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RESEARCH ARTICLE

RELATIONSHIP BETWEEN TUBERCULOSIS AND STUNTING IN TODDLERS AT THE PEDIATRIC CLINIC OF DUSTIRA HOSPITAL

(HUBUNGAN TUBERKULOSIS DENGAN STUNTING PADA BALITA DI POLI ANAK RUMAH SAKIT DUSTIRA)

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ABSTRACT
Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. TB is one of the chronic infections that can affect the nutritional status of toddlers. Children suffering from TB are at risk of experiencing stunting. This study aimed to determine the relationship between tuberculosis and stunting among toddlers attending the Pediatric Clinic of Dustira Hospital. This research employed an analytical method with a cross-sectional design involving 90 toddlers aged 24–59 months at the Pediatric Clinic of Dustira Hospital. The study utilized secondary data obtained from the medical records of patients from the Pediatric Clinic of Dustira Hospital during the 2021–2022 period. Data were analysed using univariate and bivariate analyses with the chi-square test. The results showed that 17.7% of toddlers with TB experienced stunting. Statistical analysis indicated a significant relationship between TB and the incidence of stunting among toddlers (p-value = 0.044). Toddlers with TB were found to be 4.65 times more likely to experience stunting. TB, as a chronic disease, is associated with malnutrition in toddlers. Chronic malnutrition leads to a decrease in the linear growth rate as the body attempts to compensate in order to maintain its nutritional status. This linear growth retardation can progress into stunting or even severe stunting.

Keywords: stunting, toddlers, tuberculosis

ABSTRAK
Tuberkulosis (TB) adalah penyakit menular yang disebabkan oleh Mycobacterium tuberculosis. TB merupakan salah satu infeksi kronis yang dapat mempengaruhi status gizi balita. Balita yang mengalami TB dapat mengalami stunting. Penelitian ini dilaksanakan untuk mengetahui hubungan antara tuberkulosis dengan stunting pada balita di Poli Anak Rumah Sakit Dustira. Penelitian ini merupakan penelitian analitik dengan desain cross sectional pada 90 pasien balita usia 24 – 59 bulan di Poli Anak Rumah Sakit Dustira. Penelitian menggunakan

data sekunder berupa rekam medik pasien Poli Anak Rumah Sakit Dustira periode tahun 2021-2022. Data penelitian dianalisis melalui analisis univariat dan bivariat menggunakan metode uji chi square. Hasil penelitian menunjukkan terdapat 17,7% balita TB yang mengalami stunting. Hasil analisis menunjukkan bahwa terdapat hubungan yang bermakna antara TB dengan kejadian stunting pada balita (p-value = 0,044). Balita dengan TB lebih berisiko 4,65 kali untuk mengalami stunting. TB merupakan penyakit kronik berhubungan dengan malnutrisi pada balita. Malnutrisi kronik mencetuskan kondisi penurunan laju pertumbuhan linier karena tubuh berusaha melakukan kompensasi untuk mempertahankan status gizi. Perlambatan pertumbuhan linier akan berlanjut menjadi kondisi stunting bahkan severe stunting.

Kata Kunci: balita, stunting, tuberkulosis

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. This bacterium can also infect organs other than the lungs, a condition known as extrapulmonary TB.[1] According to data from the World Health Organization (WHO) in 2021, an estimated 10.6 million people worldwide were affected by TB, of which 1.2 million cases occurred in children.[2] TB is a major cause of morbidity and mortality among children globally, with the highest mortality rates found in children under five years of age, particularly those with nutritional problems.[3] The Global Tuberculosis Report 2022 stated that Indonesia ranks as the second-highest country in the world for TB cases, following India.[4] Data from the Ministry of Health of the Republic of Indonesia (Kemenkes RI) in 2022 recorded 61,594 TB cases among children in Indonesia, with 34,615 of them occurring in the 0–5-year age group.[5] The West Java Provincial Health Office reported that in 2019, there were 18,625 TB cases among children in West Java. In the same year, the Cimahi City Health Office documented 860 TB cases among children.[6] Dustira Hospital, a teaching and referral hospital, was reported to have the second-highest number of TB case detections in Cimahi, according to the 2019 Cimahi City Health Profile.[7]

Children with tuberculosis generally exhibit symptoms such as weight loss or failure to gain weight over the previous two months, growth failure despite nutritional interventions for one to two months, persistent fever lasting more than two weeks, prolonged cough for more than two weeks, and fatigue or general malaise.[8] These clinical manifestations of TB in children can significantly affect their quality of life, particularly with regard to their nutritional status.[9]

