

Research Article

# Pediatric Tuberculosis Characteristic in West Nusa Tenggara Regional General Hospital During COVID-19 Pandemic 2019-2021

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## Abstract

Tuberculosis (TB) infection is still an important health problem worldwide, especially in children. The Coronavirus Disease (COVID-19) pandemic has affected the priority of healthcare including TB services. Many health services reported a significant decrease in TB detection, notification, treatment and prevention due to COVID-19 policies. Therefore, we conducted a study to determine the characteristics of pediatric TB patients in West Nusa Tenggara Province General Hospital during COVID-19 pandemic. This study was a retrospective study using registry data from the Pediatric Respiriology Division, Department of Child Health, West Nusa Tenggara Province General Hospital from March 2019 to December 2021. Of 225 children with TB disease, there were 66.2% outpatient and 33.8% inpatient. Thirty point seven percents (69/225) were in ages group 5 to 11 years old and mostly were males (69.8%). West Lombok Regency was the district with highest number of subjects (37.3%). Majority of subjects were visited in March-December 2019, nearly before pandemic. Polymerase Chain Reaction (PCR) test for TB were performed in 172 (76.5%) subjects and showed positive result in 22/172 (9.8%). Most of them were pulmonary TB (72.9%) and 9.8% bacteriologically confirmed. Only 4 (1.8%) of children were died. Pulmonary TB is the most common TB disease among pediatric TB patients in this study. During study period, the number of hospital visit was decreased due to COVID-19 policies. This findings can guided healthcare providers to improve detection, treatment and prevention of TB disease post COVID-19 pandemic.

## Keywords

Pediatric Tuberculosis, Characteristics, COVID-19 Pandemic

## 1. Introduction

Tuberculosis is an important health problem worldwide. One of the principal components in tuberculosis control is pediatric tuberculosis. It is based on the fact of high percentage of children under 15 years of age (40-50% of the population), and the fact that every year, around 500.000

children worldwide are infected with tuberculosis [1]. In 2015, it was estimated that Indonesia had 1 million tuberculosis cases (647 per 100.000 population), with 100.000 deaths (41 per 100.000 population) [2]. Based on West Nusa Tenggara Health Office in 2020, pediatric tuberculosis cases in 10

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provinces were 250 cases [3]. Comprehensive treatment for pediatric tuberculosis had been implemented, which included a clinical aspect and a public health program [2].

In January 2020, WHO announced the global pandemic of *Coronavirus disease 2019* (COVID-2019) [3]. COVID-19 pandemic shifted healthcare priorities. Although the COVID-19 infected and deaths were fewer compared to the adult population, the pandemic impact on pediatric growth and immunity towards other diseases was enormous in developing countries. The impact showed in lower active or passive health care access, prevention such as BCG vaccination as well as delay on new tuberculosis case reports and active case finding in several countries due to resource diversion on COVID-19 [4, 5].

Prior data indicates the high number of tuberculosis cases as the impact on healthcare care services decreases including in the aspect of prevention, diagnosis, and treatment during the COVID-19 pandemic. Therefore, this study aims to describe the characteristics of pediatric tuberculosis patients during the COVID-19 pandemic in 2019-2021 in West Nusa Tenggara Regional General Hospital.

## 2. Method

The data of this cross-sectional retrospective study were taken from the Pediatric Pulmonology Division, West Nusa Tenggara Regional General Hospital, from March 2019-December 2021. The subjects were pediatric ages 0-15 years old and were clinically or bacteriologically diagnosed with tuberculosis. Non-complete registry data was excluded. Total sampling was used, and 225 subjects were included. Descriptive analysis was conducted using computerization. Ethical approval was granted by the Research Ethics and Committee West Nusa Tenggara Regional General Hospital

(no. 070.1/46/KEP/2022).

