

TB TRANSMISSION SCOURGE: SHARE SLEEPING ROOM IN DENSITY HOUSE

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Abstract

Mycobacterium tuberculosis exhaled by patients when coughing, sneezing, even speaking. Duration and frequency of exposure is important factor of TB transmission, especially in closed room. Therefore, household contact of TB patient is susceptible. This research aimed to find out the influence of share sleeping room with TB patient in home dense residential against tuberculosis symptoms existence at household contact of TB patient. This cross-sectional research collected data by interviewed 73 TB patients and their household contact. Results showed that household contact was suffered of TB symptoms if slept in same room with patient in crowded house. To avoid tuberculosis transmission, household contact is recommended to separate sleeping room with patient. Cross infection in crowded house can prevented by improved ventilation so that air circulation can occur and pathogenic bacteria in the air can be reduced.

Keywords : TB transmission scourge, share sleeping room

1.INTRODUCTION

Tuberculosis was one of 10 main causes of death due to infection diseases [1]. Globally, it caused around 1.3 million dead and 6.4 million new case reported in 2017. Overall, 90% of TB patients are adults (≥ 15 years old). Two-thirds of TB cases occurred in 8 countries: India (27%), China (9%), Indonesia (8%), Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). Only 6% of global cases were in Europe (3%) and America (3%). While three countries with highest incidence of new TB cases in 2017 were India (26%), Indonesia (11%) and Nigeria (9%) [2]. The Indonesian health profile 2017 reported that there were 360.770 cases of tuberculosis in Indonesia, with the number of new cases as many as 168,412 cases. Provinces with the highest numbers were Jawa Barat (78,698), Jawa Timur (48,323), Jawa Tengah (42,272), DKI Jakarta (35,733), Sumatera Utara (20,429), Banten (13,837) and Sumatera Selatan (11.107) (Ministry of Health of the Republic of Indonesia, 2018). Based on data from Dinas Kesehatan Kota Serang, Puskesmas Serang Kota have the highest number of TB registered and treated, that were 112 cases in 2014. Report in July 2015 until June 2016, TB case which registered and treated at this Puskesmas as many as 119 cases [3]. Puskesmas Serang Kota located in Kecamatan Serang near from Dinas Kesehatan Kota Serang. Most number of TB in Kota Serang can be lead to the transmission of TB from patient to their household contact. Especially, who has long duration and frequency of exposure. This can increase TB case at Kota Serang. WHO suggested that there was a research indicate 3.5 – 5.5% (equivalent with prevalence of 3,500 to 5,500 per 100,000 people) of household contact or TB patient close contact had found suffering from active TB. Clinical Evaluation of household contact or any close contact are advised, because this group is priority group based on risk of infection. WHO recommends investigation of household contact, especially aged less than 5 years, individual with low body defense (especially people with HIV/AIDS) and people who ever contact with a patient or suspected of MDR-TB (Multi Drug Resistance) and XDR-TB (Extensive Drug Resistance) [4].

2. MATERIALS AND METHODS

This is cross sectional study at Kota Serang, Provinsi Banten. The population is all of the people in Puskesmas Serang Kota working area who lived with TB patient. To simplify this research, sample chosen from TB patient data at Puskesmas Serang Kota by simple random technique, as many as 73 respondents. Data collected by interviewed respondents that was closer and frequently contact with TB patient. Household contact categorized to have TB symptoms, if they have cough more than 2 weeks and suffer of two or more than two of TB symptoms.

3. RESULTS AND DISCUSSIONS

Data analysis showed that 19.2% of respondents still sleep in the same room with TB patient and there were 20.5% patients live in house with the density was less than 9 m² for one person. While household contact who suffer for more than two of TB symptoms were 26% of respondents. The result of bivariate test found that sleep in same room and house density have significant relationship with the existence of TB symptoms at household contact of TB patient.

Table 1. Bivariate Analysis Result

Variables	The Existence of TB Symptoms at Household Contact				<i>p.</i>	PR (CI 95%)
	Yes		No			
	N	%	N	%		
Share sleeping room						
Shared	12	63,2	2	3,7	0,000*	7,22 (3,490-14,955)
Not shared	7	36,8	52	96,3		
House density						
<9 m ² /person	10	52,6	5	9,3	0,000*	4,29 (2,136-8,643)
≥9 m ² /person	9	47,4	49	90,7		

