



Relationship between healthy house and smoking habits with afb (+) pulmonary tuberculosis cases at the singotrnan public health center, Banyuwangi district

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Article Info

Article history:

Received December 28, 2023

Revised February 21, 2024

Accepted February 22, 2024

Keywords:

AFB (+) pulmonary tuberculosis cases

Smoking Habits

Healthy house

ABSTRACT

Singotrnan Public Health Center has 65 cases of AFB (+) pulmonary TB, which means increased by 22.6% from the previous year. Healthy house and smoking habits are known to be some of the risk factors for pulmonary TB cases. This study aims to analyze the relationship between healthy house and smoking habits with AFB (+) Pulmonary Tuberculosis cases in the working area of the Singotrnan Public Health Center, Banyuwangi District. The method used is analytic research with a case-control type. This research was conducted on 28 samples, consist of 14 from the case group and 14 from the control group in the working area of the Singotrnan Health Center. Data were obtained from assessments using observation sheets and interviews using questionnaires. The data obtained were analyzed univariably using tabulation and bivariably using the Chi Square test using the Odds Ratio value to determine the dynamics of the independent and dependent variables. The results of the Chi Square test showed that there is a significant relationship between healthy houses ($p_{\text{value}} = 0.022$) and smoking habits ($p_{\text{value}} = 0.002$) with AFB pulmonary TB cases (+). The Odds Ratio value shows that unhealthy homes have a 6.6 times higher risk and smoking increases the risk 15 times higher for being diagnosed with AFB (+) Pulmonary TB. In conclusion, healthy homes and smoking habits have the potential to increase the risk of AFB (+) Pulmonary TB in the working area of the Singotrnan Public Health Center, Banyuwangi District.

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DOI: <https://doi.org/10.52465/johmpe.v2i1.281>

1. Introduction

Tuberculosis (TB) is an infectious disease that is a global health problem caused by *Mycobacterium tuberculosis* and it is estimated that about one-third of the world's population has been infected by the bacteria. In 2019 Indonesia ranked second out of 30 high burden countries with the highest number of new TB cases after India, whereas the rank maintained and the amount of cases increased by 55% in 2021 [1]. Banyuwangi is one of the districts that experienced an increasing trend of TB cases in 2019, increasing 81.85% from 2014, and the percentage of deaths has remained at 4% for the last three years. Singotrunan Public Health Center had the highest number of AFB (+) pulmonary TB cases and prevalence rate in Banyuwangi Regency in 2019, with 65 cases, an increase of 22.6% from the previous year [2].

In addition to exposure by infectious TB patients, other factors that cause a person to become infected with TB are factors of unhealthy housing conditions, immunity, and behavior that become an opportunity for a person to be exposed and suffer from TB disease [3]. The inside of the house such as the roof, walls, and floors have the potential to become a place for the development of bacteria that cause pulmonary TB if the conditions are rarely or difficult to clean [4]. The size of ventilation that is disproportionate to the floor area, high humidity, and sunlight that does not enter the house causes poor air circulation and lighting, increasing the possibility that *Mycobacterium tuberculosis* can develop in the house [5].

Cigarettes have a dose-response effect which causes adaptive immunity in individuals to decrease along with the length of active smoking [6]. Previous research conducted in Banyuwangi District showed that 15% of male TB patients in Banyuwangi District were still active smokers and on average started smoking since adolescence [7]. Meanwhile, this research was conducted in smaller location which is in the working area of Singotrunan Public Health Center, therefore the percentage of smokers might differ.

Research on the causal factors of AFB(+) pulmonary TB in Banyuwangi has so far been limited. Therefore, this study was conducted by identifying two of the factors that cause TB transmission, namely healthy house status and smoking habits. This study aims to analyze the relationship between healthy house and smoking habits with cases of AFB (+) Pulmonary Tuberculosis in the working area of Singotrunan Public Health Center, Banyuwangi District.

2. Method

This study is an analytic study with a case control type that compares case groups with control groups retrospectively from disease cases to their causative factors [8]. The data sources used were secondary data from the P2M section of the Banyuwangi Health Office and Singotrunan Public Health Center and primary data oAFBined through observation using a healthy home assessment sheet and interviews regarding respondents' smoking behavior.

