

Original Research

Relationship of active and passive smokers to the incidence of pulmonary tuberculosis

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com**Abstract****Background:** Tuberculosis is an infectious disease caused by the Mycobacterium Tuberculosis germ. Through these germs, it then spreads from tuberculosis sufferers through the air. Smoking is one of the things that increases the risk of pulmonary tuberculosis.**Objective:** The purpose of this study was to analyze the relationship between active smokers and passive smokers with the incidence of tuberculosis.**Methods:** This research method uses a type of analytical research using a cross sectional approach where the sample used is 52 respondents.**Results:** Based on the results of the chi-square test, it was found that there is a relationship between active smokers and passive smokers with the incidence of Tuberculosis.**Conclusion:** Based on the results of the analysis, it can be concluded that there is a relationship between active smokers and passive smokers.**Keywords:** Active Smoker, Passive Smoker, Tuberculosis

Introduction

Tuberculosis is an infectious disease caused by the Mycobacterium Tuberculosis germ. Through these germs, it then spreads from tuberculosis sufferers through the air. This tuberculosis germ usually attacks the lung organs and can also attack outside the lungs. Almost a quarter of the world's population is infected with germs. The number of deaths due to tuberculosis globally in 2020 was 1.3 million, which increased compared to 2019 which was 1.2 million. (Global Tuberculosis Report, 2021).

According to a World Health Organization report in 2018, Indonesia ranked 3rd by accounting for 8% of tuberculosis patients worldwide. The number of new cases of tuberculosis in Indonesia is 420,994 based on male sex 245,298 cases and female sex 175,696 cases in 2017 where this data is data as of May 17, 2018. (World Health Organization, 2018). According to the World Health Organization in 2015, around 75% of pulmonary tuberculosis patients are in the productive age group ranging from 15 to 50 years. Furthermore, in 2016 there were around 10.4 million tuberculosis incidences worldwide with an estimated 90% of cases of adult age, 65% of men and 10% women.

The cause of tuberculosis is caused by Mycobacterium Tuberculosis, where about 89% of tuberculosis is suffered by adults and 11% by children. To date, tuberculosis is still the highest cause of death after HIV/AIDS and is also one of the top 20 causes of death worldwide. Indonesia is currently ranked 3rd with the highest number of tuberculosis patients in the world after India and China. Globally, it is estimated that 9.9 million people suffered from tuberculosis in 2020. (Ministry of Health of the Republic of Indonesia, 2021).

According to data from the North Sulawesi Provincial Health Office, the CNR (Case Notification Rate) rate per 100,000 residents of pulmonary tuberculosis in 2016 was 217 cases, increased in 2017 to 250 cases and in 2018 increased to 273 cases. Pulmonary tuberculosis is one of the fourth highest diseases in North Sulawesi Province. There are 15 regencies/cities in North Sulawesi Province, in 2018 Manado City ranked first highest in cases of pulmonary tuberculosis with 2,052 cases, then Bitung City ranked second with 563 cases, and Tomohon City ranked third with 353 cases (North Sulawesi Provincial Health Office, 2018).

Smoking is one of the things that increases the risk of pulmonary tuberculosis. The link between smoking and tuberculosis can lead to impaired lung macrophage ability and increase mortality due to pulmonary tuberculosis. Smoking is also associated with a decrease in the levels of pro-inflammatory cytokines produced. Where these cytokines are very important as an initial process of local defense for bacterial infections including mycobacterium tuberculosis. Smoking behavior factors are factors that can

actually be prevented, but smoking behavior at a young age will be increasingly difficult to quit smoking. This is because cigarettes contain nicotine content that can cause addiction for smokers. Indonesia ranks 3rd as a cigarette consumer in the world, namely 28% or 65 million of Indonesia's population (Health Research and Development Agency, 2018).

When the researcher conducted interviews with 5 patients in the Modayag area, the results were obtained that as many as 3 patients were active smokers and 2 other patients were passive smokers where the patients were at home with active smokers, then a comparison was made between active smokers and passive smokers with patients with Pulmonary TB and non-Pulmonary TB. Where the respondents used were 13 people who did not suffer from Pulmonary TB and 39 people suffered from Pulmonary TB.

Methods

Study Design

This research method uses a type of analytical research using a cross sectional approach.

Samples/Participants

The sample used was 52 respondents. The sampling technique in this study is total sampling. Total sampling is a sampling technique where the number of samples is equal to the population. (Sugiyono, 2018). The reason for taking the total sampling is the number of population that is less than 100. So that the number of samples in this study was 52 people within one month.

