The Relationship of the Pulmonary TB Characteristics with the Risk Transmission at Public Health Center in Medan

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Keywords: Pulmonary TB BTA+, Risk of Transmission, Patients's Characteristics.

Abstract: TB incidence rate in Medan is 129 and CNR (Case Notification Rate) is 321 per 100,000 populations in 2016, increased to 345 per 100,000 populations in 2017. Therefore, is necessary to analyze the relationship of pulmonary TB BTA+ characteristics patients with the risk of transmission at puskesmas in Medan. This study using cross sectional design, independent variables is patients's characteristics (age, gender, occupation, and education) and dependent variable the risk of pulmonary TB transmission based on the PMO, medication adherence, and spitting habit. Population is the entire patient with pulmonary TB BTA+ who went to Puskesmas Medan. Sample was taken with purposive sampling technique, in 10 puskesmas from March to June 2018, got 126 patients, analyzed using Mann-Whitney test. The result shows gender, age, education, and occupation not significantly related with the risk of transmission based on PMO. Gender, age, and occupation also not significantly related with the risk on medication adherence. However, age is significantly related with the risk on spitting habit. Education is also significantly related with the risk on medication adherence. Recommended to the puskesmas officers and PMO to educate patients with TB not to spit carelessly and take medicine regularly.

1 INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* which is a serious health threat to the global society. Six countries were accounting for 60% of new cases, namely India, Indonesia, China, Nigeria, Pakistan, and South Africa (Kemenkes, 2016).

The estimated prevalence of all TB cases in Indonesia was 660,000 and the incidence estimates was 430,000 cases per year. The number of TB deaths was estimated at 61.000 deaths per year. In 2015, the pulmonary TB Case Notification Rate (CNR) for Indonesia was 117 per 100,000 population. Meanwhile, in North Sumatera the prevalence rate of TB was 794/100,000 population, incidence rate of 501/100,000 population and death rate due to TB of 41/100,000 population, with Case Detection Rate (CDR) of 22,961 (33.3%) and CNR of 156/100,000 population (Kemenkes, 2016).

According to the report of Integrated TB Information System (SITT) in 2016 in Medan, the incidence rate was estimated to be 129 per 100,000 population. This estimation was still lower than it supposed to occur in the community. Meanwhile, in 2016 it was obtained CNR of 321 per 100,000 population and CDR of 67.6% in Medan. Furthermore, in 2017 there was an increase of CNR to 345 per 100,000 population and CDR was decreasing to 65.5%.

From the research's result of Vidal et al, it was found there were 1,264 (41%) infected by TB and 176 (6%) have TB out of 3,071 of domestic contacts. The risk of TB incidence in families with new TB cases was 3.7 times higher than families with no new TB cases with OR = 3.7 (95% CI: 2.1-6.5). Referring to a research by Ustero et al (2017), it could be concluded the risk of TB transmission due to exposure in school was lower than in households with OR = 0.06 (95% CI: 0.03–0.12).

Based on the explanation above, it is necessary to analyze the relationship of the characteristics of pulmonary TB BTA+ patients with the risk of transmission at public health center (puskesmas) in Medan 2018.

2 RESEARCH METHOD

This research is conducted using the crossectional design whereas the independent variables are the patient's characteristics (age, gender, occupation, education). Age consists of two categories which are ≤ 50 years old and > 50 years old. Gender consists of two categories which are male and female. Occupation is classified into two, unemployment and employed. Next, Education is grouped into two, which are lower level (elementary school and middle school) and higher level (high school and university).

The dependent variable is the risk of pulmonary TB transmission based on the role of Medication Consumption Supervisor (PMO), medication adherence, and spitting habit. The role of PMO is measured based on the presence of PMO as well as the role of PMO in reminding the patients to take the medicine, using a mask when coughing, coughing up sputum in the provided place, and encouraging the patients to take a rest. Medication adherence is measured based on the regularity of medication consumption and in filling the prescription according to the schedule determined by puskesmas. Spitting habit is measured based on the availability of provided place to cough up sputum and the risk of contact with the patient's sputum.