The case population of this study were all patients who had been diagnosed with AFB (+) Pulmonary TB and were recorded as patients undergoing treatment at Singotrunan Health Center in 2020, with a case population of 34 people consisting of 14 men and 20 women. Inclusion criteria for the case group and control group were residents who resided in the

Singotrunan Health Center working area for at least one year, were at least 15 years old, were male heads of households, and were willing to become respondents in the study as evidenced by the signature on the informed consent. Based on these inclusion criteria, the sample oAFBined from saturated sampling was 14 people each from the case and control groups.

This research was conducted in the working area of Singotrunan Health Center, Banyuwangi District. Data collection was carried out from September to December 2021. The instruments and tools used for data collection are the Global Tobacco Surveillance Sysrem (GTSS) questionnaire regarding smoking habits, a healthy home assessment sheet based on the Technical Guidelines for Healthy Home Assessment of the Ministry of Health of the Republic of Indonesia in 2012, a thermohygrometer to measure temperature and humidity levels, a meter to measure ventilation area, and a luxmeter to measure lighting [9]-[10].

Univariable analysis was performed by grouping and tabulating data based on the variables studied. Bivariable analysis was performed using the Chi Square (X^2) statistical test with $\alpha=0.05$, and the dynamics of the relationship between the independent and dependent variables were seen through the Odds Ratio (OR) value.

3. Results and Discussion

This study was conducted in the working area of Singotrunan Public Health Center, Banyuwangi Subdistrict with a total sample of 14 people in the case group and 14 people in the control group, so that the total number of respondents was 28 people. Data were oAFBined from filling out observation sheets and interviews with samples. Observations and interviews were conducted from October to December 2021 in 4 villages where AFB (+) pulmonary TB cases met the inclusion criteria, namely Lateng Village, Singotrunan Village, Singonegaran Village, and Kampung Mandar Village, while in 3 other villages AFB (+) pulmonary TB cases did not meet the gender inclusion criteria, namely male. Male inclusion criteria were chosen to avoid gender bias in terms of smoking habits. Observations and interviews were conducted between 12:00-14:00 pm to prevent temperature and lighting bias in each measured house.

Table 1. Distribution of respondents based on characteristics

	Characteristic	Frequency	Percentage
Address (Village)	Lateng	10	35.7%
	Singotrunan	8	28.6%
	Singonegaran	6	21.4%
	Kampung Mandar	4	14.3%
TOTAL		28	100.0%
Age range	16-24	3	10.7%
	25-33	1	3.6%
	34-42	5	17.9%
	43-51	7	25.0%
	52-60	12	42.9%
TOTAL		28	100.0%
Education	Elementary school	6	21.4%
	Junior high school	9	32.1%
	High school	11	39.3%
	University	2	7.1%
TOTAL		28	100.0%

Job	Unemployed	1	3.6%
	Civil servant	2	7.1%
	Entrepreneur	18	64.3%
	Private	7	25.0%
TOTAL		28	100.0%
Smoking habit	Not smoking	16	57.1%
	Smoking	12	42.9%
TOTAL		28	100.0%
Healthy house status	Not healthy	12	42.8%
	Healthy	16	57.2%
TOTAL		28	100.0%

A total of 28 respondents went through the interview and healthy home assessment process. Of the total respondents, the majority reside in Lateng Village (35.7%). Respondents were dominated by the age range of 52-60 years (42.9%). The majority of respondents were high school graduates (39.3%). The most common occupation for respondents was entrepreneurship (64.3%). More than half of the respondents did not smoke (57.1%) and their residential houses were considered healthy (57.2%).

Table 2. Chi Square test of the relationship between healthy house status and AFB (+) Pulmonary TB

Healthy House Status	Status				TOTAL	<i>p</i> value	OR
	Control		Case				
Healthy	11	39.3%	5	17.9%	16	57.2%	
Not Healthy	3	10.7%	9	32.1%	12	42.8%	0.022
TOTAL	14	50.0%	14	50.0%	28	100.0%	

The number of the AFB (+) Pulmonary TB case group whose results of the Healthy Home measurement were rated as unhealthy were 9 people (32.1%) and those rated as healthy were 5 people (17.9%), while in the control group, 3 people (10.7%) were rated as unhealthy and 11 people (39.3%) were rated as healthy.