*significant if p-value <0,05

M. tuberculosis is carried by airborne particles, called droplet nuclei, with a diameter of 1 to 5 microns. Droplet nuclei containing tuberculosis bacteria, out along in coughing patients which untreated or drop out treatment [5]. The particles can remain in the air for several hours, depending on environmental conditions. Tuberculosis disease transmitted when a person inhales droplet nuclei containing M. tuberculosis. Centers for Disease Control and Prevention explained that these droplets will cross mouth or nose, upper respiratory tract and bronchial, then reach the alveoli of the lungs [6]. Most people who are infected by Mycobacterium tuberculosis (around 80-90%) do not necessarily become sick. Provisionally, the germs which enter the body can be in a state of dormant (sleeping) and the existence of dormant bacteria can be known only by test in the laboratory. The Mantoux test (tuberculin skin test) can indicate whether a person is ever infected with TB bacteria, which increase the possibility they will develop TB in the future [7].

Those who become ill known as "tuberculosis patient", generally in 3-6 months after infection. Those who do not become ill remain at risk for suffering for the rest of their life.10 Based on CDC's reports of data research and surveillance, the Advisory Council for the Elimination of Tuberculosis / ACET, one of the most vulnerable groups are close contacts, that is, those who live at same home or live in closed environment with tuberculosis patient [8]. Because of the risk of infection is higher to the people who have long term and regularly exposure. These people should be identified

promptly (generally within 3 days) and checked out immediately (usually within 7 days) after TB patient had been identified.

Ministry of Health in Indonesia considered that clinical symptoms indicated by the patients that is the main symptom, which is cough for 2 weeks even more, and any other symptoms such as coughing sputum with blood, coughing blood, breathless, weak, appetite decreased, weight decreased, malaise, sweating at night without any activity and fever repeated more than a month [9]. Household contacts, based on the WHO definition is someone who shares the same enclosed living space for one night or more, or for a few minutes or all day with TB patient during the three months prior to the commencement of the treatment episode. Three-months period used in the general guidelines TB, although the actual transmission period can be longer or shorter. Prolonged transmission may be associated with poor treatment adherence or untreated tuberculosis [4].

Residential density affects the incidence of TB, because crowded inhabitants will facilitate the occurrence of infectious diseases contact. It is proofed by a number of studies regarding the density of homes with tuberculosis [10,11,12]. Research by Lestari et al. found a significant difference between people who are not infected with TB on the number of people who live at their home. TB patient groups shown to have more family members than those with a negative TST test results. Most of Indonesian people live in communal society, where in a dwelling house stay many people [10]. So the possibility of contact with patient is higher. Exposure, by sharing the same bed or stay in the same house, even though not in the same enclosed space with patient, have an influence to the transmission of tuberculosis. Although the quantity or duration of exposure may be very subjective [4].

This study found that 19.2% of household contacts have a sleeping in the same room with TB patient habits. Consequently, the exposure is more frequent and has long duration. Result of bivariate test also showed there was relationship between separated room with patient and the TB symptoms existence at household contact of patient.

Longer duration, more often exposure, and closer with the patient can increase risk of infection [6]. It is causes household contact should not sleep in same room with tuberculosis patient. When sleeping, patient would not recognize to cover their mouth when coughing or sneezing and certainly not using mask or another protective equipment respiratory. People who shared room with TB patient will be exposed to TB bacteria all night when sleeping. Confirmed TB patient usually had been transmitted the infection to their close contact, even before diagnosed and began TB treatment. However, patient should do some action to prevent infection spread. One of steps to do is sleep alone and not in the same room with another family member [6].

House density calculated by compared floor area of house by the number of permanent resident. About 20.5% house of respondents have house density less than 9 m²/person. The minimum house density in this study is 4.4 m²/person and the maximum value is 60 m²/person. House density has a relationship with the existence of TB symptoms at household contact in this research.

According to healthy house requirements from Kementerian Kesehatan Republik Indonesia, minimum large of sleeping room for one person is 8 m². Room size is not suggested to be habited by 2 persons, except to children under five years-old [13]. Number of residents has influence to the TB transmission risk. Tesema et al. noted that people who lived with more than 4 family member 3 times riskier than they who live with less than 4 persons [14]. Crowded room can increase TB infection risk is the reason.

House density effect disease transmission because increase possibility of household to contact with patient in a long time [15]. If more crowded, infection contact will be easier. It has been proofed by some research related to house density and tuberculosis [10,11,12]. Harfadhilah et al. discovered that crowded resident 7.76 more risk to suffering TB than eligible house density [16]. Same result has found significant relationship too at Wulandari et al. research about house density risk with pulmonary

tuberculosis (p-value = <0,001) [17]. Appropriate with those study, Abdullah and Hakim noted that there was relationship between house density with high number of germs in the air [18]. Therefore, crowded house need to use ventilation to remove those germs.

