Overview of Tuberculosis among Children of Madurese Ethnicity in East Java, Indonesia

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Overview of Tuberculosis among Children of Madurese Ethnicity in East Java, Indonesia

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KEYWORDS Associated Factors. Madurese Children. Tuberculosis. Descriptive Study

ABSTRACT This study aimed to find the characteristics of tuberculosis (TB) in children among the Madurese ethnicity in Indonesia. A descriptive study with a cross-sectional approach was used. The study used Indonesian TB scoring on 23 Madurese children consisting of 16 children with active TB and 7 healthy control children. Data was analysed with SPSS software and Pearson's test. The findings showed that children who contacted adults with TB active associated with the incident of active TB (OR=64 (3.83-2623.17)). A positive result of the tuberculin test was experienced in active TB participants (OR=136 (5.58-20266.2)). While weight or nutritional status has a good category (OR=0.31 (0.03-3.07) and children with TB active indicated the symptom of cough more than 3 weeks (OR=7 (0.60-185.21)). Those who had s*wollen lymph nodes* were in an active TB group (OR=128 (5.22-19130.8)), as well as had a chest X-ray suggestive of TB (OR= 0.02 (0-0.26)).

INTRODUCTION

As one of the chronic communicable diseases, which causes a high rate of morbidity and mortality (Mertaniasih et al. 2017), the case of tuberculosis among children aged above 15 years has reached about 1 million cases each year or ten percent of total cases, hence there is an increase of child mortality around the world up to 233,000 children (World Health Organisation 2018). According to the WH statistics, approximately twenty-three percent of 1.3 million children under 5 years of age are eligible for accessing preventive therapy of tuberculosis (World Health Organisation 2019). In Indonesia, the prevalence of tuberculosis is about 845,000 divided into sixty percent in men, thirty-two percent in women, and eight percent in children. However, approximately 281,000 people have not been notified or have not been diagnosed with tuberculosis (World Health Organisation 2018). East Java has reached 56,445 total cases in 2018. Furthermore, Bangkalan City where Madurese ethnic live, become the second city with the highest cases (Ministry of Health 2018).

The most critical source of infection in children is exposure to infectious adults, especially those with severe smear-positive, or babies of a mother who is sputum sm -positive have a high risk of TB infection. The number of people living in a household (occupancy density), the length of stay in the hospital for TB patients, and one room with TB patients can be supporting factors for TB infection in children (Berry et al. 2010; Ebonyi et al. 2016)

Pulmonary TB occurs when the body's immune system decreases, which makes it easier for M.Tb infection (Zafar 2014). Factors for developing TB infection to become active TB are influenced by age, specifically, children aged less than 5 ye have a greater risk of becoming sick with TB because their cellular immunity is not fully developed (immature) and the risk of TB disease will gradually decrease with age (Berry et al. 2010; Rahajoe and Supriyanto 2018). Other factors that correlate with TB are malnutrition, immune-compromised conditions (for example, HIV infection, malignancy, an transplantation, and immunosuppressive treatment), diabetes mellitus, and chronic renal failure. In HIV infection there is damage to the immune system so that dormant TB germs experience activation (Ebonyi et al. 2016).

Madurese ethnic is one of the ethnicities in Indonesia that has a negative stereotype in health status, that is, high level of malnutrition in Madurese children, low educational awareness, poverty among the population, and the tendency of belief in religious leaders (Rochana 2012; Laksono 2014). As those are determinant factors of

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health status, the awareness of the population to these factors has a connection with health behaviour, which leads to the prevalence of disease contaminations. The majority of Madurese people are highly likely to solve their problems in daily life including health problems by visiting Islamic theologians rather than visiting the hospital (Rochana 2012; Sulistyono et al. 2018).

Research Objective

The purpose of this overview of tuberculosis among children was to find the characteristics of tuberculosis (TB) in children among Madurese ethnicity in East Java Indonesia from November 2019 to February 2020.

