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The Relationship of Smoking Status and Ventilation Extent with The Incident of Tuberculosis

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ABSTRACT
Tuberculosis is an infectious disease caused by the bacterium Mycobacterium Tuberculosis and attacks the organs or tissues of the human body, especially the lungs, which is caused by an imbalance between the environment, agent and host. Factors that can cause the spread of tuberculosis, if treatment is not carried out quickly, will cause an increase in the number of cases of tuberculosis. The aim of this research is to analyze the relationship between family smoking status and ventilation area with the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City. In this research, researchers used quantitative research as an approach. The research method used is an analytical survey while the type of research is Case Control. The total population was 35 tuberculosis cases with a sample size of 52 respondents who were divided between the case group and the control group using the Chi-Square test. The results of the study showed that there was a significant relationship between the independent variables of family smoking status (p-value = 0.018), ventilation area (p-value = 0.007) with the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City.
Keywords: Tuberculosis, Family Smoking Status, Extent of Ventilation

INTRODUCTION

Tuberculosis is an infectious disease caused by the bacteria Mycobacterium Tuberculosis and attacks the organs or tissues of the human body, especially the lungs. Every year, this disease can claim one million lives due to infection with tuberculosis. This has a huge impact on other people, especially the family or surrounding community (RI Ministry of Health, 2020).

Transmission of tuberculosis is caused by the spread of germs through the air in the form of phlegm droplets due to stones or sneezes from tuberculosis sufferers. In one cough or sneeze a sufferer can produce 300 splashes of phlegm. Germs that spread in the air are then inhaled by healthy people and enter the lungs, causing infections in healthy people. Pulmonary tuberculosis requires regular treatment for 6 months, if it is less than 6 months or incomplete then the treatment stage is repeated from the beginning and it will take a long time to recover from this disease and can even cause death. (RI Ministry of Health, 2020).

In East Java, there were 42,560 cases of tuberculosis in 2021, 42,922 cases in 2020, and 78,799 cases in 2022. Because most tuberculosis patients are between 15 and 64 years old, community recovery and comprehensive treatment of the disease can be carried out. can increase their productivity and enable them to lead a normal life in society (East Java Provincial Health Service, 2022).

Based on the 2021 Madiun City Health Profile, the Banjarejo Community Health Center work area has the highest number of tuberculosis cases, namely 26 cases in 2021, 22 cases in 2020, and 33 cases in 2019. Even though in 2020 there was a decrease of 11 cases. with a percentage of 4.9% compared to the previous year, but in 2021 there will be an additional 4 cases of tuberculosis or a percentage of 10% (Madiun City PP and Family Planning Health Service, 2022). Meanwhile, in 2023, based on medical record data at the Banjarejo Community Health Center, there will be 35 cases of tuberculosis.

According to John Gordon's epidemiological triangle idea, an imbalance of host, agent, and environmental factors impacts the disease state. Likewise, pulmonary tuberculosis is caused by an imbalance between the environment, agent and host. Pulmonary tuberculosis host variables include the host, such as smoking status in the family.

Environmental changes that facilitate the spread of Mycobacterium tuberculosis agents. This bacterium is a straight or slightly curved rod measuring 0.2 to 0.4 x 1.4 cm and can cause tuberculosis. These bacteria can survive for 20–30 hours in phlegm and 8–10 days in droplets.

Meanwhile, regarding environmental factors, one of the factors that causes tuberculosis is the condition of the home environment. Environmental factors in a house have an impact on the spread and transmission of Mycobacterium TB. People who live in damp, dark, and unventilated homes are more susceptible to the spread of Mycobacterium tuberculosis (Najiyah, 2022).

Based on research (Musdalifa, 2022)which states that the smoking status factor has a close relationship with the incidence of tuberculosis with valuep value = 0.019. According to researchers, there is a relationship between smoking status and education, where someone with low education tends to smoke and increases the risk of developing pulmonary TB.