## 3. Result

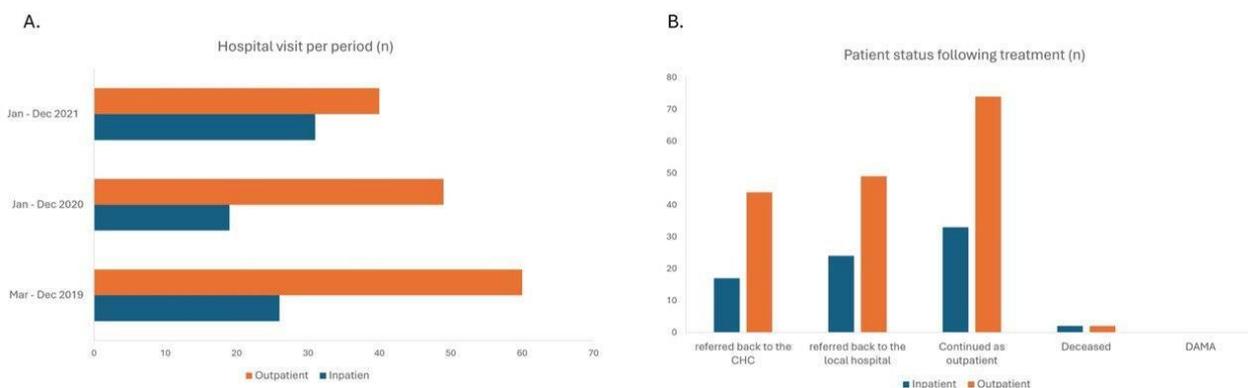
Subjects of 225 pediatrics diagnosed with tuberculosis data based on medical records were included. Subject basic demographic characteristics are provided in Figure 1. The subject's mean age is  $5,121 \pm 4,424$  years, consisting of 68 (30,2%) females and 157 (69,8%) males. The subjects were divided into 149 (66,2%) outpatients and 76 (33,8%) inpatients. Based on the inpatient and outpatient age mean differences, an older age mean was found in the outpatient ( $5,282 \pm 4,361$  years) than in the inpatient ( $4,807 \pm 4,557$  years). Based on age group, the study subject was dominated by pediatrics (69 patients or 30,7%). Meanwhile, neonates became the lowest age group subject (1 neonate). Based on sex, most of the subjects were male, 157 subjects (69,8%). Based on patient domicile, West Lombok Regency had the highest number of patients, 84 people (37.3%).

Figure 2 depicts hospital visits per period and subject status post-treatment. Based on the year of visit, most of the patients made hospital visits in March-December 2019, 86 patients (38,2%). Most of the patients, 107 people (47.6%), were treated as outpatients, followed by 27,1% referred to the local Community Health Center, and 23.6% to a local hospital. Only 4 patients (1.8%) of the total subjects were deceased. There was no case of Discharge Against Medical Advice (DAMA).