MATERIAL AND METHODS

Data Source and Sample Size

This descriptive study with a cross-sectional approach was carried out in selected health facilities in Jawa Timur, Indonesia over a period of four months, from November 2019 to February 2020. As many as 23 Madurese children aged 0 to 5 years old were enrolled based on purposive sampling technique. The sample of this study was divided into two groups, namely, active TB (16 children) and a control group (7 children).

Data collection was carried out by conducting interviews with respondents, namely, parents or guardians of children who were included in the research sample. Interviews were conducted with the help of instruments in the form of a questionnaire. The questionnaire contains closed questions about the variables studied. The dependent variables in this study were the child's nutritional status, contact history, fever and cough history, tuberculin test, swollen lymph nodes, bone/joint swelling, and chest X-ray, while the independent variable in this study was the incidence of tuberculosis in children aged 0 to 15 years.

Statistical Analysis

The data were processed statistically using the Pearson test with SPSS 20.0 (SPSS Inc., Chicago, IL) and shown on the cross-tabulation table (crosstab) to determine the effect of independent variables on the dependent variable by considering the significance value α=0.05 and OR (Odd Ratio). The ninety-five percent Confident Interval (CI) was used to see the significance of the OR for each independent variable so that the OR can be concluded in the population.

Ethics Statement

This study was approved by the Ethics Committee of the Faculty of Medicine, Wijaya Kusuma University in Surabaya, Indonesia (No.98/SLE/FK/UWKS/2019). Written informed consent was obtained from participants before their enrolment in this study.

RESULTS

The socio-demographic data in this study was divided into four variables, namely, gender of children, mother's and father's education, and BCG immunisation status of the children. The number of female children in active TB was higher than male (68.8%), as a contrast, the male children in the control group comprised 57.1 percent. This data indicated that TB is highly likely to contaminate female children in Madurese ethnic. Higher education graduates, both mother and father, have the percentage of TB in children (81.3% and 75%, respectively). Educational status of parents is one of determinant factors influencing health behaviour and health status. Meanwhile, there were a higher percentage of children who have taken BCG immunisation in the active TB group (93.8%) (Table 1).

Pearson analysis shows several variables correlated with the incidence of TB in Madurese children aged 0 to 15 years. Children who contacted adults with TB active were likely infected with TB, compared to the children who had no contact (OR=64 (3.83-2623.17), *p*-value=<0.001*). All children with TB active had a 136 times positive result of the tuberculin test compared to the control group (OR=136 (5.58-20266.2), *p*-value=<0.001*). The weight or nutritional status in TB active children is in the 'good' category (OR=0.31 (0.03-3.07), *p*-value=0.318), which was quite similar with the control group's status. Further, the symptom of a fever for more than 2 weeks was less likely to exist in active TB children, and the symptom of cough for more than 3 weeks was experienced by half of the children in the active

Table 1: Socio demographic subjects of study

Characteristics	*Active TB*		*Control*		*p-value*
	n	*%*	*n*	*%*	
Gender					0.363
Male	5	31.3	4	57.1	
Female	11	68.8	3	42.9	
Education Level of the Mother					0.026*
Elementary /Junio High School	3	18.8	5	71.4	
Senior High School	13	81.3	2	28.6	
Education Level of the Father					0.182
Elementary / Junior High School	4	25.0	4	57.1	
Senior High School	12	75.0	3	42.9	
BCG Immunization					<0.001*
Not Taken	1	6.3	7	100	
Already Taken (Scar is present)	15	93.8	0	0	

group (OR=7 (0.60-185.21), *p*-value=0.99). Those who had lymph gland swelling were 128 times more likely to be a part of the active TB group (OR=128 (5.22-19130.8), *p*-value=<0.001*) rather than the control group. Bone or joint swelling was less likely present in the active group, as well as in the control group, whereas suggestive chest X-ray of TB was highly likely experienced by the active TB children (OR= 0.02 (0-0.26), *p*-value=<0.001*) rather than children in the control group (Table 2).