The variables are measured using questionnaires and scoring of the respondents' answers, obtained through direct interview. Before the interview with pulmonary TB BTA+ patients is conducted, the questionnaires have been tested with reliability test and the obtained value of Alpha Croncbach is 0.819 with the validity value of all questionnaires of <0.05. Beforehand, the proposal has received an approval by the Ethical Commision of Health Research, Faculty of Nursing Universitas Sumatera Utara (*Komisi Etik Penelitian Kesehatan Fakultas Keperawatan*) with registered number: 1317/III/SP/2018.

The population of this study is the entire outpatient patient with pulmonary TB BTA+ in Puskesmas Medan. The sample was taken with purposive sampling technique, which is the entire patient with pulmonary TB BTA+ in 10 (ten) puskesmas with the highest number of visits from patient with pulmonary TB BTA+, gathered from the previous data. This research is executed from March to June 2018 with 126 samples. The analysis is performed using Mann-Whitney test.

3 RESULT AND DISCUSSION

3.1 Univariate Analysis

Result shows the obtained distribution of respondent's characteristic can be seen as in table 1.

Table 1: Distribution Proportion of Patient with Pulmonary TB BTA+'s Characteristic in Medan

Characteristic	f	%
Gender		
Male	90	71.4
Female	36	28.6
Age		
≤ 50 years old	84	66.7
> 50 years old	42	33.3
Education		
Lower Level	23	18.3
Higher Level	103	81.7
Occupation		
Unemployment	36	28.6
Employed	90	71.4
Total	**126**	**100.0**

Table 1 demonstates patient with pulmonary TB BTA+ based on gender, there are 90 male patients (71.4%), which is higher than female patients with only 36 people (28.6%). The similar result was obtained in a research by Ndungu et al in Nairobi[, the result displayed the proportion of male was significantly higher than female (p<0.05). Furthermore, in a study performed by Panjaitan F (2012) the same result was acquired, more men were suffering from tuberculosis with the ratio of 3 : 2.

Based on age, the majority of samples (66.7%) are within the age group of ≤ 50 years old. A study conducted by Rukmini and Chatarina howed age (OR: 0.473, *p*=0.018) and gender (OR:1.613, *p*=0.027) were included in the risk factor affecting the incidence of adult with pulmonary TB in Indonesia. Followed by Suswati in Jember District in 2006 displayed 54% of 200 respondents were within the age range of 15 to 35 years old. In Indonesia, it is estimated patient with pulmonary TB is at the productive age range of 15 to 50 years old. This is likely due to people within the productive age range have more interaction with pulmonary TB patients, hence it grows the risk of being infected.

Based on education, the largest number of patients is within the higher level category (high school and university) with 103 people (81.7%). This differs from a study by Ndungu et al in Nairobi, the result indicated half of the patients (53.3%) did

not complete the secondary education and only 16 people (6.2%) have completed tertiary education.

The next result shows most of patients (71.4%) are the employed category (laborer, entrepreneur, and civil servant/military/police), which in line with the number of patient with pulmonary TB is within the productive age category of 66.7%.

3.2 Bivariate Analysis

Result shows the relationship of patient with pulmonary TB BTA+'s characteristic with the risk of transmission based on the presence of PMO in puskemas in Medan in 2018 as can be viewed in table 2. Table 2 shows gender, age, education, and occupation do not have significant relationship with the risk of transmission of pulmonary TB based on the presence of PMO (p>0,05). Gender and age do not have significant relationship with the risk of transmission of pulmonary TB based on the presence of PMO, this is possibly because the selection of PMO determined by the patient's family in accordance with the advice of puskesmas officer and not based on the gender and age of patients. The selection of PMO is commonly based on certain criterias, such as someone who has a close relationship the patient and trusted to be able to monitor the drug adherence as well as the habit in monitoring the risk of transmission to other people. This also applies to education and occupation, neither of them have significant relationship with the risk of transmission of pulmonary TB based on the presence of PMO. Table 3 displays independent variable (gender, age, and occupation) do not have significant relationship with the risk of transmission of pulmonary TB ($p>0.05$) based on medication adherence, only education has a significant relationship with the risk of transmission of pulmonary TB based on medicine adherence ($p<0.05$).

Education has a significant relationship with the risk of transmission of pulmonary TB based on medicine adherence, whereas patient with higher education level tends to have lower medicine adherence than patient with lower education level.

