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THE RELATIONSHIP BETWEEN KNOWLEDGE AND HOST BEHAVIOR WITH PULMONARY TUBERCULOSIS CASES IN THE PRODUCTIVE AGE IN RANTAU ALAI DISTRICT, OGAN ILIR REGENCY

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ABSTRACT

Pulmonary tuberculosis is an infectious disease that is a health problem in the world. In Indonesia, most cases of tuberculosis attack the productive age. Cases of pulmonary tuberculosis in Rantau Alai District in 2022 amounted to 380 cases, with the number of positive cases as many as 29 cases resulting in disability in the lungs and extrapulmonary organs and even death. The purpose of this study was to analyze the relationship between knowledge and behavior of the host with the incidence of pulmonary tuberculosis at productive age in Rantau Alai Subdistrict, Ogan Ilir Regency. This study used a case-control design with 108 respondents selected by simple random sampling. Then, the data analysis test was carried out, namely the chi-square test and multiple logistic regression test. The results showed that there was a significant relationship between knowledge (p-value<0.001), smoking history (p-value>0.001), household contact (p-value<0.001), the habit of drying mattresses (p-value<0.001) and the habit of opening windows every morning (p-value<0.001) against pulmonary tuberculosis. The results of multivariate analysis showed that the variable of house contact (p-value 0.001) was the most dominant variable associated with pulmonary tuberculosis (OR= 15.059, 95% CI: 3.093-73.317). The conclusion of this study is that poor knowledge and behavior of the host can increase the risk of pulmonary tuberculosis. Suggestions for the community are–expected to follow extension activities on an ongoing basis and implement clean and healthy living behaviors to prevent the proliferation of pulmonary tuberculosis bacteria.

Keywords: knowledge, host behavior, pulmonary tuberculosis, case-control

Introduction

Pulmonary tuberculosis is known as an infectious disease that is still a threat in parts of the world because it has not been resolved 100%.[1] It is used as one of the Sustainable Development Goals (SDGs), especially in the third goal on health that is expected to ensure a healthier and more prosperous life for all ages as a new strategy (End Tuberculosis Strategy) to reduce the incidence of pulmonary tuberculosis by 80%, reduce the number of deaths from pulmonary tuberculosis by 90% and ensure that no family is burdened with the cost of treatment due to pulmonary tuberculosis.[2]

Pulmonary tuberculosis is the 13th leading cause of death and the second leading infectious killer after COVID-19. By 2022, pulmonary tuberculosis is expected to affect all countries and age groups by 10.6 million, namely 5.8 million men, 3.5 million women and 1.3 million children.[3] Indonesia is ranked second with the highest pulmonary tuberculosis caseload after India. Cases of pulmonary tuberculosis in Indonesia in 2022 based on the largest age groups, namely age 45-54 years (16.5%), age 35-44 years (14.7%), age 25-34 years (14.7%) and age 15-24 years (14.2%). These ages are productive ages between 15-54 years old. Productive age is the age at which a person is productive to work or work to produce something.[4]

South Sumatra Province ranks 8th with the highest cases of pulmonary tuberculosis. The estimated cases of pulmonary tuberculosis in South Sumatra Province are 38,940 with 21,610 confirmed cases of pulmonary tuberculosis.[5] In 2021, there was an increase in the number of people who died while undergoing Tuberculosis (TB) treatment, from 136 cases to 191 purposive cases. Ogan Ilir Regency is one of the areas with high pulmonary tuberculosis cases out of 17 districts/cities in South Sumatra with 7,383 suspected cases and 554 cases. The number of deaths due to pulmonary tuberculosis throughout 2021 is still in the high category, with 13 cases of death.[6]

Rantau Alai Sub-district is a sub-district in Ogan Ilir Regency that has 2 health centers, namely Lebung Bandung Health Center and Mekar Sari Health Center. Both health centers have a high number of pulmonary tuberculosis cases. In 2022, there were 186 cases of pulmonary tuberculosis in Lebung Bandung Health Center with 15 cases of suspected pulmonary tuberculosis receiving standardized services and 196 cases in Mekar Sari Health Center with 14 cases of suspected pulmonary tuberculosis receiving standardized services.[7]

Indonesian people's knowledge about pulmonary tuberculosis is still relatively low. This has a relationship with the transmission of pulmonary tuberculosis caused by Mycobacterium tuberculosis because people with low knowledge have a 2.5 times greater risk of pulmonary tuberculosis transmission than people with high knowledge.[8] In addition, poor host behavior in health maintenance can also increase the risk of transmission of pulmonary tuberculosis.[9] The purpose of this study was to examine the effect of knowledge and behavior of guests on the incidence of pulmonary tuberculosis at productive age in Rantau Alai District, Ogan Ilir Regency in 2023.