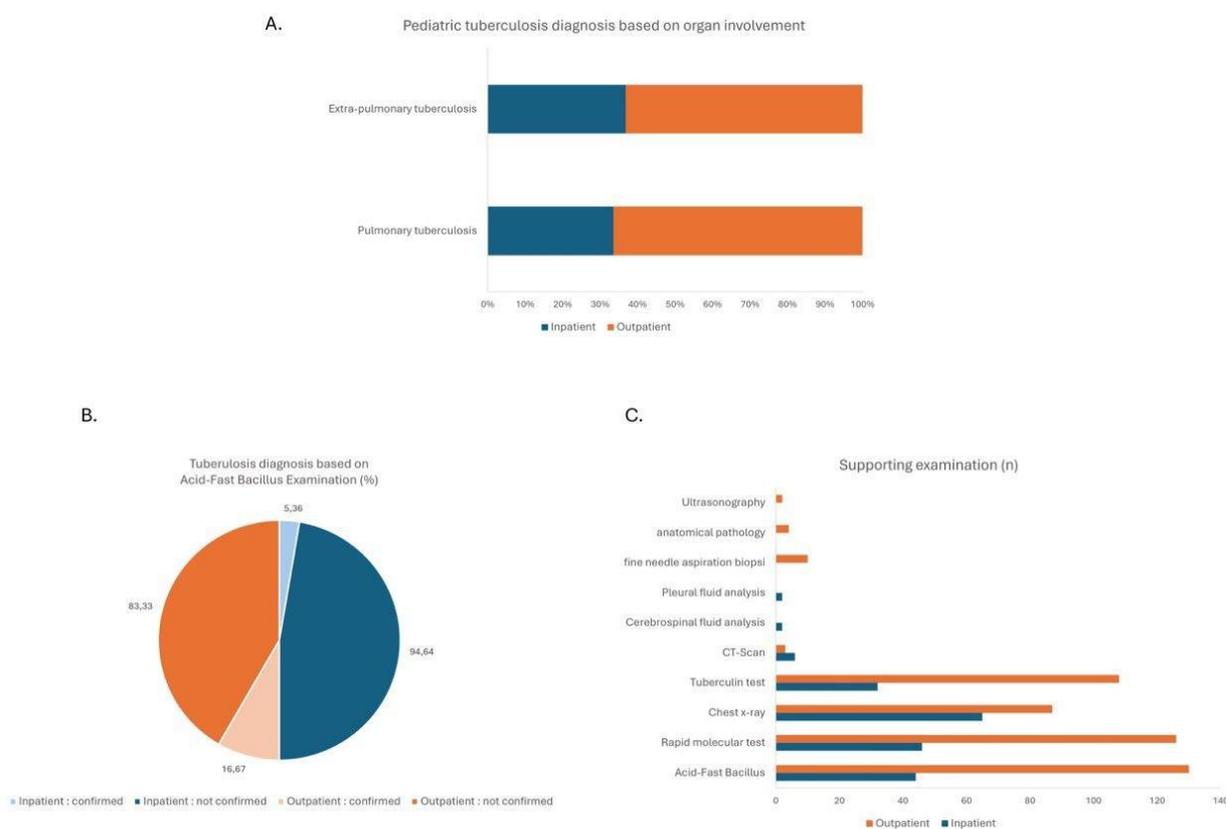
Regarding patient diagnosis (Figure 3), pulmonary tuberculosis, 164 patients (72.9%), had the largest proportion of all tuberculosis patients. Although 3 patients did not undergo supporting examination, nearly all, 98.7% (222 patients), did. Several supporting examinations were conducted, as seen in Figure 3.



Figure 1. Subject demographic characteristics based on (A) sex, (B) age, and (C) domicile.



**Figure 2.** (A) Subject status during and (B) post-treatment. Subject status during treatment was further divided based on the period of hospital visit. CHC: Community Health Center; DAMA: Discharge Against Medical Advice.



**Figure 3.** (A) Pediatric tuberculosis diagnosis description. (B) The percentage of tuberculosis diagnoses confirmed bacteriologically based on patient status. (C) Supporting examination was used during the period of study.

### 4. Discussion

Based on the difference in mean age between inpatients and outpatients, it was found that the mean age was greater in the outpatient group,  $5.282 \pm 4.361$  years, compared to inpatients,  $4.807 \pm 4.557$  years. Based on the patient age group, the research subjects were dominated by the children's age group of 5-11 years, 69 (30.7%) patients. In research conducted by Stosic et al (2021), which recorded children and adolescents

in all health facilities in Serbia from 2005-2016, tuberculosis in the age range 5-14 years was diagnosed in 149 (25%) patients. The same research also showed that the majority of tuberculosis cases were detected in the age group 15-18 years, 389 (65.3%) cases, and the least was found in the age group 0-4 years, 58 (9.7%) cases [6]. Aygun et al (2020) research on 216 young pulmonary tuberculosis patients at Kanuni Sultan Süleyman Hospital found that the median patient age was 12.3 (range, 0.33-18) years [7].

