	32	61.5	52	100.0	0.667
No	8	33.3	16	66.7	24	100.0	
Total	28	36.8	48	63.2	76	100.0	

DISCUSSION

Our findings showed that patients with tuberculous lymphadenitis were more common in girls (Table 1). *Mycobacterium tuberculosis* infection and gender in girls are related because the immune system of girls is more susceptible to infectious diseases than boys. A vulnerable immune system can be triggered by eating habits in girls with smaller portions than boys, affecting body defense (Nurwitasari, 2015). In addition,

most patients with tuberculous lymphadenitis in this study were 12-17 years (Table 1). The age of 12-17 years is an active age for activities outside the home or school-age children. As a result, they are vulnerable to exposure to *Mycobacterium tuberculosis* (Buntuan, 2014). By the age of 10, the progression of primary infection will increase. The triggers include exposure load, activities outside the home, immune depression, and malnutrition (Carvalho *et al.*, 2018). Furthermore, tuberculous lymphadenitis patients in this paper lived in rural areas. A study explained that education level, distance from home to health facilities, socio-cultural, and economic status of patients could be determinants of tuberculosis disease susceptibility (Sunantara, 2016).

In addition, all tuberculous lymphadenitis patients received anti-tuberculosis drugs. The drugs consist of isoniazid (H), rifampicin (R), and pyrazinamide (Z). The data showed that all samples received the same combination treatment. The treatment was chosen based on the pediatric tuberculosis treatment guidelines for tuberculous lymphadenitis patients (Kementerian Kesehatan RI, 2016). The results showed that all tuberculous lymphadenitis patients had successful treatment. The percentage of successful therapy in this study was influenced by the discipline factor, patient compliance in adhering to treatment, and parents' awareness to carry out an examination as early as possible. Health workers should give health education to tuberculous lymphadenitis patients. Thus, it will reduce the risk of treatment failure.

Most respondents in this study were not underweight (61.5% in the case group and 66.7% in the control group). In addition, tuberculosis lymphadenitis did not correlate with nutritional status in children under 18 years old in dr. Soebandi Regional Public Hospital. Based on the research facts, several factors influence the incompatibility of the hypothesis with the study results. This study results could be affected by factors including nutritional status measurement, nutritional maintenance in early health care, the role of parents, and the incubation period of bacteria. When patients were first diagnosed with tuberculosis lymphadenitis, they had normal body weight or weight loss but were still within the normal range of nutritional status. They did not have metabolic disorders and impaired appetite. Often, their symptom was only lumping in the lymph nodes. In addition, early health care and good parents' role were essential in children's nutritional intake to make children remain in normal nutritional status. Although *Mycobacterium tuberculosis* infection causes excessive protein breakdown and decreased muscle protein reserves, this process can be prevented and balanced by providing good nutrition to accelerate disease healing (Wisnugroho, 2016).

The incubation period of *Mycobacterium tuberculosis* also caused no correlation between both variables in this paper. Its incubation period is different from other infectious processes because it starts from when it enters the body until the primary complex is formed. It ranges from 2 to 12 weeks, at which time the bacteria multiply until they reach 10³-10⁴. This amount can trigger a cellular immune response (Kementerian Kesehatan RI, 2016). When the primary complex is in sufficient quantities, cellular

immunity forms hypersensitivity which is characterized by the appearance of symptoms and positive tuberculin test. In this process, most individuals still have good immune status to inhibit the proliferation of *Mycobacterium tuberculosis* bacteria (Jatu, 2018). Thus, most tuberculous lymphadenitis patients in this study still had a good nutritional status.

CONCLUSION

In conclusion, tuberculosis lymphadenitis in the early incubation period does not correlate with nutritional status among children under 18 years old. There should be a proper early diagnosis of tuberculosis lymphadenitis and promptly adequate treatment to manage this disease. Thus, there is prevention in the nutritional status deterioration in the patients.

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