The calculation results using SPSS showed a *p*value of 0.022. Because the *p*value < 0.05 (α), H_0 is rejected, in other words, there is a significant relationship between healthy homes and pulmonary tuberculosis cases. The calculation results showed an estimated Odds Ratio (OR) of 6.6. Because the OR shows > 1, it means that the risk factor increases the effect factor, that is, the AFB (+) Pulmonary TB case group and the control group who live in unhealthy houses have a 6.6 times higher risk of being diagnosed with AFB (+) Pulmonary TB.

Table 3. Chi Square test of the relationship between smoking habit and AFB (+) Pulmonary TB

Smoking Habit	Status				TOTAL	<i>p</i> value	OR
	Control		Case				
Not smoking	12	42.9%	4	14.3%	16	57.1%	0.002

Smoking	2	7.1%	10	35.7%	12	42.9%
TOTAL	14	50.0%	14	50.0%	28	100.0%

The number of cases of pulmonary TB AFB (+) who did not smoke was 9 people (32.1%) and those who smoked were 5 people (17.9%), while in the control group who did not smoke were 12 people (42.9%) and those who smoked were 2 people (7.1%).

The calculation results using SPSS showed a p_{value} of 0.002. Because the $p_{\text{value}} < 0.05 (\alpha)$, H_0 is rejected, in other words, there is a significant relationship between smoking habits and pulmonary tuberculosis cases. Because the OR shows > 1 , it means that the risk factor increases the effect factor, i.e. the AFB (+) pulmonary tuberculosis case group and the control group who smoke are 15 times more likely to suffer from AFB (+) pulmonary tuberculosis than those who do not smoke.

3.1. Relationship between Healthy Homes and Cases of AFB (+) Pulmonary TB

This study shows the results of the Chi Square test with a p_{value} of 0.022, in other words there is a significant relationship between healthy homes and cases of AFB (+) Pulmonary TB in the Singotrunan Public Health Center working area, Banyuwangi District. The OR value shows more than 1, namely 6.6, meaning that the risk factor increases the effect factor, namely the AFB (+) Pulmonary TB case group and the control group who live in unhealthy homes are 6.6 times more at risk of suffering from AFB (+) pulmonary tuberculosis than those who live in healthy homes.

Similar results were obtained from research by Muhith in the Ujungpangkah Health Center working area, Gresik Regency, where healthy homes ($p_{\text{value}}=0.046$) had a significant relationship with AFB (+) Pulmonary TB. Muhith explained that occupancy density, lighting, and air circulation or ventilation systems that do not meet the requirements can increase the development of Mycobacterium tuberculosis and increase the frequency of tightness for residents who are AFB (+) Pulmonary TB patients [11]. Similar research by Nur'aini conducted in South Purwokerto District, Banyumas Regency, which had a larger number of cases, namely 37 cases, showed a significant relationship between the physical environment of the house and cases of AFB (+) Pulmonary TB ($p_{\text{value}}=0.002$) [12]. Another study that is in line is research by Fikri et al. conducted in Campurdarat District, namely healthy home status ($p_{\text{value}}=0.014$) has a significant relationship with cases of AFB (+) Pulmonary TB. The majority of respondents who do not open the windows in the morning cause no air circulation to occur in the house space, so that humidity increases and natural lighting does not meet the requirements, and the unhealthy house increases the risk of getting sick with AFB (+) Pulmonary TB 1.1 times higher than those living in healthy homes [13].

This study is inversely proportional to the results of research by Pongkorung et al. which shows that the physical environment of the house ($p_{\text{value}}=0.771$) does not have a statistically significant relationship with cases of AFB (+) Pulmonary TB [14]. Research by Imaduddin et al. also showed that there was no significant relationship between house building construction ($p_{\text{value}} = 1.000$) and cases of AFB (+) Pulmonary TB, and in this study bivariable analysis could not be carried out because there were cells with a value of 0 and

the assessment of house building construction characteristics had an almost equal proportion between the case group and the control group [15].

