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Relationship Nutritional Status and Pulmonary Tuberculosis: Literature Review

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ABSTRACT

Background: The incidence of tuberculosis is an important problem now. One of the risk factors that influence tuberculosis is nutritional status. Malnutrition and tuberculosis are interrelated problems. Aims of the study is to clearly understand the relationship between nutritional status and the incidence of pulmonary tuberculosis literature. **Method:** A literature review was carried out by searching articles through electronic databases (Google Scholar, PubMed, ScienceDirect, and SpringerLink) using the keywords nutritional status, tuberculosis, risk factors for the incidence of tuberculosis, and nutritional status incidence of pulmonary tuberculosis. The inclusion criteria for the articles used were articles published in accredited National and International publications articles, year of publication of the articles in the range 2017-20123, full text, open access, and cross-sectional study research design. Seven articles were selected for analysis. Articles were analyzed following Prisma Guidelines. **Results:** Based on a literature review, it was found that there was a relationship between nutritional status and the incidence of pulmonary tuberculosis. Nutritional status affects a person's immune system. When nutritional status is in poor condition, the body's immune system will be low, making it susceptible to disease, one of which is pulmonary tuberculosis. On the other hand, tuberculosis can worsen a person's nutrition due to the disease process. **Conclusion**: Based on studies, it is explained that nutritional status has a significant relationship and a high risk of the incidence of pulmonary tuberculosis. Nutritional status and pulmonary tuberculosis have a reciprocal relationship.

Introduction

Tuberculosis (TB) is a contagious infectious disease caused by infection with the bacteria Mycobacterium tuberculosis and is still a health problem of concern in the world. The incidence of tuberculosis according to the 2017 Global Tuberculosis Report shows that as many as 500,000 children were infected with TB in 2016 [1]. Based on the TB Prevalence Survey in Indonesia in 2016, the prevalence of pulmonary TB was 156,723 cases with 61% male cases and most cases occurring in the 45-54 years age group [2]. The high incidence of TB has an impact on increasing mortality rates [3].

Several risk factors for TB infection are low immunity, being in close contact with adults infected with TB, poor nutritional status, lack of access to medical services, and unhealthy environmental conditions [4]. Previous research has proven that there is a relationship between risk factors and the incidence of pulmonary TB, namely knowledge (p-value 0.018), nutritional status (p-value 0.012), and smoking habits (p-value 0.000) [5]. According to Binongko in 2012 in Maksalmina in 2013, one of the risk factors that influence tuberculosis is the nutritional status [6]. Analysis of risk factors for

pulmonary tuberculosis explains that the BMI variable influences the incidence of pulmonary tuberculosis. A BMI in the underweight category will affect a person's immune system, thereby increasing the risk of pulmonary tuberculosis [7].

Malnutrition and tuberculosis are interrelated problems. Nutritional status is one of the most important factors in the body's defense against tuberculosis infection. In poor nutritional conditions, the body's immune response will weaken so that the body's ability to defend itself against infection will decrease. Based on previous research, it is clear that there is a significant relationship between nutritional status and the incidence of pulmonary tuberculosis. This explains that poor nutritional status is 3.4 times more likely to suffer from pulmonary tuberculosis than adequate nutritional status [6].

There are many main factors in maintaining the body's immunity against tuberculosis transmission, one of which is being exposed to poor nutrition. Poor nutrition will cause the body's immunity to decrease so that the protective function to fight infection will decrease. Nutritional status will also influence recovery from tuberculosis treatment. Previous research found that the majority of pulmonary tuberculosis patients had very poor nutritional status, namely around 40.6%. Malnutrition will worsen the condition of TB patients which results in malnutrition. Another study explains that the majority of TB patients have poor nutritional status, namely 53.7% [8]. Based on this research, nutritional status is one of the factors that influences the occurrence of tuberculosis [9, 18, 19]. Several related literature have discussed the nutritional status of pulmonary tuberculosis of various ages including from the elderly, adults, teenagers, and children. However, some of these articles only explore the relationship between nutritional status and tuberculosis in general and only mention it as a risk factor for tuberculosis. Most of the previous literature used the case-control method. Literature regarding the relationship between nutritional status and pulmonary tuberculosis is still limited. Therefore, this research will explore various previous scientific literature and obtain information specifically regarding the relationship between nutritional status and pulmonary tuberculosis [14, 15]. Based on this background, researchers tried to analyze the relationship between nutritional status and tuberculosis using the literature study method. This research aimed to clearly understand the relationship between nutritional status and the incidence of pulmonary tuberculosis based on literature published previously [16, 17].