Apart from tuberculosis, the issue of stunting in Indonesia remains unresolved. Stunting is defined as a condition of short or very short stature based on length or height-for-age that is less than -2 Standard Deviations (SD) on the WHO growth curve,

caused by chronic nutritional deficiencies. Children with stunting are at risk of decreased immune function, increased susceptibility to infections, and higher morbidity and mortality rates.[10] According to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), in 2020 approximately 149.2 million children under the age of five were too short for their age (stunted).[11,12] Data from the 2018 Basic Health Research (Riskesdas) reported that the prevalence of short and very short toddlers in Indonesia was 30.8%. The 2021 Indonesian Health Status Study, conducted across 34 provinces, showed that the stunting rate declined from 27.7% in 2019 to 24.4% in 2021. Although this indicates a reduction, the WHO still classifies the prevalence as high (20–<30%).[10,13] The West Java Provincial Health Office (2019) reported that the total number of stunted toddlers in West Java reached 94,165 in 2019, while in Cimahi City, the number of stunted toddlers reached 888 in the same year.[14] The UNICEF and the National Development Planning Agency (Bappenas) have set targets to reduce stunting as part of the Sustainable Development Goals (SDGs) - specifically, Goal 2: Zero Hunger (Child Malnutrition) and Goal 3: Good Health and Well-being (Child Survival).[15,16]

A study by Jahiroh and Nurhayati (2017) showed that nutritional status can influence the ability of toddlers to fight off infections. Malnourished children (for example, those who are stunted) have reduced immunity, making them more vulnerable to infectious diseases.[17] Conversely, chronic infections such as tuberculosis in children can lead to weight loss and increased metabolism due to the body's immune response to infection. If TB is not managed properly, it can result in malnutrition. This indicates a bidirectional relationship between stunting and TB, as reported by Pradmapriyadarsini et al.[18] The present study, entitled *The Relationship Between Tuberculosis and Stunting in Toddlers at the Pediatric Clinic of Dustira Hospital*, was conducted to test the hypothesis that tuberculosis is associated with the occurrence of stunting. The hypothesis posits that there is a significant relationship between TB and stunting in toddlers.

MATERIALS AND METHODS

This study employed an analytic observational research design with a cross-sectional approach. Secondary data were obtained from the medical records of patients at the Pediatric Clinic of Dustira Hospital for the 2021–2022 period. The inclusion criteria for this study were pediatric clinic patients aged 24–59 months at Dustira Hospital during the 2021–2022 period. The exclusion criteria were toddlers

with a history of congenital abnormalities or chronic diseases other than TB that could cause short stature, as well as those whose height and weight data were unavailable in the medical records. The minimum required sample size was 64 toddlers, consisting of TB and non-TB groups, determined using the two-proportion hypothesis test formula. Samples were selected using a probability sampling technique with the simple random sampling method. The WHO growth curve was plotted using the WHO Anthro 2.2 application. Data were analyzed using univariate and bivariate analyses, with the chi-square test applied via SPSS version 22. Ethical considerations were observed throughout the study, particularly in maintaining patient confidentiality. Ethical approval was obtained from the Ethics Committee of Dustira Hospital (Ethical Approval No. RSD/158/X/2023) on October 6, 2023. The study was conducted in the Medical Records Department of Dustira Hospital, Cimahi, from October 2023 to January 2024.

RESULTS AND DISCUSSION

The study was conducted using data from 90 medical records of toddlers aged 24–59 months who attended the Pediatric Clinic of Dustira Hospital during the 2021–2022 period. The data consisted of 45 toddlers diagnosed with TB and 45 toddlers without TB.

The characteristics of TB patients included age, sex, stunting status, and classification of TB diagnosis based on the anatomical location of the disease. These characteristics are presented in Table 1.

Table 1 Characteristics of toddlers with Tuberculosis

No	Variable	Number (n)	Frequency (%)
1.	Age		
	24–35 months	24	53.3
	36–47 months	14	31.1
	48–59 months	7	15.6
2.	Sex		
	Male	25	55.6
	Female	20	44.4
3.	TB Diagnosis		
	Pulmonary TB	40	88.9
	Extrapulmonary TB	5	11.1
4.	Stunting Status		
	Normal	37	82.2
	Stunted	2	4.4
	Severely Stunted	6	13.3
	Total	45	100

Table 1 shows that the majority of toddlers with TB at the Pediatric Clinic of Dustira Hospital were in the 24–35-month age group, totaling 24 children (53.3%). Meanwhile, 14 children (31.1%) were aged 36–47 months, and 7 children (15.6%) were aged 48–59 months. A study conducted by Ramos JM et al. at a hospital in Ethiopia (2019) reported that toddlers aged 24 months represented the largest group of TB cases compared to those aged 36 and 48 months.[18] The number of male toddlers with TB was 25 (55.6%), while female toddlers accounted for 20 (44.4%).

The results showed no significant difference in the proportion of TB cases between males and females, consistent with the findings of Peer V et al. in a multicenter study conducted across seven high-income countries (2022).[19]

TB diagnoses among children were classified based on the anatomical site of infection, namely pulmonary TB and extrapulmonary TB.[1,8] As shown in Table 1, most toddlers were diagnosed with pulmonary TB (40 children; 88.9%), while 5 children (11.1%) had extrapulmonary TB. These results align with the study by Ping Chu et al. in China (2022) and data from the Indonesian Ministry of Health, which reported that 91% of TB cases in Indonesia are pulmonary.[20]

Regarding nutritional status, Table 1 indicates that 37 toddlers (82.2%) had normal growth, 2 toddlers (4.4%) were classified as stunted, and 6 toddlers (13.3%) were categorized as severely stunted. A study by Jahiroh et al. (2017) reported a higher proportion of stunted toddlers with TB toddlers (26%) compared to those with severe stunting (14%).[17]

The characteristics of non-TB toddlers aged 24–59 months who were treated at the Pediatric Clinic of Dustira Hospital during the 2021–2022 period, including age, sex, and stunting status, are presented in Table 2.

