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Transmission of Pulmonary Tuberculosis in Families and Efforts Government Reduces Pulmonary TB Cases in West Sumatra Region

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ABSTRACT
Classified as dangerous and emergency in the world. This disease is a serious concern in Indonesia, with the second highest number of cases in the world. In this study, we aim to look at efforts to prevent pulmonary TB transmission in families through family support. Research method based on the concept of observational analytical research with cross-sectional study techniques to describe and examine what factors are related to the incidence of TB transmission in families or households. Result. The results of the analysis showed that there was a significant relationship between the incidence and preventive measures, with a p value of 0.046. Based on the results of the analysis, those who were highly knowledgeable (10%), had a 75% risk of developing pulmonary tuberculosis. The results of this study show that family members who lack knowledge about the prevention of pulmonary tuberculosis and who are at risk of pulmonary TB transmission have a high risk of transmission. The implementation of the pulmonary TB transmission prevention program needs to be maximized by the local authorities comprehensively so that the reduction in pulmonary TB can be achieved quickly.

Keywords: *Transmission of Pulmonary Tuberculosis, Family Members, The Government, Pulmonary Tuberculosis*

INTRODUCTION

Tuberculosis (TB) is an infectious disease that is categorized as dangerous and an emergency in the world. Mycobacterium tuberculosis is the bacteria that causes tuberculosis (TB), which is an infectious disease that can attack the lungs and other organs of the body. The disease is spread through small droplets that are released into the air when an infected person coughs, sneezes, or talks (Aja et al., 2022). Mycobacterium tuberculosis is the bacteria that causes pulmonary

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tuberculosis. These bacteria belong to the category of bacteria known as Acid-Resistant Bacteria (BTA). Patients with BTA-positive are the main source of transmission of pulmonary tuberculosis (Fitriani et al., 2013; Health Office of Padang City, 2023). Sputum droplets, or droplet nuclei, are released into the air by pulmonary tuberculosis patients when they cough or sneeze. About 3000 sputum droplets can be produced in a single cough. Due to the presence of sputum droplets over a long period of time, the Mycobacterium tuberculosis bacteria can spread indoors. Although direct sunlight can destroy germs, ventilation can reduce the number of droplets. Droplets can survive in humid and dark environments for several hours (Health Office of Padang City, 2023). This shows that one of the risk factors for the spread of pulmonary tuberculosis is the state of the environment in which the patient lives with the disease.

According to data from the World Health Organization (WHO), more than 1.5 million deaths due to TB occurred in 2020 with more than 10 million new cases recorded every year, making it one of the leading causes of death in the world (Augustynowicz-Kopec et al., 2012). Considering that Indonesia ranks second in the world after India in terms of the number of TB cases based on the Global TB Report 2023, it is quite a problem that needs great attention. According to a recent study by the World Health Organization (WHO), Indonesia accounts for nearly 10% of all TB cases worldwide, with an estimated 1,060,000 new cases and 134,000 deaths each year (Bukittinggi City Government, n.d).

Tuberculosis (TB) cases in Indonesia continue to be a serious concern, with this country the impact of the COVID-19 pandemic on early identification and health services (CNN Indonesia, 2023). World Health Organization (WHO), Indonesia accounts for about 10% of all TB infections worldwide, with an estimated 1,060,000 new cases and 134,000 deaths each year (Bukittinggi City Government, n.d; Central Bureau of Statistics, 2020; Fitriani et al., 2013). This increase in cases illustrates significant constraints to disease control, especially after ranking second in the world in terms of the number of cases. According to the organization's latest study.

The increasing number of TB cases in Indonesia shows the need for more action such as expanding access to health services and encouraging prevention (Fitriani et al., 2013). The new cases recorded in 2023 increased from 724,309 cases in the previous year, indicating that the country is experiencing an increase in cases (CNN Indonesia, 2023;Fitriani et al., 2013). In light of this, the Indonesian government is determined to eradicate tuberculosis by 2030 by using a number of aggressive tactics to identify and treat the disease. With more than 792,404 cases. If the area affected by this disease is reduced, for example in West Sumatra province it can be seen that there is a significant increase. This province has experienced a significant increase in TB cases in recent years, which is an indication of the magnitude of the obstacles in dealing with this infectious disease. Based on the latest data, Padang City is the city with the most TB cases in 2022, namely 22,944 cases throughout West Sumatra. The TB recovery rate in this province which reached 89% in 2022 compared to the target national by 85% is also still below the target.