Methods

This study used analytic observational analysis with a case-control study design, research conducted in Ogan Ilir District, Ogan Ilir Regency in February 2024. Knowledge and behavior are independent variables and pulmonary tuberculosis cases are the dependent variable. The population of this study was all residents of productive age 15-64 years in Rantau Alai District, Ogan Ilir Regency, South Sumatra who were positive for tuberculosis, as many as 174 people.

The sample size was calculated using the hypothesis test formula and amounted to 108 respondents (36 case samples, namely all Pulmonary Tuberculosis patients who had been treated at the Rantau Alai Health Center and 72 control sample respondents, namely right and left neighbors or those in the same environment as Pulmonary Tuberculosis patients) using simple random sampling based on inclusion and exclusion criteria. The sample inclusion criteria in this study were positive respondents with pulmonary tuberculosis recorded at the Rantau Alai District Health Center, Ogan Ilir Regency in 2023, aged 15-64 years and domiciled for 1 year or more in Rantau Alai District. Then, the control inclusion criteria in this study were negative respondents with pulmonary tuberculosis who were the closest neighbors of the case group, aged 15-64 years and domiciled for 1 year or more in Rantau Alai District. Meanwhile, the exclusion criteria in this study were respondents who were not yet 15 years old or had passed the age of 64 years, had died during the study and had lived for less than 1 year in Rantau Alai District. The cases ware those who tested positive for TB through laboratory tests and diagnosis at the public health care. This research used a 1:2 ratio between cases and controls. The research data were divided into primary data obtained through questionnaires, interviews and observations, and secondary data obtained through documents and previous reports. The data were analyzed using univariate analysis by categorizing variables into good and bad categories with the reference that it is said to be good if the variable ≥ median and is said to be lacking if the variable ≤ median, after which it was continued with bivariate (chi-square) and multivariate (multiple logistic regression). Data were then analyzed using univariate analysis to describe the characteristics of each research variable. Then, bivariate analysis was used to explain the relationship between each variable, such as knowledge, smoking history, household contact, the habit of drying mattresses and the habit of opening windows every morning. Finally, multivariate analysis was conducted to determine the dominant variables affecting the incidence of pulmonary tuberculosis. This research was approved by the Ethics Committee of the Faculty of Public Health, Sriwijaya University with letter number 501/UN9.FKM/TU.KKE/2023 which is voluntary and there is no financial incentive.

Results

Based on Table 1, the characteristics of respondents were mostly at the age of 55-64 years (25.9%), gender was dominated by women (52.8%) and the last education of respondents was

mostly at the high school level (36.1%). Then, it is known that 46 respondents (42.6%) have low knowledge, 45 respondents have a history of smoking (41.7%), 29 respondents who have been in contact with people with pulmonary TB (26.9%), 43 respondents with bad habits (rarely or never drying the mattress once a week) (39.8%) and 42 respondents with bad habits (never opening the window every morning) (38.9%).

Table 1. Characteristics of Respondents

Variable	Cases	%	Control	%
Age				
15-24 Years	5	4,6	14	13,0
25-34 Years	2	1,9	17	15,7
35-44 Years	4	3,7	18	16,7
45-54 Years	7	6,5	13	12,0
55-64 Years	18	16,7	10	9,3
Gender				
Male	21	19,4	30	47,2
Female	15	13,9	42	38,9
Last Education				
Elementary	19	17,6	13	12,0
Junior High School	11	10,2	17	15,7
High School	5	4,6	34	31,5
College	1	0,9	8	7,4
Knowledge				
Low	30	27,8	16	14,8
High	6	5,6	56	51,9
Smoking History				
Smokers	23	21,3	22	20,4
Non-Smokers	13	12,0	50	46,3
Household Contact				
Contact	24	22,2	5	4,6
No Contact	12	11,1	67	62,0
The Habit of Drying Mattresses				
Bad	26	24,1	17	15,7
Good	10	9,3	55	50,9
The Habit of Opening Windows Every Morning				
Bad	25	23,1	17	15,7
Good	11	10,2	55	50,9

Based on table 2, bivariate analysis was performed using the chi-square between the independent variables and the dependent variable. Independent variables including knowledge, smoking history, household contact, the habit of drying mattresses and the habit of opening windows every morning have a significant relationship with the incidence of pulmonary tuberculosis because they have a p-value <0.05. Then, the magnitude of the significance is supported by the OR and CI values listed.