Meanwhile, regarding environmental factors, one of the factors that causes tuberculosis is the condition of the home environment. Environmental factors in a house have an impact on the spread and transmission of Mycobacterium TB. People who live in damp, dark, and unventilated homes are more susceptible to the spread of Mycobacterium tuberculosis. Based on research results(Rosyid, 2023)in 2022, which is located in the working area of the Banjarejo Community Health Center, Madiun City, the condition of the physical environment of the house which is one of the causes of the spread of tuberculosis in the Banjarejo Community Health Center area is the ventilation area that does not meet the requirements with a percentage of 53.%.

Based on the description above, this is the background for conducting research on "The relationship between family smoking status and ventilation area with the incidence of tuberculosis in the working area of the Banjarejo Health Center, Madiun City.

RESEARCH METHODS

The approach taken in this research is analytical research. The method used in this research is a survey method which is carried out by distributing questionnaires and observing respondents directly using the Case Control approach.

RESULTS AND DISCUSSION

Univariate Analysis

The univariate analysis here is presented based on the dependent variable, namely Tuberculosis. The independent variables are smoking status and ventilation area.

Table1. Frequency distribution of respondents based on smoking status in the working area of the Banjarejo Community Health Center, Madiun City

Smoking Status	Frequency	Presentation
Smoke	35	67.3
Do not smoke	17	32.7
Total	**52**	**100%**

Based on table 1, there were 35 respondents with family smoking status with a presentation of 67.3%. Meanwhile, respondents with non-smoking status were 17 respondents with a presentation of 32.7%.

Table2. Frequency distribution of respondents based on ventilation area in the working area of the Banjarejo Community Health Center, Madiun City

Ventilation area	Frequency	Presentation
Not eligible	41	78.8
Qualify	11	21.2
Total	**52**	**100%**

Based on table 2, there were 41 respondents whose ventilation area did not meet the requirements with a presentation of 78.8%. Meanwhile, 11 respondents with adequate ventilation area met the requirements with a presentation of 21.2%.

Table3. Frequency distribution of respondents based on the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City

Tuberculosis incidence	Frequency	Presentation

Case	26	50
Control	26	50
Total	**52**	**100%**

Based on table 3, there are 26 case respondents with a percentage of 50% and 26 control respondents with a percentage of 50%.

Bivariate Analysis

Bivariate analysis aims to determine the relationship between the independent variable and the dependent variable by using statistical tests. The statistical test used in this research is the Chi-Square test with a significance level of 0.05.

Table 4. The relationship between smoking status and the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City

Smoking Status	Tuberculosis incidence				Total		OR (95%CI)	ρ-value
	Case		Control					
	N	%	N	%	N	%		
Smoke	22	84.6	13	50	35	67.3	5,500	0.018
Do not smoke	4	15.4	13	50	17	32.7	(1,478 - 20,461)	
Total	**26**	**100.0**	**26**	**100.0**	**52**	**100.0**		

Based on table 4, the results of the chi-square test between family smoking status and the incidence of tuberculosis in the group of cases with family smoking status were 22 respondents with a percentage of 84.6% and respondents with non-smoking status were 4 respondents with a percentage of 15.4%. Meanwhile, in the control group with family smoking status there were 13 respondents with a percentage of 50% and there were 13 respondents with non-smoking status with a percentage of 50%.

Table 5. Relationship between ventilation area and the incidence of tuberculosis in the working area of Banjarejo Health Center, Madiun City

Ventilation area	Tuberculosis incidence				Total		OR (95%CI)	ρ-value
	Case		Control					
	N	%	N	%	N	%		
Not eligible	25	96.2	16	61.5	41	78.8	15,625	0,0,07
Qualify	1	3.8	10	38.5	11	21.2	(1,821 - 134,040)	
Total	**26**	**100.0**	**26**	**100.0**	**52**	**100.0**		

Based on table 5, the results of the chi-square test between ventilation area and the incidence of tuberculosis in the group of cases with ventilation area not meeting the requirements were 25 respondents with a percentage of 92.2% and 1 respondent with

ventilation area meeting the requirements was 1 respondent with a percentage of 3.8%. Meanwhile, in the control group with ventilation area that did not meet the requirements, there were 16 respondents with a percentage of 61.5% and 10 respondents with ventilation area that did not meet the requirements with a percentage of 38.5%.