DISCUSSION

The finding of this study has shown that contacting adults who were TB active was associat-

Table 2: Characteristics of research subjects based on TB scoring

Parameter	*Active children*		*TB control OR*		*p-value*
	n	*%*	*n*	*%*	
Contact to TB					<0.001*
Yes	15	93.8	0	0	64 (3.83-2623.17)
No	1	6.3	7	100	ref
Tuberculin Test					<0.001*
Positive	16	100	0	0	136 (5.58-20266.2)
Negative	0	0	7	100	ref
Weight/Nutritional Status					0.318
Good	13	81.3	4	57.1	ref
Under	3	18.8	3	42.9	0.31 (0.03-3.07)
Fever > 2 weeks					0.628
Yes	4	25	0	0	3.08 (0.25-83.25)
No	12	75	7	100	ref
Cough >3 weeks					0.99
Yes	8	50.0	0	0	7 (0.60-185.21)
No	8	50.0	7	100	ref
Lymph Gland Swelling					<0.001*
Yes	16	100	0	0	128 (5.22-19128)
No	0	0	7	100	ref
Bone/Joint Swelling					
Yes	0	0	0	0	
No	16	100	7	100	ref
Chest X-Ray					<0.001*
Suggestive of TB	15	93.8	0	0	0.02 (0-0.26)
Normal	1	6.3	7	100	ref

ed with the incident of TB in Madurese children aged 0 to 15 years. This is aligned to studies that children who were infected with TB had had close contact with an adult who suffers from TB, particularly within the household (Søborg et al. 2011; Triasih and Graham 2011; Narasimhan et al. 2013). Children under 5 years of age have immature cellular immunity, which leads to the vulnerable to be infected by TB when contacting several periods with those who were diagnosed as TB patients (Rakhmawati et al. 2019). Therefore, the WHO arranged recommendations for preventing transmission of TB in children by vaccination, contact screening, and contact management (World Health Organisation 2014). The high rate TB incidence in Madurese children caused by contacting TB patient might happen because of cultural behaviours. Firstly, as a low education stigma that immerses in Madurese (Laksono 2014), it indicates that parents were not concerned about TB transmission or have not adequate information about how TB can spread. Hence, health education related to TB prevention for the parent is a must in order to make them be aware of a contact management to protect their children from transmission of TB. Secondly, the majority of Madurese families live in a home with a large number of members. In other words, the density of population and conditions of the house might be inappropriate (Rochana 2012; Suhariadi et al. 2016).

Children who had positive results on the tuberculin test displayed the highest probability of the incidence of TB compared to children who had a negative result. Diagnosis of TB in children can rely on tuberculin skin testing and chest radiography (Karim et al. 2012). As the tuberculin skin test can indicate longer infection contact and transmission of TB, the positive result in children, which reached up to 33.3 percent gives an accurate diagnosis of infection (Fada 2017). In Indonesia, the tuberculin skin test is one variable for TB scoring, which is highly recommended by the Indonesian Paediatric Society, and has a minimum score to consider as TB, namely a total score of 6 or above (Triasih and Graham 2011). This has proved that the tuberculin test is one of the trustworthy tests to diagnosis TB in children. The use of this test should be increased, as it can track TB patients in a short time and in an easy way.