Table 2. The Bivariate Analysis Result of The Relationship Between Knowledge and Host Behavior with Pulmonary Tuberculosis Cases

Variables	Pulmonary Tuberculosis				P-value	OR	95% CI	
	Case		Control					
	n	%	n	%			Lower	Upper
Knowledge								
Low	30	83,3	16	22,2	0,000	17,500	6,199	49,401
High	6	16,7	56	77,8				
Smoking History								
Smokers	23	63,9	22	30,6	0,002	4,021	1,727	9,360
Non-Smokers	13	36,1	50	69,4				
Household Contact								
Contact	24	66,7	5	6,9	0,000	26,800	8,548	84,026
No Contact	12	33,3	67	93,1				
The Habit of Drying Bedding/Mattress								
Bad	26	72,2	14	23,6	0,000	8,412	3,387	20,893
Good	10	27,8	58	76,4				
The Habit of Opening Windows								
Bad	25	69,4	17	23,6				
Good	11	30,6	55	76,4	0,000	7,353	3,008	17,972

The results of table 3 show that 4 variables, namely knowledge, household contact, the habit of drying mattresses and the habit of opening windows every morning have a p-value <0.05, this means that these variables have a significant relationship with pulmonary tuberculosis. Meanwhile, the smoking history variable as a confounding variable. Furthermore, the table shows that the most dominant variable for the incidence of pulmonary tuberculosis is household contact. The odds ratio (OR) value showed that respondents with household contact had a 15 times higher risk than respondents without household contact. With a confidence interval of 3.093-73.317, researchers believe that respondents with household contact are a risk factor for pulmonary tuberculosis in productive age in 95% of the general population. Table 3 below shows the final model from the results of the multivariate analysis carried out.

Table 3. The Final Model Multivariate Analysis of The Relationship Between Knowledge and Host Behavior with Pulmonary Tuberculosis Cases

Variable	*P-value*	OR	(95%-CI)
Smoking History	0,102	3,265	0,792-13,467
The Habit of Opening Windows	0,008	7,230	1,683-31,057*
The Habit of Drying Bedding/Mattresses	0,006	7,387	1,767-30,885*
Knowledge	0,004	8,416	2,003-35,360*
Household Contact	0,001	15,059	3,093-73,317*

**significant (p-value < 0.05)*

Discussion

Bivariate analysis showed that there a significant relationship between knowledge and the incidence of pulmonary tuberculosis in productive age people in Rantau Alai District. In theory,

knowledge plays an important role in shaping a person's behavior.[10] Low knowledge has the potential to lead to poor behavior related to awareness of pulmonary tuberculosis transmission.[11] The results of this study are in line with research conducted by Nita[12] which stated that respondents with less knowledge are 7.875 times more likely to suffer from pulmonary tuberculosis compared to respondents with good knowledge. In addition, it is also supported by research conducted by Zulaikhah[13] which stated that respondents with less knowledge will have a 5.1 times greater risk of suffering from pulmonary TB compared to respondents with good knowledge because knowledge can influence respondent behavior such as cough etiquette, not throwing phlegm or spitting carelessly, using masks and undergoing treatment. From the results of the research interview, the majority of respondents, especially in the case group, only had the last education in elementary school. This greatly affects one's level knowledge in preventing the transmission of pulmonary tuberculosis disease because most of them still do not know the pulmonary tuberculosis disease is not a hereditary disease from parents but contagious disease.[14]

The result showed that there is a significant relationship between smoking history and the incidence of pulmonary tuberculosis in the productive age population in Rantau Alai District. Smoking is one of the factors that can reduce a person's immune system so that they are susceptible to disease.[15] In fact, cigarette smoke inhaled by pulmonary tuberculosis sufferers can increase the risk of severity, recurrence, and treatment failure.[16] The results of this study are in line with research conducted by Darmin[17] and Rosyanti[18], namely that respondents who have a history of smoking can increase the risk of contracting pulmonary tuberculosis by 4 times higher than respondents who do not have a history of smoking. Based on the results of this study, most male respondents especially in the case group, have been smoking since adolescence. In fact, they can consume more than 20 cigarettes per day or can be said to be heavy smokers. In fact, this can have a bad impact on health because it can make them more susceptible to contracting the mycobacterium tuberculosis bacteria which is very easy to multiply in the lungs of people who have experienced damage or complications.[19]