Discussion

1. **The Relationship between Family Smoking Status and the Incidence of Tuberculosis in the Working Area of the Banjarejo Community Health Center, Madiun City**

   Based on the results of the univariate analysis that has been carried out, it can be concluded that the frequency distribution between smoking status and the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City is dominated by respondents with smoking status, totaling 35 respondents, both cases and controls, with a percentage of 67.3%. Meanwhile, there were 17 respondents with non-smoking status, both cases and controls, with a percentage of 32.7%.

   Meanwhile, based on the results of bivariate analysis using the Chi-Square test which was used to determine the relationship between smoking status variables and the incidence of tuberculosis in the working area of the Banjarejo Health Center, Madiun City, the results showed that in the case group of respondents with a family history of smoking status there were 22 respondents with a percentage of 84. 6%, and those with no family history of smoking status were 4 respondents with a percentage of 15.4%. Meanwhile, in the control group with family smoking status there were 13 respondents with a percentage of 50% and there were 13 respondents with non-smoking status with a percentage of 50%.

   So, based on the calculation results, the p-value = 0.018 ($p < 0.05$) is obtained, which means that there is a relationship between smoking status and the incidence of tuberculosis in the working area of the Banjarejo Health Center, Madiun City.

   According to Giacomo's theory, smoking is an important risk factor for cardiovascular disease, and is often the main cause of death worldwide related to cerebrovascular disease, lower respiratory tract infections, COPD, pulmonary TB and respiratory tract cancer. The respiratory epithelium is the main barrier against harmful environmental agents and protects by sweeping particles out in the mucus layer, phagocytizing and recruiting other immune cells. Smoking can directly compromise physical barrier integration, increase respiratory epithelial permeability and impair muccociliary clearance (Giacomo M, et al, 2011).

   Smoking is an important factor that can reduce the body's immune system so that it can affect the recovery of treatment for tuberculosis sufferers. People who smoke are more at risk of suffering from tuberculosis because of the toxic content such as tar that is inhaled from cigarette smoke (Fitriani, 2014).

This smoking status consists of the smoking category and smoking habits. According to (Adin, 2016) The category of smokers is divided into passive smokers and active smokers. Passive and active smoking both have a bad impact on health. Cigarette smoke is very dangerous because cigarette smoke exhaled by active smokers and inhaled by passive smokers contains five times more carbon monoxide, four times more tar and nicotine.

Apart from that, bad smoking habits can also influence the smoking history in the family. According to (Suparyanto and Rosad, 2020), a person's smoking habit can be seen from the number of cigarettes smoked in one day and the length of time they consume cigarettes. The more cigarettes you smoke in one day, the more dangerous it will be for the body because the substances contained in cigarettes are cumulative (accumulated). And the longer someone consumes cigarettes, the more difficult it is to stop consuming cigarettes.

This research is in line with (Musdalifa, 2022) which suggests that there is a relationship between smoking status and the incidence of pulmonary tuberculosis in productive age in South Sumatra Province with a p-value = 0.019 < 0.05, this study explains that the large number of cigarettes consumed can be a factor in contracting tuberculosis. The results of this study are also in line with(Away, 2021)which suggests that there is a relationship between smoking status and the incidence of pulmonary TB at the Sikumana Community Health Center, Kupang City with a p-value = 0.037 < 0.05, in this study it is explained that someone with an active smoking status can be at risk of developing tuberculosis.

Based on the results of research conducted by researchers, it is stated that there is a relationship between smoking status and the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City with a value of OR = 5,500 which explains that smoking status in the family can be a factor in contracting tuberculosis because in this study, Researchers examined active and passive smokers in the family and surrounding environment. Smoking habits and the number of cigarettes consumed can also be a factor in the occurrence of tuberculosis.