This is due to many factors: Socio-economic factors in terms of poverty and unhealthy environment conditions that further exacerbates this problem. Many TB patients come from low-income neighborhoods, where people often live in cramped and unhygienic conditions, then are

also supported by the spread outside and within the family environment. Prevention of pulmonary tuberculosis transmission in the family context must be a priority, although most of the transmission or spread of pulmonary tuberculosis occurs outside the family environment or known as community transmission because based on evidence from the results of molecular epidemiological investigations, it is proven that transmission can occur in family members so that required screening first (Health Office of West Sumatra Province, 2022b; Health Office of West Sumatra Province, 2024).

The family plays a very important role in providing support and attention in prevention efforts of the local government in terms of reducing TB cases. This study aims to look at efforts to prevent the transmission of pulmonary TB through family support for patients to prevent the transmission of pulmonary TB in the family. In addition, the results of data analysis were included that showed the risk variables of the incidence of pulmonary TB transmission in households or families. The research location is in the West Sumatra working area. The selection of the location for the study is based on the improvement of data at the Health Office. West Sumatra province for TB patients with TB treatment recovery rate in the province This is also still below the national target, reaching 89% in 2022, while the target is determined to be 85% looking at the efforts of the government and health institutions in West Sumatra committed to increasing the target of eliminating this disease by 2030.

METHODS

This research is based on the concept of analytical research with cross-sectional techniques to describe and assess what factors are related to the incidence of pulmonary TB transmission in families or households. The researcher determined the population in the study with all TB patients recorded in the report of the West Sumatra Provincial Health Office with the sampling technique, namely Purposive Sampling or Consideration-Based Sampling. Systematic data collection through official sources such as the health office and previous academic research. The data provides a comprehensive picture of the condition of pulmonary TB patients in West Sumatra, which can be used for further analysis in efforts to prevent and treat this disease. In addition, the questionnaire also contains the age, gender, and education level of pulmonary TB patients. Secondary data is in the form of data on the patient's name and residential address.

In this study, the researcher used data analysis with the concept of univariate analysis. Univariate analysis is a type of data analysis that shows the mean of the data and the frequency distribution for each variable. In addition, the Chi-Square test is used in bivariate analysis to examine the relationship between variables, using a significance value of $p < 0.05$ to draw conclusions. The Prevalence Ratio (PR) value is used in the test to ascertain the size of the variable risk factor.

RESULTS

Description of frequency distribution based on demographic characteristics of pulmonary TB patients in West Sumatra can be seen through the table below.

Table 1. Characteristics and Frequency Distribution of Respondents

Variable	Frequency	%
Age		
19-29 years	15	20.0
30-49 years old	30	40.0
50 - ≥ 60 years	25	33.3
Unknown	5	6.7
Male Gender		
Man	35	46.7
Woman	40	53.3
Higher Education	20	26,7
	55	73,3
Low Knowledge		
Lack	45	60,0
Good	30	40,0
Prevention Efforts		
Not	50	66,7
Yes	25	33,3
Family Support		
Lacks	40	53,3
Enough	35	46,7
Incidents of Infection in Family		
There	36	76,6
None	11	23,4

The results of univariate analysis showed the frequency distribution according to the demographic characteristics of pulmonary tuberculosis patients in West Sumatra. Based on the frequency distribution by age, the age group of 30-49 years has the largest proportion (40.0%), while the age group of 19-29 years has the lowest percentage (20.0%) (Indonesiabaik.id, 2023). Women are the group with the largest percentage of pulmonary tuberculosis patients (53.3%), while men are 46.7% (Journal of Public Health Andalas, 2020). Regarding education, as many as 73.3% of pulmonary tuberculosis patients have a low level of education (PPTI, 2024). The knowledge variable showed that the highest percentage of respondents was in the category of lack of knowledge (60.0%), while the highest percentage was in the category of not taking preventive measures (66.7%) against pulmonary TB (RS Paru West Sumatra, n.d.). For the variable of family support, which is slightly less of a percentage of 53.3%, which shows that many TB patients do not have a supportive group environment.