Instruments

The instrument in this study used a questionnaire. Where the questionnaire is used as a measurement to find out the Characteristic Relationship with Pulmonary Tuberculosis Patients. The data collection used has been adapted to the purpose of the researcher and refers to the concepts and theories that have been made. The question consists of 2 parts where the first part contains about name, gender, education and occupation while the second question contains about the smoking habits of the respondents which consists of questions consisting of questions consisting of tuberculosis, environment, exposure, smoking status, length of smoking, quantity and place of smoking.

Data Collection

The data collection process in this study is with primary data and secondary data in the work area of the Modayag Health Center. Primary data was obtained from the research sample, namely the results of filling out questionnaires and observations carried out and secondary data was obtained from data at the Modayag Health Center, namely many pulmonary TB patients, the number of pulmonary TB patients based on gender and age.

Data Analysis

The type of statistical used in this study is the chi square statistical test. analysis used on two variables that are likely to be related between independent variables and with related variables (Sumantri, 2015). Bivariate analysis in this study was conducted to see the relationship between bound variables and independent variables. This analysis is carried out using a correlation test to determine the relationship between the free variable and the bound variable. Where H_0 is rejected if the significant number is < 0.05 which means that there is a relationship between the dependent variable and the independent variable. Meanwhile, H_0 is accepted if the significant number is > 0.05 which means that there is no relationship between the dependent variable and the independent variable.

Ethical Considerations

Based on the results of the reviewer of the Health Research Ethics Commission of the Graha Medika Institute of Health and Technology, Kotamobagu provided approval and ethical recommendations for research submissions.

Results

Univariate Analysis

Respondent Characteristics

Gender

Based on Table 1, it can be seen that the characteristics of respondents based on male gender are 28 respondents (53.8%) and female gender as many as 24 respondents (46.2%).

Table 1 Distribution of respondent frequencies by gender

Gender	Frequency	%
Male – Male	28	53.8%
Woman	24	46.2%
Total	52	100%

Source : SPSS Processed Data 2023

Education

Based on Table 2, it can be seen that the characteristics of respondents based on elementary education were 19 respondents (36.5%), junior high school as many as 14 respondents (26.9%) and high school as many as 19 respondents (36.5%).

Table 2 Distribution of respondent frequencies by level of education

Education	Frequency	%
Elementary Education	19	36.5%
Junior High School	14	26.9%
Senior High School	19	36.5%
Total	52	100%

Source : SPSS Processed Data 2023

Work

Based on Table 3, it can be seen that the characteristics of respondents based on work are mostly working as IRTs as many as 18 respondents (34.6%) and mining as many as 14 respondents (26.9%).

Table 3 Distribution of respondent frequencies by occupation

Work	Frequency	%
Workshop	2	3.8%
Gardening	5	9.6%
IRT	18	34.6%
Kiosk	2	3.8%
Merchant	9	17.3%
Farmer	2	3.8%
Mine	14	26.9%
Total	52	100%

Source : SPSS Processed Data 2023

Univariate Analysis

Smoking Status

Based on table 4, it shows that the distribution of respondents with active smoking status was 25 respondents (48.1%) and passive smoking status was 27 respondents (51.9%).

Table 4 distribution of respondents by smoking status

Smoking status	Frequency	%
Active	25	48.1%
Passive	27	51.9%
Total	52	100%

Source : SPSS Processed Data 2023

Tuberculosis

Based on table 5, it can be seen that the distribution of respondents from 52 respondents was 39 respondents (75%) with TB and 13 respondents (25%) who did not experience TB

Table 5 distribution of respondents by incidence of tuberculosis

TUBERCULOSIS	Frequency	%
Yes	39	75%
Not	13	25%
Total	52	100%

Source : SPSS Processed Data 2023

Milieu

Based on table 6 of the distribution of respondents above, as many as 52 respondents (100%) live with a smoker.

Table 6 distribution of respondents by environment

Milieu	Frequency	%
Yes	52	100%
Not	0	0%
Total	52	100%

Source : SPSS Processed Data 2023

Exposure

Based on table 7, the distribution of respondents shows that most of the respondents are exposed to cigarette smoke every day, as many as 47 respondents (90.4%) and as many as 5 respondents (9.6%) are sometimes exposed to cigarette smoke.