Materials and Method

This research employed a literature review sourced from several databases i.e. Google Scholar, PubMed, ScienceDirect, and SpringerLink. The keywords used are “nutritional status”, “pulmonary tuberculosis”, “risk factors for pulmonary tuberculosis”, “nutritional status” and "incidence of pulmonary tuberculosis”. The inclusion criteria for the articles used were articles published in accredited national and international publications articles, year of publication of the article in the range 2017-2023, full text, open access, pulmonary TB, not explain TB prevention, and cross-sectional study research design.

Searching for articles with these keywords produces around 5,640 articles from several databases. After identifying the relevance of titles and duplication of articles, a total of 102 articles were obtained. Then as many as 7 selected articles were analyzed in full text. The article analysis process can be seen in the Prisma scheme in Figure 1.

Results and Discussion

Results

Seven articles were analyzed using a matrix table (Table 1) to identify each variable studied regarding the relationship between nutritional status and the incidence of pulmonary tuberculosis. A literature study from seven focused and analyzed literature proves that nutritional status is related to the incidence of pulmonary TB. Previous research explains that the variable that has the most influence on the incidence of pulmonary tuberculosis is the nutritional status variable. Someone with poor nutritional status has a higher risk of suffering from pulmonary tuberculosis compared to people who do not have these risk factors.

The variable that is the focus of this literature review is the relationship between nutritional status and the incidence of pulmonary tuberculosis. The results of the article analysis found that nutritional status increases the incidence of pulmonary tuberculosis and conversely pulmonary tuberculosis can affect the nutritional status of sufferers. The results of the article synthesis analysis can be seen in Table 1.