The results of the bivariate analysis showed that there was a significant relationship between household contact and the incidence of pulmonary tuberculosis in productive age in Rantau Alai sub-district. Household contact plays a role in the occurrence of pulmonary tuberculosis because Mycobacterium tuberculosis germs can spread through inhalation when coughing, sneezing or talking.[20] This is in line with research by Mauliyana[21] which shows that people who have a history of contact with pulmonary TB sufferers have a 9 times greater risk of developing pulmonary TB compared to people who do not have a history of household contact. The high rate of pulmonary tuberculosis transmission that occurred was because most respondents did not know that pulmonary tuberculosis was a contagious disease, they still often had household contact with pulmonary

tuberculosis sufferers without using masks, such as still spending time together by chatting in the family room, sleeping in the same bed, even they still used cutlery together with family members.[22]

The results of the study showed that there was a significant relationship between the habit of drying mattresses and the incidence of pulmonary tuberculosis in productive age people in Rantau Alai District. The habit of drying mattresses is an act of drying mattresses repeatedly once a week which is carried out as an effort to prevent pulmonary tuberculosis.[23] Not having the habit of drying mattresses can support bacterial growth because bedding that is splashed with sputum from pulmonary tuberculosis sufferers can be a good place for the growth of Mycobacterium tuberculosis bacteria.[24] The result of the study were in line with research conducted by Nuraini[25] and Sudarsa[26] which states that people who do not have the habit of drying mattresses have a 3 times greater risk of contracting pulmonary tuberculosis compared to people who have the habit of drying mattresses. From the results of the research interview, most respondents admitted that they were lazy to dry mattresses once a week because the mattress was too heavy.

Based on the results of the study, there is a significant relationship between the habit of opening windows every morning and the incidence of pulmonary tuberculosis in productive age people in Rantau Alai District. The habit of opening windows every morning is an act of opening windows repeatedly once a day as an effort to prevent pulmonary tuberculosis.[27] If the windows are not opened every morning until the afternoon, the air in the house cannot be exchanged with the air outside the house, making the room in the house humid and can accelerate bacterial growth.[28] In studies Halim[29] and Fitriani[30], people who rarely or do not have the habit of opening windows every day have a 3 times greater risk of suffering from pulmonary tuberculosis compared to people who have the habit of opening windows every day.

Furthermore, the final multivariate analysis model using multiple logistic regression showed that the most dominant variable at risk of influencing the incidence of pulmonary tuberculosis in productive age in Rantau Alai Sub-district was household contact. In the final multivariate analysis modeling, household contact had the highest OR compared to the other four variables, which was 15.059, meaning that respondents who were in household contact with patients with pulmonary tuberculosis had a 15 times greater risk of being exposed to pulmonary tuberculosis compared to respondents who were not in household contact with patients with pulmonary tuberculosis. The household contact confidence interval (95%-CI: 3.093-73.317) means that the productive population in Rantau Alai Sub-district is 95% sure that respondents are at risk of developing pulmonary tuberculosis ranging from 3.093 to 73.317 when compared to respondents who are not in household contact with patients with pulmonary tuberculosis.

The incidence of pulmonary tuberculosis in productive age in Rantau Alai Sub-district was most dominantly influenced by the variable of household contact because the majority of respondents who were positive for pulmonary tuberculosis in 2023 had lived in the same house

with patients with Acid-Fast Bacilli (AFB)-positive pulmonary tuberculosis, either patients for more than 6 months or those who were still on treatment. Based on the results of the interview, they did not know that tuberculosis is included in infectious diseases so they still often interact with patients with pulmonary tuberculosis as usual and even exchange cutlery and toiletries. Poor Clean and Healthy Behavior (*Perilaku Hidup Bersih dan Sehat* or PHBS) behavior of patients, such as sneezing and coughing without covering the mouth and disposing of sputum carelessly, also greatly increases the risk of transmission to family members at home.

Conclusion

The incidence of pulmonary tuberculosis in productive age in Rantau Alai Sub-district revealed that knowledge, smoking history, household contact, the habit of drying bedding or mattresses and the habit of opening windows every morning had a significant relationship with the incidence of pulmonary tuberculosis. Furthermore, the most dominant variable affecting pulmonary tuberculosis is household contact. There is a significant relationship between knowledge and the behavior of extension workers, so it is suggested that the government is expected to create a program "One Village One Pulmonary Tuberculosis Cadre" which can be taken from the community domiciled in each village with guidance from health centers that have collaborated with the local government.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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