3.2. Relationship between Smoking Habits and Cases of AFB (+) Pulmonary TB

Proper citation of other works should be made to avoid plagiarism. When referring to a reference item, please use the reference number as in [16] or [17] for multiple references. The use of "Ref [18]..." should be employed for any reference citation at the beginning of sentence. For any reference with more than 3 or more authors, only the first author is to be written followed by *et al.* (e.g. in [19]). Examples of reference items of different categories shown in the References section. Each item in the references section should be typed using 8 pt font size [20]–[25].

This study shows the results of the Chi Square test with a pvalue of 0.002, which means that there is a significant relationship between smoking habits and cases of AFB (+) Pulmonary TB in the Singotrunan Health Center work area, Banyuwangi District. The OR value shows more than 1, namely 15.00, meaning that the risk factor increases the effect factor, namely the AFB (+) Pulmonary TB case group and the control group who smoke are 15 times more at risk of suffering from AFB (+) pulmonary tuberculosis than those who do not smoke.

The results of this study are in line with research by Simbolon et al. which shows that smoking status ($p_{\text{value}}=0.01$) has a significant relationship with cases of AFB (+) Pulmonary TB and people who smoke have a 6 times higher risk of having AFB (+) Pulmonary TB than people who do not smoke [16]. Another study that showed similar results was conducted by Hartina et al. which shows that smoking is significantly associated with cases of AFB (+) Pulmonary TB ($p_{\text{value}}=0.047$) and smoking increases the risk of Pulmonary TB by 2.7 times than not smoking [17]. Research by Shimeles et al. (2019) also showed that smoking is one of the factors that have the most impact on cases of AFB (+) Pulmonary TB, where people who smoke have a 4 times higher risk of being diagnosed with AFB (+) Pulmonary TB than people who do not smoke.

Observations showed that the number of active smokers among the AFB (+) Pulmonary TB case group was 10 out of 14 people (71.42%) and had been actively smoking since adolescence, which means that there are still many people who continue to smoke even though they have been diagnosed with AFB (+) Pulmonary TB. Cigarettes have a dose-response effect where if a person starts smoking younger, it will have a greater influence on their health because it can reduce individual adaptive immunity so that immunity is also affected. Darmin *et al.* explained that smoking habits that started since adolescence cause difficulty and unwillingness to stop smoking because they have long been accustomed to getting pleasure from smoking, thus overriding the fact that they are sick and continue the habit of smoking [18].

There are three main toxins in cigarette smoke that are known to reduce antigen response, including nicotine, tar, and carbon monoxide, which can damage lung alveolar macrophages that affect T lymphocyte cell immunity and potentially increase the risk of Mycobacterium tuberculosis bacterial growth in the body [19]. For those who have been diagnosed with AFB (+) Pulmonary TB, smoking is an important factor that has the potential to reduce immunity so that it can cause the patient's healing process when seeking treatment to be slower or obstructed (Leung, 2010). Research conducted by Obore

et al. showed that in addition to having an impact on active smokers, cigarette smoke also has the potential to increase Indoor Air Pollution and increase the risk of passive smokers, namely other family members who live in the same house as active smokers, to develop AFB (+) Pulmonary TB disease by 2 times [20].

4. Conclusion

Healthy homes have a significant association with cases of AFB (+) Pulmonary TB in the working area of Singotrunan Public Health Center, Banyuwangi District. People living in unhealthy homes have a 6.6 times greater risk of being diagnosed with AFB (+) Pulmonary TB than those living in healthy homes. Smoking habits have a significant association with cases of AFB (+) Pulmonary TB in the Singotrunan Public Health Center working area, Banyuwangi District. People who smoke have a 15 times greater risk of being diagnosed with AFB (+) Pulmonary TB than those who do not smoke.

Further studies is needed by doing research in the wider areas and with bigger amount of respondents to get representative results for Banyuwangi District as a whole. However based on the result of this research, the medical personnel of Singotrunan Public Health Center is expected to gear up the health promotion, especially related to healthy housing and the danger of smoking with the main targetted audience of adolescence, in dire to reduce the number of smokers and prevents more case of AFB (+) Pulmonary TB in the future.

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