The current study found that the weight or nutritional status cannot be considered as factors that indicate the incidence of TB active in children since it had similarity to those who had not contracted TB. Some studies noted that significant weight loss has been a symptom of TB infection in children and can lead to mortality (Bafwafwa et al. 2017), however, this statement is contradictive with the findings of the present study. A study in a different area in Indonesia had shown contrasting results with this study (Nurwitasari and Wahyuni 2015), and found a profound correlation of TB and nutritional status or weight of children, even though the regression test showed that nutritional and weight status have no influence on the infection of TB. Children with prolonged contact intensity with TB patients for more than 6 months can cause children to be exposed to tuberculosis germs and still develop into infections even though they are in a good nutritional status (Pryjambodo 2008). Nutritional status does not affect an individual because the infection is a malnourished reciprocal relationship or causal relationship. Infectious diseases can worsen the state of nutrition and malnutrition can facilitate infection (Arsin et al. 2012). Based on this finding, it can be concluded that to diagnosis TB, this factor cannot be considered in the first place, as there were not any differences between the two groups.

Fever for more than 2 weeks does not exist in the active group, and the number of children who experienced the symptom of cough for more than 3 weeks is similar to the children who had not experienced the symptom in children with active TB. This finding is consistent with previous studies in the Republic of Congo that has shown that approximately sixty-four percent of children in the study experienced persistent cough for more than 15 days (Bafwafwa et al. 2017). Diagnosis of TB in children based on history, clinical symptoms, physical examination, support, history of contact, especially with active adult TB patients accompanied by a collection of clinical symptoms of children was suspected of TB including cough for more than 3 weeks (Graham et al. 2012; Dodd et al. 2014).

The results of the present study show that children who had lymph gland swelling were more likely to be TB active, in comparison to children who had no lymph gland swelling. This aligns

with a previous study that stated swollen lymph nodes as a symptom of active TB in children (Graham et al. 2012; Dodd et al. 2014). Inflammation due to Mtb is initially spreading to regional lymph nodes, causing them to disproportionately swell, which will involve neck nodes (Esposito et al. 2013). Paediatrics should be more familiar with the swollen lymph nodes in children, since this is a potential sign to evaluate TB status in children.

In this study, children in the active group were less likely to show bone or joint swelling. This phenomenon happened because it is more common in bone tuberculosis rather than lung TB, which rarely happens. Even, the possibility of spreading Mt.b to bones and joints is less likely (Pigrau-Serrallach and Rodríguez-Pardo 2013). On the other side, this study found that suggestive chest X-ray of TB had highly likely appeared in the active TB group in children. Combination of chest X-ray and clinical symptoms, such as malnutrition, peripheral lymphadenopathy, and persistent cough, have been common indicators to diagnose TB in children (14,17), However, the suggestive signs on chest X-ray have a lower accuracy in endemic areas (Triasih and Graham 2011). Chest X-ray is the recommended first-line imaging modality, although it appears normal in fifteen percent of patients with confirmed TB (Pelletier-Galarneau et al. 2017). Radiographs can help differentiate between latent TB and pulmonary TB in a person who tests positive for TB infection. The results of nodular or fibrotic lesions consistent with old TB can be treated with latent TB therapy after TB disease is excluded. However, the result of full calcification and discrete granuloma does not increase the risk of progression to TB disease (Lindsay et al. 2016). Combining with other tests, chest X-ray will provide more accurate diagnosis of TB in children, even though nodular or fibrotic lesion is not considered to be the one indicator of TB in children.

The nature of the study was a cross-sectional descriptive, which become the limitation of this study since it will not provide causality and is subject to recall limitations.

CONCLUSION

The overview of TB active in Madurese children has been significantly associated with the tuberculin test, swollen lymph nodes, and a suggestive chest X-ray. Besides, weight or nutritional status and the symptom of cough for more than 3 weeks were commonly experienced in both groups. This study suggested enhancing health education for the parents to minimise the number of TB incidents in children.

RECOMMENDATIONS

In order to reduce the prevalence of TB in Madurese children, medical doctors and other medical professionals should work together on educating Madurese dwellers. Moreover, utilising influencer figures in this ethnic group, such as Islamic theologians will support with succeeding the TB programs to reduce TB cases. The government has to establish decent regulations related to TB programs, such as a mass detection TB program, especially for Madurese ethnics. In addition, a cultural approach should be considered to reach best results on health promotion in this population.

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