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ASSOCIATION BETWEEN ADULT TUBERCULOSIS TREATMENT STATUS WITH CHILDREN TUBERCULOSIS STATUS WHO HAD HOUSEHOLD CONTACT

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ABSTRACT

Background: Tuberculosis (TB) is one of the ten types of diseases that cause the quite high death rate in the world. Indonesia is ranked number three in TB cases. Tuberculosis can spread from adult tuberculosis patients to others including children who have a history of household contact. Adult TB patients who have been diagnosed immediately receive treatment to cure and reduce transmission. Tuberculosis treatment is divided into intensive phase, advanced phase and successful treatment. **Aim:** This study aims to analyze the relationship between treatment status of tuberculosis on adult who contact with tuberculosis status on children in the household. **Methods:** This study was an observational analytic study with a cross sectional study. The subjects of this study were 35 adult TB patients who were in contact with 58 children aged 0-18 years. Data collection was carried out at RSUP Kariadi and four puskesmas in Semarang from September 2019 to October 2019. Children tuberculosis status was classified as being TB exposure, TB infection and TB disease based on tuberculin tests and clinical symptoms. Statistical tests using the *Chi-Square* and *Fisher Exact* hypothesis tests. **Results:** Based on the results of statistical analysis, there was no significant relationship between the status of tuberculosis treatment on adult ($p = 0.848$) with status of tuberculosis for children that are in household contact. **Conclusion:** The status of tuberculosis treatment on adult has no statistical relationship with the status of tuberculosis for children in household contact.

Keywords: Tuberculosis, intensive phase, advanced phase, complete treatment, children, household contact

INTRODUCTION

Tuberculosis is one of the ten diseases that cause high mortality rates in the world. Based on data from the Global Tuberculosis Report there are an estimated 1.3 million deaths due to tuberculosis among people who are HIV negative and 15% of children contribute to the death rate for tuberculosis cases. Based on data from the Global Tuberculosis Report in 2018, Indonesia ranks third highest for tuberculosis cases after India and China.^{1,2}

Tuberculosis is caused by the bacterium *Mycobacterium tuberculosis*. Children can contract tuberculosis from

household contact with adult tuberculosis patients with smear positive. Transmission of *Mycobacterium tuberculosis* can be through droplets that come out of adult tuberculosis patients by coughing, sneezing, talking and using shared eating utensils.³

Adult tuberculosis patients who have just been diagnosed with tuberculosis will receive treatment for 6 months. Treatment of tuberculosis in Indonesia according to WHO recommendations is divided into two phases, namely intensive and advanced phases. Treatment is carried out in Indonesia using a fixed dose combination. In the intensive phase, patients will be given a



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fixed dose combination consisting of 4 drugs namely rifampicin, isoniazid, ethambutol, pyrazinamide. The intensive phase is given for two months. If the intensive phase of treatment is given appropriately and there is no resistance, then in two months the results of the sputum test will be positive negative. The next stage the patient will be given treatment in an advanced phase. The drugs that are given in the advanced phase are fixed dose combinations consisting of 2 drugs, namely isoniazid and rimpisin. Treatment in the advanced phase is given for four months. The goal of treatment in the advanced phase is to kill the germs that are persistent and prevent recurrence. Patients who have been on medication for six months and have sputum smear negative results will be declared successful. The purpose of this treatment is to cure patients, prevent serious complications that can cause death, reduce transmission to others, especially children.⁴⁻⁷

METHODS

Thirty-five adult household contact tuberculosis patients with fifty-eight children were selected as research subjects because they met the inclusion and exclusion criteria. Researchers conducted interviews with adult tuberculosis patients and parents of children who had received informed consent. Fifty-eight children underwent physical examination, signs and symptoms of tuberculosis and tuberculin tests to determine the status of a child's tuberculosis. The exclusion criteria in this study were adult tuberculosis patients who were MDR treatment, adult tuberculosis patients who were HIV positive and refused informed consent. Data on adult tuberculosis patients were obtained from four puskesmas in Semarang and RSUP Doctors Kariadi. This research was conducted in September 2019 until October 2019. This study used an observational analytic study with cross

sectional study. Sample selection by consecutive sampling. The independent variable in this study is the status of adult tuberculosis treatment consisting of intensive phase, advanced phase and successful treatment. Researchers know the treatment status of adult tuberculosis patients from four puskesmas in Semarang and RSUP Doctors Kariadi, as well as direct interviews with adult tuberculosis patients. In this study had received permission from the Medical Research Ethics Commission Kariadi doctor, Semarang City Health Office and four puskesmas in Semarang. Variable bound in this study is the status of tuberculosis of children which consists of exposure tuberculosis, tuberculosis infection and tuberculosis disease, based on tuberculin tests and clinical symptoms of children. Data is processed with a computer program. The hypothesis regarding the relationship status of adult tuberculosis treatment status with pediatric tuberculosis status using Fisher exact. Data is significant if $p < 0.05$.