This is possibly because patient with higher education level is busier and more preoccupied. In addition to that, patients with high education level are more likely to ignore the PMO's message, meanwhile patients with lower education level are more obedient to PMO. In contrary, by Suswati in Jember District showed there is no relationship between education and medicine adherence of patient with pulmonary TB. Table 4 displays gender, education, and occupation do not have significant relationship with the risk of transmission of pulmonary based on spitting habit ($p>0.05$). However, age has a significant relationship with the risk of transmission of pulmonary TB based on spitting habit ($p<0.05$).

Patients who are under the age of 50 years old with spitting habit have higher chance in transmitting pulmonary TB than patients who are over the age of 50 years old. People who are below the age of 50 years old have more outdoor activities, thus it is more difficult for them to search a place to cough up sputum in order to minimize the risk of transmission. On the other hand, people who are over the age of 50 years old mostly retired and spend most of their time at home, hence the risk of transmission is lesser.

From a study's result by Putri et al it is obtained the value of $p=0.481$ ($p>0.05$), which displayed spitting habit did not have association with the incidence of pulmonary TB. In the study, most of the respondents have bad spitting habit (60.5%), such as cough up sputum in any place, cough up sputum on the bathroom floor, in the ditch, and cough up sputum into a tissue or in a special container then keeping it for days in the room.

According to the study above, it is recommended for the TB puskesmas officer to motivate and educate the patient with pulmonary TB not to cough up sputum everywhere. As well as to PMO to be more intensive in reminding patient with pulmonary TB to take the medication in order to accelerate the convertion of sputum, thus it would not become a source of transmission to other people.

Table 2: The Relationship of Patient with Pulmonary TB BTA+'s Characteristic with The Risk of Transmission Based on The Presence of PMO in Puskesmas in Medan 2018

Characteristic	Category	n	Average		SD	p	Median (min-max)
Gender	Male	90	2.08		1.800	0.491	2 (0-7)
	Female	36	1.86		1.839		2 (0-7)
Age	≤ 50 years old	84	2.15		1.853	0.205	2 (0-7)
	> 50 years old	42	1.74		1.697		1.5 (0.7)
Education	Lower Level	23	1.91		1.782	0.767	2 (0-6)
	Higher Level	103	2.04		1.820		2 (0-7)
Occupation	Uneployement	36	2.17		1.612	0.317	2 (0-6)
	Employed	90	1.96		1.884		2 (0-7)

Table 3: The Relationship of Patient with Pulmonary TB BTA+'s Characteristic with The Risk of Transmission Based on Medicine Adherence in Puskesmas in Medan 2018

Characteristic	Category	n	Average	SD	p	Median (min-max)
Gender	Male	90	13.86	8.242	0.116	12.5 (1-35)
	Female	36	15.94	7.139		15 (4-30)
Age	≤ 50 years old	84	14.74	8.242	0.608	14 (1-32)
	> 50 years old	42	13.88	7.461		13 (3-35)
Education	Lower Level	23	10.70	7.622	0.013	9 (3-25)
	Higher Level	103	15.29	8.218		14 (1-35)
Occupation	Uneployement	36	13.44	7.205	0.452	12.5 (3-30)
	Employed	90	14.86	8.261		14 (1-35)

Table 4: The Relationship of Patient with Pulmonary TB BTA+'s Characteristic with The Risk of Transmission Based on Spitting Habit in Puskesmas in Medan 2018

Characteristic	Category	n	Average	SD	p	Median (min-max)
Gender	Male	90	4.34	3.043	0.312	4 (1-27)
	Female	36	3.72	1.560		3.5 (1-8)
Age	≤ 50 years old	84	4.58	3.078	0.009	4 (1-27)
	> 50 years old	42	3.33	1.476		3 (1-6)
Education	Lower Level	23	3.96	1.894	0.923	4 (1-7)
	Higher Level	103	4.21	2.869		4 (1-27)
Occupation	Uneployement	36	3.81	1.636	0.658	4 (1-7)
	Employed	90	4.31	3.034		4 (1-27)

4 CONCLUSIONS

The result shows gender, age, education, and occupation not significantly related with the risk of transmission based on PMO. Gender, age, and occupation also not significantly related with the risk on medication adherence. However, age is significantly related with the risk on spitting habit. Education is also significantly related with the risk on medication adherence.

ACKNOWLEDGEMENT

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