The majority of patients in the current study were male

(69,8%) and had hospital visits in March-December 2019 (38,2%). The hospital visits during the pandemic, Januari-December 2020, declined from the previous year to 30,2%, leading to the conduction of this research. West Lombok, with 84 cases (37.3%), had the highest incidence of pediatric tuberculosis cases in West Nusa Tenggara. However, a different number was found in West Nusa Tenggara Health Office data in 2022, where pediatric tuberculosis was dominantly found in Lombok in 67 cases [8]. The discrepancy between the 2 data might be explained by the type of hospital. Our hospital is the final referral hospital in West Nusa Tenggara that does not cover all cases. Furthermore, East Lombok is the most populated district in West Nusa Tenggara.

The majority of pediatric tuberculosis was diagnosed as pulmonary tuberculosis (72,9%). Young-age tuberculosis has a high prevalence (15-40%) among total tuberculosis cases and contributes to more than 10% hospitalization and mortality in hospitals [9]. Hajarsyah et al (2018) study indicated a significant relationship between living in the same place with tuberculosis-confirmed adults and pediatric tuberculosis incidence ( $p=0,0001$ ). Sleeping on the same bed was also found to be significant to pediatric tuberculosis incidence ( $P=0,001$ ) and increased the tuberculosis infection risk up to 2.7 times (OR 2.713; 95%CI 1.92 to 3.83). The research also found that about 73,8% of children had contact duration >6 hours/ day with tuberculosis-confirmed adults and a significant association between contact duration with pediatric tuberculosis incidence ( $P=0,0001$ ) [9]. Several studies explored several risk factors that play roles in the development of tuberculosis in children. Of the 14 studies, 12 studies (85.7%) indicated contact with tuberculosis patients, 11 studies (78.6%) showed residential factors and 7 studies (50%) found that children's nutritional status and health were risk factors for tuberculosis [10].

The acid-fast bacillus (AFB) test was completed in most of the current study subjects, followed by a molecular rapid test (76,5), chest x-ray (67,6%), and tuberculin test (62,2%). Several examinations, for instance, CT-Scan (4%), pleural fluid analysis (0,9%), cerebrospinal fluid analysis (0,9%), fine needle aspiration biopsy (4,4%), anatomical examination (1,8%), and ultrasonography (0,9%), were only completed on few numbers of patients. Supporting examination should be considered to prevent over- or underdiagnosis [11].

The current study showed that most pediatric tuberculosis patients were outpatients. A similar finding was found in previous studies with 114 outpatients [12]. Outpatient condition is determined by several factors, for instance, the disease progressivity. Previous studies showed that pediatric age under 5 years has a higher chance of greater infection progression into tuberculosis due to immature immunity. The risk of tuberculosis infection gradually decreases with the increase of age [12].

This study has several limitations. First, since the study design was cross-sectional which only had one-time measurements, no follow-up was conducted and the causality re-

lation between each variable could not be explained. Second, the data used were secondary data taken from the registry data of the Pediatric Pulmonology Division in West Nusa Tenggara Regional General Hospital; Therefore, incomplete data, errors in data recording, and information bias could not be avoided.

## 5. Conclusion

The majority of the current research subjects are male outpatients with and mean age of 5 years. March to December 2019 has the highest number of patients with West Lombok Regency as the highest tuberculosis patient regency. However, the number of hospital visits declined during the pandemic on Januari-December 2020, in comparison to the previous year. Further research with larger tuberculosis pediatric samples on the correlation between the analyzed variables and adding relevant variables is needed.

## Abbreviations

TB	Tuberculosis
COVID-19	Coronavirus Disease 2019
CHC	Community Health Center
DAMA	Discharge Against Medical Advice
AFB	Acid-Fast Bacillus

## Conflicts of Interest

The authors declare no conflicts of interest.

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