4. CONCLUSION

Household contact is more vulnerable to tuberculosis infection since they have long duration and frequently exposure of TB bacteria expelled by patient. Contamination possibility will increase if they sleep in same room with patient and exposed to Mycobacterium tuberculosis all night long. Cross infection will be more intense in crowded house.

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REFERENCES

- [1] World Health Organization (WHO). 2018. *Global Tuberculosis Report*.
- [2] Kementerian Kesehatan Republik Indonesia. 2018. *Data dan Informasi Profil Kesehatan Indonesia 2017*.
- [3] Dinas Kesehatan Kota Serang. 2015.
- [4] World Health Organization (WHO). 2012. *Recommendations for Investigating Contacts of Persons with Infectious Tuberculosis in Low- And Middle-Income Countries*.
- [5] Department of Health Services (DHS). 1990. *Using Ultraviolet Radiation and Ventilation to Control Tuberculosis*. California Indoor Air Quality Program, Air and Industrial Hygiene Laboratory, and Tuberculosis Control and Refugee Health Programs Unit, Infectious Diseases Branch.
- [6] Centers for Disease Control and Prevention (CDC). 2013. *Core Curriculum on Tuberculosis: What the Clinician Should Know*.
- [7] Centers for Disease Control and Prevention (CDC). 2011. *TB Elimination Tuberculin Skin Testing*.
- [8] Departemen Kesehatan RI. 2000. *Peraturan Menteri Kesehatan Republik Indonesia tentang Rumah Sehat*. Jakarta.
- [9] Kementerian Kesehatan Republik Indonesia. 2015. *Pelatihan Tatalaksana TB Bagi Pengelola Program TB/Tim DOTS di Fasilitas Kesehatan/Rumah Sakit*. Kementerian Kesehatan Republik Indonesia Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan. Jakarta.
- [10] Lestari P, Sustini F, Endaryanto A, Asih R. 2011. Home Humidity Increased Risk of tuberculosis in Children Living with Adult Active Tuberculosis Cases. *Universa Medicina*. Volume 30. No 30.
- [11] Firdiansyah W, Subyantoro P. 2014. Pengaruh Faktor Sanitasi Rumah dan Sosial Ekonomi Terhadap Kejadian Penyakit TB Paru BTA Positif di Kecamatan Genteng Kota Surabaya. *Swara Bhumi*. Volume 3. No 3.
- [12] Hamidah, Kandau G, Posangi J. 2015. Hubungan Kualitas Lingkungan Fisik Rumah Dengan Kejadian Tuberkulosis Paru di Wilayah Kerja Puskesmas Perawatan Siko Kecamatan Ternate Utara Kota Ternate Provinsi Maluku Utara. *Biomedik (eBm)*. Volume 3. Nomor 3. Pasca Sarjana Fakultas Kesehatan Masyarakat Universitas Sam Ratulangi.
- [13] Kementerian Kesehatan Republik Indonesia. 1999. *Persyaratan Kesehatan Perumahan*. Keputusan Menteri Kesehatan Republik Indonesia Nomor 829/MENKES/SK/VII/1999).

- [14] Tesema C, Tadesse T, Gebrehiwot M, Tsegaw A, Weldegebreal F. 2015. Environmental and host-related determinants of tuberculosis in Metema district, North-west Ethiopia. *Drug, Healthcare and Patient Safety*. Available at <http://dx.doi.org/10.2147/DHPS.S82070>. Accessed at 15th December 2016.
- [15] Pruss-Ustun A, Corvalan C. 2006. *Preventing Disease through Healthy Environment: Toward an*
- [16] *Estimate of the Environmental Burden of Disease*. Geneva: WHO.
- [17] Harfadhilah D, Noor N, Sunarka I. 2012. *Analisa Faktor Risiko Lingkungan Terhadap Kejadian Tuberkulosis Paru*.
- [18] Wulandari A, Nurjazuli, Adi M. 2015. Faktor Risiko dan Potensi Penularan Tuberkulosis Paru di Kabupaten Kendal, Jawa Tengah. *Jurnal Kesehatan Lingkungan Indonesia*. Volume 14. Nomor 1
- [19] Abdullah M, Hakim B. 2011. Lingkungan Fisik dan Angka Kuman Udara Ruangan di Rumah Sakit Umum Haji Makassar Sulawesi Selatan. *Jurnal Kesehatan Masyarakat Nasional*. Volume 5. Nomor 5.