2. The Relationship between Ventilation Extent and the Incidence of Tuberculosis in the Banjarejo Community Health Center Working Area

Based on the results of the univariate analysis that has been carried out, it can be concluded that the frequency distribution between ventilation area and the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City is dominated by respondents with ventilation area that does not meet the requirements, totaling 41 respondents, both cases and controls, with a percentage of 78. 8%. Meanwhile, there were 11 respondents with adequate ventilation area, both cases and controls, with a percentage of 21.2%.

Meanwhile, based on the results of bivariate analysis using the Chi-Square test which was used to determine the relationship between the variable ventilation area and the incidence of tuberculosis in the working area of the Banjarejo Community Health Center, Madiun City, the results showed that in the case group of respondents whose ventilation area did not meet the requirements, there were 25 respondents with a percentage of 96 .2%, and respondents with adequate ventilation area were 1 respondent with a percentage of 3.8%. Meanwhile, in the control group, there were 16 respondents whose ventilation area did not meet the requirements, with a percentage of 61.5%, and there were 10 respondents whose ventilation area met the requirements, with a percentage of 38.5%. So based on the calculation results, the p-value = 0.007 ($p < 0.05$) is obtained, which means that there is a relationship between the ventilation area and the incidence of tuberculosis in the working area of the Banjarejo Health Center, Madiun City.

Ventilation functions as a place for air exchange in a room to keep the air flow in the room fresh. According to (Ministry of Health, 2023) namely the ventilation area that covers 10% - 15% of the floor area. Therefore, a healthy home environment must receive sufficient sunlight and have adequate ventilation.

Meanwhile, according to (Saputri, 2022) which refers to the Health Service's 2007 Healthy Home Assessment Technical Guidelines so that the indoor air is fresh, the technical requirements for ventilation and windows are that ventilation holes remain at a minimum of 5% of the floor area and the incidental ventilation area (can be opened and closed) is a minimum of 5% of the floor area, The minimum window height is 80 cm from the floor, the air that enters is clean air, and the air flow is ensured not to be obstructed by household furniture.

This research is in line with (Khairani et al., 2020) which states that there is a relationship between the area of house ventilation and the incidence of pulmonary TB in adult patients visiting the Karang Jaya Community Health Center, North Muisi Rawas Regency with a p-value = 0.027 < 0.05, in this study it states that poor ventilation area can be a factor contracted tuberculosis. The results of this study are also in line with (Sahadewa, 2019) which also explained that there was a relationship between ventilation and risk factors for the incidence of BTA pulmonary TB in Jatikalang Village, Krian District, Sidoarjo Regency with p-value = 0.006 < 0.05, in this study it was stated that poor ventilation could be a factor in contracting tuberculosis.

Based on the results of research conducted by researchers, it is stated that there is a relationship between ventilation area and the incidence of tuberculosis in the working area of the Banjarejo Health Center, Madiun City with an OR value = 15.625, which shows that respondents with poor ventilation area are at 15.625 greater risk of contracting tuberculosis compared to respondents with poor ventilation. has good ventilation area.

Poor ventilation in the respondent's house was caused by the narrow area of the house and the rooms being close to each other, making it impossible to provide ventilation in the room where they gathered. The respondent's home area is also a densely populated area so that the space between houses does not have a large enough area. Apart from that, poor ventilation can also be caused by ventilation that is not opened or cannot provide access for air in and out, only as a source of natural lighting.

CONCLUSIONS

Based on the results of research on the relationship between family smoking status and ventilation area with the incidence of tuberculosis in the work area of the Banjarejo Community Health Center, Madiun City, it can be concluded that the majority of respondents have a history of family smoking status and ventilation area that does not meet the requirements. This research shows that there is a relationship between family smoking status and ventilation area with the incidence of tuberculosis in the area. As a suggestion, for the Banjarejo Community Health Center, health workers are advised to provide education about the dangers of smoking, keeping the house clean, and the importance of opening and closing windows regularly. For Stikes Bhakti Husada Mulia Madiun, it is hoped that the results of this research will become study material for future researchers and become a reference regarding tuberculosis. For the public, it is recommended to pay attention to the physical condition of the house, especially ventilation, by regularly opening windows to let sunlight in, which will help reduce humidity and prevent the spread of tuberculosis.

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