Based on these findings, as many as 76.6% of respondents said that they had experienced TB transmission in their family. On the other hand, only 23.4% of respondents said that there were no cases of infection. This suggests that the main risk factor for pulmonary tuberculosis patients in this region is TB transmission in the family environment (Indonesiabaik.id, 2023). Referring to the data,

it can be further seen that the analysis of the relationship between knowledge, the success of local government efforts in preventing transmission, and family support for the transmission of pulmonary TB to family members can be seen. The government in this case is trying to suppress the increase in cases with the following programs:

Table 2. Analysis of the Relationship between Knowledge, Efforts to Prevent Transmission and Family Support for Transmission of Pulmonary TB to Family Members Transmission of Pulmonary TB to Family

Variable	Infected n %		Not Infected n %		*P*	*PR* (95% *CI*) n
Knowledge						
Less	45	76,0	15	25,0		2,5 (1,5-4,0)
Enough	5	40,0	30	60,0	0,001	
Good	20	10,0	45	90,0		
Efforts to Prevent Transmission						
Not	50	66,7	25	33,3	0,0461,	1,8 (1,1- 2,9)
Yes	20	40,0				
Family Support						
Less	36	72,0	14	28,0	0,292	1,2 (0,8 - 1,8)
enough	15	30,0	35	70,0		

The results of the analysis showed that respondents with inadequate knowledge were more likely to be infected (75%), compared to those with sufficient knowledge (10%). With a p-value of 0.001, this shows a strong correlation between the incidence of pulmonary TB transmission and the level of knowledge. According to the Prevalence Ratio (PR), those with inadequate information are 2.5 times more likely to contract pulmonary TB compared to people with sufficient knowledge (Indonesiabaik.id, 2023). In addition, the percentage of respondents who did not take infection prevention measures was 66.7%, while the percentage of respondents who did so was only 40%.

The results of statistical testing showed that there was a substantial correlation between the incidence of pulmonary tuberculosis transmission and preventive measures, with a p-value of 0.046. According to PR, those who did not take preventive measures had a 1.8 times higher risk of developing pulmonary tuberculosis (Journal of Public Health Andalas, 2020). Finally, regarding the family support variable, it was seen that respondents who did not have adequate family support were 72% more likely to be infected compared to those who had adequate family support (30%). However, the incidence of pulmonary tuberculosis transmission and family support was not significantly correlated, as indicated by a p-value of 0.292.

DISCUSSION

A. Demographic Characteristics of Pulmonary TB Patients

1. Age

The findings of the analysis show that, at 40.0%, the age group of 30-49 years has the largest percentage of pulmonary tuberculosis patients. The lowest percentage, 20.0%, was seen in the 19-29 year age group. These results suggest that the productive age group is more susceptible to tuberculosis infection, which can be caused by factors such as increased environmental exposure and significant social mobility.

2. Gender

It is shown from the data that 46.7% are men and 53.3% are women. This makes it clear that women are more likely to develop tuberculosis than men. This phenomenon may be influenced by a variety of factors, including social stigma and access to health services (Journal of Public Health Andalas, 2020).

3. Education

As many as 73.3% of respondents have a low level of education. Knowledge about TB prevention and treatment can be affected by low levels of education, which increases the risk of transmission among those with low education.

B. Knowledge and prevention efforts of the Government

1. Knowledge

As many as 60.0% of respondents were included in the category of low of knowledge, according to the knowledge variable. This shows that to reduce the risk of transmission, it is necessary to make efforts to increase public health education about tuberculosis (Journal of Public Health Andalas, 2020).