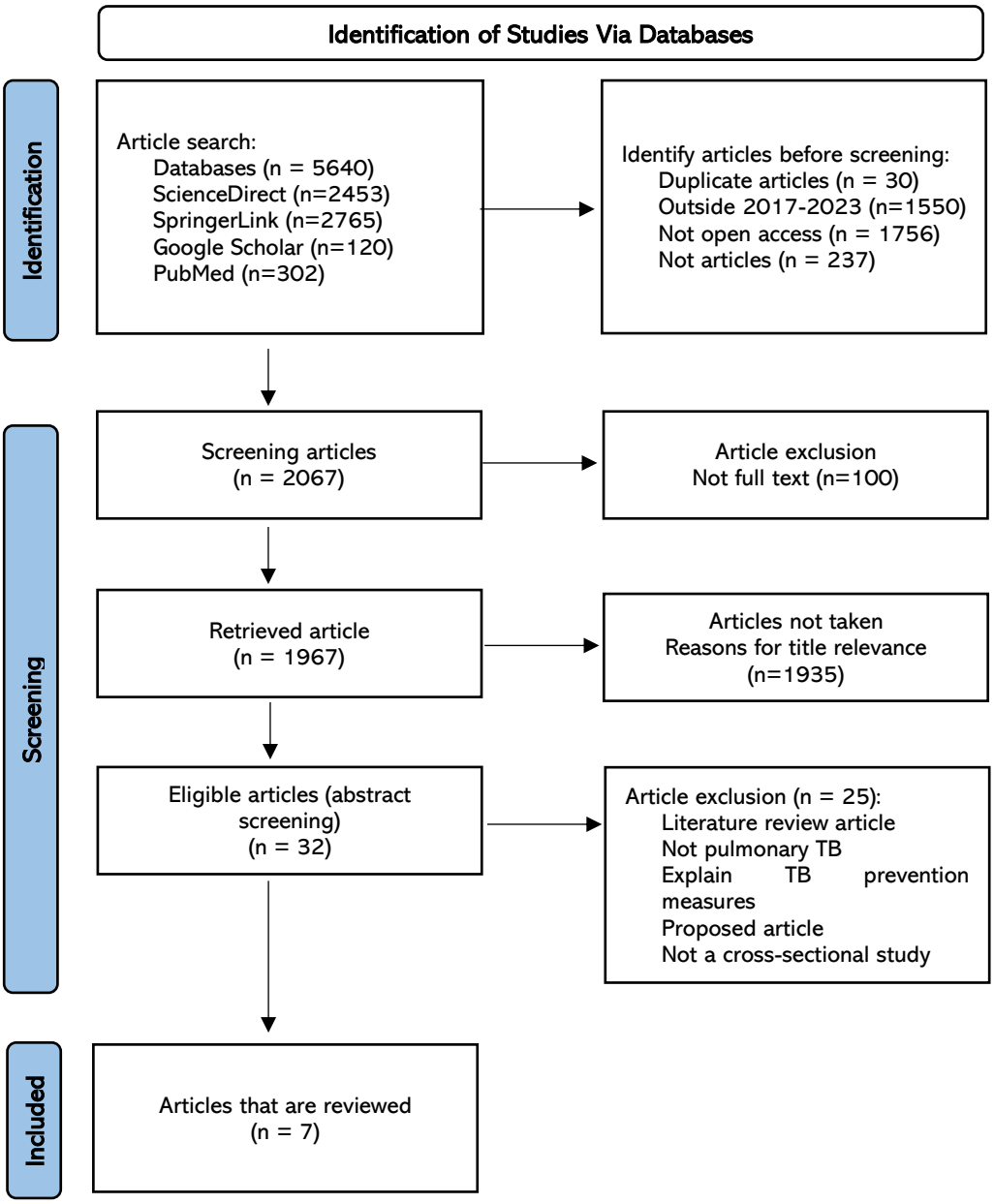

Figure 1. Article selection scheme using Prisma Guideline Flowchart

Discussion

A literature study from seven focused and analyzed literature proves that nutritional status is related to the incidence of pulmonary TB. Someone with poor nutritional status or underweight has a 1.6 times risk of suffering from pulmonary TB compared to someone who has normal nutritional status [5, 25, 26]. Previous research shows that subjects with poor nutritional status experience more cases of pulmonary TB, this is in accordance with the theory which explains that inadequate nutritional intake results in low body resistance, making it susceptible to attack by pulmonary TB

bacteria [10]. In general, nutritional status can be an important measure in determining disease [20]. Insufficient nutritional status can cause the body's immune system to be weak so that *Microbacterium tuberculosis* bacteria can easily reproduce and inhibit conversion [9].