RESULT

The research was carried out in September to October 2019. There were 132 adult tuberculosis patients in four puskesmas in Semarang and RSUP Doctors Kariadi. There are 252 children who have household contact with adult tuberculosis patients. Research subjects who met the inclusion criteria of 35 adult TB patients with 58 household contacts with children. Adult TB patients who made household contact with children consisted of 16 adult TB patients who had completed treatment, 12 TB patients with advanced treatment and 7 adult TB patients with intensive treatment. In this study the status of children tuberculosis was divided into tuberculosis disease, tuberculosis exposure and tuberculosis infection based on tuberculin tests and clinical symptoms. The results of this study include:



Table 1. Research Results

Variables	Disease	Infection	Exposure	<i>p</i>
Age (years old) (mean± SD)	8,3 ± 6,8	12 ± 3,8	7,2 ± 4,5	
Sex Child				
- Boy	2(7,1%)	7(25,0%)	19(67,9%)	
- Girl	1(3,3%)	8(26,7%)	21(70%)	
Height child (cm) (mean ± SD)	125,5 ± 34,5	144.2± 19.6	116,3 ± 23,3	
Weight child(kg) (median (min-maks))	17,4 (16,1-45)	40,5 (18,3 – 61,8)	20,8 (5,6-93,8)	
Body Mass Index child (kg/m ²) (median (min-maks))	15.7 (14,2-16,5)	17.7 (14,1-25,9)	15.9 (10,5 – 41,1)	
Nutritional Status Child				
- Obesitas	0(0%)	1(20%)	4(80%)	
- Overweight	0(0%)	1(16,7%)	5(83,3%)	
- Normal	2(5%)	13(32,5%)	25(62,5%)	
- Underweight	1(14,3%)	0(0%)	6(85,7%)	
Tubercullin test diameter (median(min-max))	10(10-10)	12(10-20)	0(0-9)	
Tuberculosis status child (n(n%))	3 (5,2 %)	15 (25,9 %)	40 (69 %)	
Adult Treatment Status				0,848
- Intensif Phase	0(0%)	4(36,4%)	7(63,6%)	
- Continous Phase	1(5%)	4(20%)	15(75%)	
- Finished Treatment	2(7,4%)	7(25,9%)	18(66,7%)	

DISCUSSION

Based on the results of the analysts, it was found that 40 (69%) children had exposed tuberculosis status, 15 (25.9%) children had infectious tuberculosis status and 3 (5.2%) children had tuberculosis. The status of exposed tuberculosis is someone who contacts tuberculosis patients but does not cause clinical manifestations and a tuberculin test is negative. Status of infected tuberculosis is someone who has *Mycobacterium tuberculosis* bacteria on his

body that is persistent and has no replication which is shown to be positive tuberculin test but does not cause clinical symptoms. Status of tuberculosis disease is a child who has been infected with the *Mycobacterium tuberculosis* bacteria and then the bacteria has the effect of damaging the organs, causing clinical manifestations and positive tuberculin tests.⁸ Symptoms of tuberculosis in children are fever more than 38⁰ C that is intermittent or persistent throughout the day and occurs more than one week, sweating at



night to wet the clothes and bedding of the child, lack of appetite and the child has failed in growth and weight that is not increased adequately, the child's weight decreased by more than 10% in the last 3-6 months and without a clear cause known or had received nutritional treatment but did not gain weight in one month, fatigue, malaise marked in infants is apathetic sign (less interactive with caregivers) and in children characterized by lethargy, the cough does not stop in 2 weeks and the cough is dry or wet.^{8,9} Tuberculin test or Mantoux test is a test used to diagnose tuberculosis with a standard antigen that has 5 units of pure protein tuberculin derivatives (PPDS 5 TU / PPD-RT23 2TU) that are injected intradermally. The tuberculin test is positive if it produces an induration diameter > 10 mm on the skin.⁹⁻¹¹

The results of bivariate analysis using chi-square and Fisher's exact did not show a significant relationship between the treatment status of adult TB with the status of pediatric TB ($p = 0.848$). The influencing factors are children aged 0-5 years who have received isoniazid prophylaxis. Isoniazid prophylaxis is given to prevent tuberculosis infection. This prophylaxis is given to children who come into contact with infectious tuberculosis, especially with smear positive but not infected sputum (negative tuberculin test). Prophylaxis is given for six months and tuberculin results are monitored in the third and sixth months.⁹ Age factors can also affect children to be infected with the *Mycobacterium tuberculosis* bacteria. The age factor is related to the child's immunity and the incubation period of *Mycobacterium tuberculosis*. The younger the child, the more likely it is that he or she has been infected by a household member.¹² In children younger than 5 years, cellular immunity has not yet developed so there is a very high possibility of infection developing completely into TB disease. As a child ages,

the risk of TB disease decreases. In babies who have been infected with TB 43% will become ill with TB, in children aged 1-5 years infected with TB, 24% will become ill with TB. While 15% of adolescents infected with TB will become sick. In adults, 5-10% will become ill with TB. In children the risk of developing TB infection becomes TB sickness, which is the first year after infection, especially the first 6 months after infection. While in infants less than 1 year the time required for the occurrence of infection and the emergence of TB pain and acute symptoms.⁹ In a study in Uganda, the duration of the latent period between exposure, infection, evidence of early disease and the onset of symptoms among household contacts of an infectious TB case was as long as 22 months.¹² In this study there were 14 children under the age of five years and 44 children over the age of five that the possibility of developing tuberculosis infection could lead to tuberculosis.

CONCLUSIONS

Researchers can conclude that the status of adult tuberculosis treatment has no significant relationship with the tuberculosis status of children who are in household contact. Further research is needed using different sampling methods (cluster random sampling) to reduce selection bias.

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