Table 2 Characteristics of Non-TB Toddlers

No	Variable	Number (n)	Frequency (%)
1.	Age		
	24–35 months	16	35.6
	36–47 months	18	40.0
	48–59 months	11	24.4
2.	Sex		
	Male	23	51.1
	Female	22	48.9
3.	Stunting Status		
	Normal	43	95.6
	Stunted	2	4.4
	Severely Stunted	0	0.0
	Total	45	100

Table 2 shows that the majority of non-TB toddlers at the Pediatric Clinic of Dustira Hospital were in the 36–47-month age group, totalling 18 children (40%). Meanwhile, 16 children (35.6%) were aged 24–35 months, and 11 children (24.4%) were aged 48–59 months. A study conducted by Azriful et al. in West Sulawesi (2018) found that the most common age group among non-TB toddlers was 48–59 months (38.8%).[21]

The number of non-TB toddlers by sex consisted of 23 males (51.1%) and 22 females (48.9%), indicating an almost equal distribution between sexes. Based on the WHO height-for-age (HAZ) curve, 43 toddlers (95.6%) were classified as normal, 2 toddlers (4.4%) were stunted, and no toddlers were classified as severely stunted. A study by Jahiroh et al. (2017) in West Bandung Regency reported that 19% of non-TB toddlers experienced stunting.[17]

According to the World Health Organization (WHO), the primary causes of stunting are associated with inadequate nutrient intake and chronic infections or diseases that interfere with food consumption, absorption, and nutrient utilization.[20]

Analysis of the Relationship Between Tuberculosis and Stunting.

The analysis presented in Table 3 shows a p-value of 0.044. A p-value ≤ 0.05 indicates statistical significance; therefore, the null hypothesis (H_0) is rejected. Based on this result, it can be concluded that there is a significant relationship between tuberculosis and the incidence of stunting among toddlers at the Pediatric Clinic of Dustira Hospital. Furthermore, the odds ratio (OR) was 4.65, suggesting that toddlers with tuberculosis are 4.65 times more likely to experience stunting compared to those without tuberculosis.

A study conducted by Martinez et al. in South Africa (2023) also demonstrated a significant relationship between childhood TB and height-for-age (HAZ) z-scores, with a reported p-value of 0.002.[9]

Table 3 Association between tuberculosis and stunting in toddlers at the Pediatric Clinic of Dustira Hospital

Variable	Stunting		Not Stunted		Total	OR	*p*-value
	n	%	*n*	%	*n*		
TB	8	17.8	37	82.2	45	4.65	0.044
Non-TB	2	4.4	43	95.6	45		
Total	10	11.1	80	88.9	90		

Meanwhile, a study conducted by Jahiroh and Prihartono N. (2017) at seven community health centers (Puskesmas) under the jurisdiction of the West Bandung Regency Health Office found a significant association between stunting and tuberculosis in toddlers, with a p-value ≤ 0.05. The study reported an odds ratio (OR) of 2.96 for stunting and 8.00 for severe stunting in relation to TB. This indicates that stunted toddlers were approximately three times more likely to develop tuberculosis, while those with severe stunting were eight times more likely to develop tuberculosis.[17] In addition, a study conducted by Girsang VI et al. (2023) in Depok showed a p-value < 0.01, with an odds ratio of 4.87 for stunting and 7.39 for severe stunting in relation to TB.[22]

Tuberculosis is a chronic disease that can lead to malnutrition in toddlers. Chronic malnutrition slows down linear growth velocity, as the body attempts to compensate to maintain its nutritional status. This linear growth retardation can eventually progress to stunting.[10,23] The findings of the present study support this mechanism, demonstrating a significant association between tuberculosis and stunting among toddlers, as well as the elevated risk of stunting in children with TB compared to those without TB.

Furthermore, the studies by Martinez et al. (2023), Jahiroh and Prihartono N. (2017), and Girsang VI et al. (2023) consistently revealed a significant relationship between stunting and tuberculosis in toddlers, as evidenced by p-values < 0.05.[9,17,22] When these previous findings are considered alongside the results of this study, they collectively reinforce the concept of a bidirectional relationship between TB and stunting, as described by Padmapriyadarsini C. et al. (2016) in India.[23]

CONCLUSION

The most common diagnosis among toddlers with tuberculosis at the Pediatric Clinic of Dustira Hospital was pulmonary TB (88.9%). The combined prevalence of stunting and severe stunting among toddlers with tuberculosis was 17.7%. There was a significant association between tuberculosis and stunting in toddlers at the Pediatric Clinic of Dustira Hospital (p-value ≤ 0.05). Toddlers with tuberculosis were found to be 4.65 times more likely to experience stunting compared to those without tuberculosis.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in the conduct of this study.

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