Table 7 distribution of respondents by exposure

Exposure	Frequency	%
Every day	47	90.4%
Sometimes	5	9.6%
Total	52	100%

Source : Primary Data 2023

Long Smoking

Based on table 8, it shows that the distribution of respondents based on the length of smoking is mostly more than 10 years as many as 52 respondents (100%).

Table 8 distribution of respondents by length of smoking

Long Smoking	Frequency	%
> 10 years	52	100%
< 10 years	0	0%
Total	52	100%

Source : SPSS Processed Data 2023

Smoking quantity

Based on table 9, it shows that the distribution of respondents based on the quantity of smoking is mostly more than 10 cigarettes as many as 52 respondents (100%).

Table 9 distribution of respondents by quantity of smoking

Smoking quantity	Frequency	%
> 10 bars	52	100%
< 10 sticks	0	0%
Total	52	100%

Source : SPSS Processed Data 2023

Smoking Places

Based on table 10, it shows that the distribution of respondents mostly smoked indoors as many as 41 respondents (78.8%) and outside the home as many as 11 respondents (21.2%).

Table 10 distribution of respondents by place

Smoking Places	Frequency	%
Outside the home	11	21.2%
Inside the house	41	78.8%
Total	52	100%

Source : SPSS Processed Data 2023

Bivariate Analysis

Based on table 11, the analysis of the relationship between tuberculosis and passive and active smokers showed that as many as 24 respondents (96.0%) experienced tuberculosis with the status of active smokers, there were 15 respondents (55.6%) experienced tuberculosis with the status of passive smokers. Furthermore, as many as 1 respondent (4.0%) did not experience tuberculosis but had the status of an active smoker and as many as 12 respondents (44.4%) did not experience tuberculosis and had the status of a passive smoker.

Table 11 Relationship of Active and Passive Smokers with Tuberculosis Incidence

Smoking Status	TUBERCULOSIS				p value
	Active		Passive		
	F	%	F	%	
Active	1	4.0%	24	96.0%	0.001
Passive	12	44.4%	15	55.6%	
Total	13	25.0%	39	75.0%	

Source : SPSS Processed Data 2023

Discussion

This is in line with research conducted by Sri Rezeki (2020) where based on the study it is known that the largest percentage of TB cases are respondents who are active smokers as many as 25 respondents (51.1%). Likewise, research conducted by Fransisca (2019) where in a study conducted with a *case control* design, it was found that the largest percentage of smokers was in the case group of 57.9%.

Based on statistical tests, there is a relationship between active and passive smokers and the incidence of tuberculosis in the working area of the Modayag Health Center, where for the status of active smokers, as many as 24 respondents (61.5%) had tuberculosis. People who are active smokers are 3,588 times more likely to be infected with Pulmonary TB when compared to people who do not smoke. This is in line with research conducted by Kakuhes et al (2020) which showed that there was a significant relationship between smoking and Pulmonary TB with a *p value* of 0.003 OR 3.701, which showed that smoking was 3.701 times greater at risk of developing Pulmonary TB when compared to those who did not smoke.

Furthermore, a study conducted by Burusie, Abay et al (2020) a study with a *systematic review* method reported that of the 22 studies conducted by meta-analysis, there were 12 studies that had a *p value* of < 0.05 where smoking significantly supported the presence of Pulmonary TB and worsened Pulmonary TB.

Some of the limitations in this study are that the researcher has difficulty in reaching the respondent's home address considering that the working area for the Modayag health center is very large, the researcher has difficulty when he wants to visit the respondent's house but the respondent is not at home., the researcher has difficulty adjusting the visit time with the respondent who works as a miner., the researcher found a lack of motivation for respondents who experienced tuberculosis to carry out routine treatment for 6 months in Phc.

Conclusion

Based on the results and discussion of the results of the research obtained, it can be concluded that respondents experienced tuberculosis with active smokers as many as 24 respondents (96.0%) and respondents with passive smoker status as many as 15 respondents (55.6%). Meanwhile, respondents who did not experience tuberculosis with active smoking status were 1 respondent (4.0%) and as many as 12 respondents (44.4%) with the status of passive smokers but did not experience tuberculosis. There is a relationship between active smokers and passive smokers with the incidence of pulmonary tuberculosis in the working area of the Modayag Health Center with a *p value* = 0.001, after the study was conducted and the results were obtained that active smokers were more affected by tuberculosis than passive smokers. It is hoped that the next research can develop this research with different number of respondents and variables.

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