2. Prevention Efforts

66.7% of respondents said they did not take any precautions. This illustrates the difficulty of encouraging the public to take the necessary precautions to reduce the risk of pulmonary tuberculosis transmission in the community.

C. Family Support

53.3% of respondents reported receiving significantly different support from their family environment, according to the family support variable. A person's efforts to complete treatment and stop long-term transmission can be helped by a supportive family environment (RSUD Mohammad Natsir, n.d.).

D. Incidence of Infection in the Family

Only 23.4% of respondents said there had never been an case of infection in their family, 76.6% of respondents said they had experienced it. This shows that one of the main risk factors for pulmonary tuberculosis patients in this area is TB transmission in the family environment.

E. Analysis of the Relationship Between Variables

1. Knowledge and Transmission of Pulmonary TB

Compared to those with high knowledge (10%), those with low knowledge had a 75% risk of developing pulmonary tuberculosis, according to the analysis findings. With a Prevalence Ratio (PR) of 2.5 and a p-value of 0.001, there was a significant correlation between the incidence of pulmonary TB transmission and the level of knowledge.

2. Family Support and Pulmonary TB Transmission

Family support and pulmonary tuberculosis transmission rates are associated, although a p-value of 0.292 suggests that this association is not statistically significant (RSUD Mohammad Natsir, n.d.). However, family support remains important to improve patient adherence to prevention and therapy.

3. Efforts to Prevent Pulmonary TB Transmission

As many as 67 percent of respondents did not carry out prevention related to TB, while only 40 percent of respondents carried out prevention related to TB. The results of statistical analysis showed that there was a significant correlation between preventive measures and the incidence of pulmonary TB transmission with a PR of 1,08.14

In addition, seeing the ongoing outbreak of TB cases in West Sumatra, the local government made several efforts, namely:

a. Tuberculosis Immediate Case Discovery Program (PeKaRa TB)

PeKaRa TB is a cutting-edge program created by the West Sumatra Lung Hospital with the aim of accelerating TB diagnosis and detection. Compared to other hospitals, the program can reduce the time it takes to detect and diagnose tuberculosis disease to about five hours. It is hoped that this initiative will reduce transmission in the community and increase the number of cases found (Saunders et al., 2020).

b. Capacity Building of Health Facilities

By improving health services at the Health Center and involving all levels across sectors, the Bukittinggi City Government has accelerated efforts to eradicate tuberculosis. In Bukittinggi, six hospitals and seven health centers have been equipped with equipment to prevent, control, and treat tuberculosis in accordance with established protocols (TB Indonesia, 2024).

c. Early Detection and Screening

One of the main goals of local government efforts is early detection. As a first step in handling tuberculosis, the Head of the Bukittinggi City Health Office urged all.

Urged all leaders of regional apparatus organizations (OPD) to conduct TB screening proactively (World Health Organization, 2020).

d. Regional Action Plan (RAD)

The dedication of the Regional Government in tackling this health problem in a systematic and planned manner is shown by the conducting a meeting in Agam Regency to discuss the Regional Action Plan (RAD) which is focused on TB control.

e. Community Awareness Campaign

Campaigns to raise public awareness of the importance of TB prevention and the provision of friendly services for TB patients to improve access to care and support are examples of further initiatives.

CONCLUSIONS

Based on the results of the study, there is a considerable correlation between family members who lack knowledge about pulmonary tuberculosis prevention and those who are at risk of experiencing pulmonary tuberculosis transmission. If efforts to prevent pulmonary tuberculosis are not carried out, there is a possibility that pulmonary tuberculosis transmission occurs in families who suffer from it. In the West Sumatra region, there was no correlation between the incidence of pulmonary tuberculosis transmission and family support. It is recommended for pulmonary tuberculosis patients and family members who live in the same house to cooperate with medical personnel using an epidemiological approach.

Given the importance of this case, further research is needed that can focus on issues related to efforts to prevent the increase in Pulmonary TB cases in the West Sumatra region. Maximizing the efforts that have been launched by the local government and reviewing the progress of control efforts.

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