Table 1. Analysis of Article Synthesis

No	Citation	Method	Sample/Place	Results
1	Feleke, B.E., Feleke, T.E., & Biadglegne, F. (2019)	Cross-sectional study	Sample: 5045 participants Place: Ethiopia	The research results show that most TB patients experience malnutrition. TB sufferers are very vulnerable to malnutrition and malnutrition is the cause of TB in patients
2	Amalia, R., Lestari, R., & Cholidah, R. (2022)	Cross-sectional study	Sample: 61 respondents Place: Cakranegara Health Center	The relationship between the tuberculosis treatment phase was not significant with the nutritional status of pulmonary tuberculosis patients (p=0.9660). This means that there is no relationship between the tuberculosis treatment phase and nutritional status
3	Gurung, L.M., Bhatt, L.D., Karmacharya, I., & Yadav, D.K. (2018)	Cross-sectional study	Sample: 133 respondents Place: Nepal	The number of calories, frequency of meals per day, type of TB, and nutritional status are related to current nutritional status. Nutritional counseling needs to be given to TB patients with nutritional support for severe malnutrition.
4	Mursudarinah & Sari, D, (2019)	Analytical observational cross-sectional study	Sample: 69 respondents Place: Surakarta	The statistical test results showed that the level of education was with a nutritional status p-value of 0.000 and the results of the treatment phase test were with a nutritional status p-value of 0.000. There is a relationship between the level of education the phase of tuberculosis treatment and the nutritional status of tuberculosis sufferers
5	Pakpahan, JY (2019)	Cross-sectional study	Sample: 30 respondents Place: Dumai	Bivariate, it shows that there is a relationship between smoking behavior (p-value 0.000) and nutritional status (p-value 0.000) with the incidence of pulmonary tuberculosis.
6	Aghnia, Q., Yusroh, Y., & Husin, U. (2018)	Observational retrospective used cross-sectional design	Sample: 98 child respondents Place: Al-Ihsan Regional Hospital	There is a relationship between tuberculosis and nutritional status in children (p=0.001). Research shows that children suffering from tuberculosis can suffer from malnutrition or malnutrition
7	Erpiono, Demmalewa, J., Dhesa, D., Ihsan, H., & Abadi, E. (2023)	Cross-sectional study	Sample: 47 respondents Place: Benu-Benua	There is a relationship between diet status and the frequency of pulmonary TB with a value of p = 0.015.

Previous research explains that the variable that has the most influence on the incidence of pulmonary tuberculosis is the nutritional status variable. Someone with poor nutritional status has a higher risk of suffering from pulmonary tuberculosis compared to people who do not have these risk factors. Malnutrition, such as a lack of calories, protein, vitamins, iron, etc., will affect a person's immune system, making them susceptible to infectious diseases such as pulmonary TB [27]. A person's nutritional status greatly determines a person's body's resistance to diseases that arise [11, 12].

There is a reciprocal relationship between malnutrition status and the risk of contracting tuberculosis. Poor nutritional status will increase the risk of tuberculosis [28, 29]. On the other hand, TB will contribute to poor nutritional status due to the course of the disease affecting the body's

immune system. Poor nutritional status will disrupt the immune system mediated by T lymphocytes, which facilitates the occurrence of infectious diseases, especially tuberculosis [13]. Tuberculosis infection can cause increased energy requirements and changes in metabolism which can worsen nutritional status, resulting in malnutrition. On the other hand, malnutrition can affect the clinical manifestations of tuberculosis as a result of a weakened immune system [8].

Literature studies also explain the relationship between nutritional status in children and pulmonary tuberculosis. Based on other research, it is inconsistent with the literature to explain that children's nutritional status is not a risk factor for the incidence of tuberculosis. This can happen to children with a positive or negative diagnosis of TB who have good nutritional status due to regular monitoring of nutritional status using the Healthy Way Card. Apart from that, there are many programs related to monitoring the nutritional status of toddlers so that more and more children have good nutritional status [13].

The body's immune system will function well if it provides adequate nutrition and food [21, 22]. In this case, what needs to be considered is the quality of food consumption which is determined by the composition of the type of food. Poor nutritional conditions can reduce resistance to tuberculosis in both adults and children. Normal body weight changes are also a predictor of successful pulmonary TB treatment. The nutritional status of TB patients generally improves during treatment. This can be caused by several factors, including increased food intake and appetite, as well as the body's metabolic processes starting to improve [9, 23, 30].

Conclusion

Based on the result, it is explained that nutritional status has a reciprocal relationship with pulmonary tuberculosis. Poor nutritional status will increase the risk of tuberculosis due to low immunity. On the other hand, tuberculosis will contribute to poor nutritional status because the disease process affects the body's immune system. Given the reciprocal relationship between nutritional status and pulmonary tuberculosis, it is recommended to implement comprehensive health interventions that address both aspects concurrently, focusing on improving nutritional support to boost immunity and, in turn, reduce the risk of tuberculosis, while also ensuring adequate nutritional care for individuals already affected by the disease to mitigate its impact on their overall health.

Declaration

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Conflicts of Interest: There is no conflict of interest in this research

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