

Risk Factors of Lung Tuberculosis Occurrence in the Working Area of Kaluku Bodoa Health Center Makassar City

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Abstract

Makassar City is one of the coastal areas that are vulnerable to the transmission of pulmonary Tuberculosis (TB). The condition of population density in the area can increase the risk of transmission.

The aims of the study to determine the risk factors for the occurrence of pulmonary TB in the coastal area of Makassar city. The Design study is case control. Cases are pulmonary TB patients recorded in the medical record of Kaluku Bodoa Health Center. Control is TB suspects who have experienced symptoms of a cough more than 2 weeks and do not have positive TB. The number of samples is 120 with details of 60 cases and 60 controls. Data analysis was used by bivariate and multivariate with odds ratio & logistic regression tests.

The results showed that occupancy density (OR: 2.33; 95% CI: 1.103-4.935) and TB contact (OR: 9.077; 95% CI: 1.098-75.02) were risk factors for pulmonary TB, while poor families (OR : 1.909; 95% CI: 0.811-4.493) and smoking behavior (OR: 1.336; 95% CI: 0.463-3.856) is not a risk factor for the incidence of Pulmonary TB. The conclusion in this study is the probability of the occurrence of pulmonary TB in subjects whose home density is <10 m² / person and has a contact history with pulmonary TB patients, which is 92%.

For Suggestions need health promotion for coastal communities regarding healthy life behavior (PHBS) and ways to reduce the risk of pulmonary TB transmission.

Keyword :Pulmonary TB, contact TB, occupancy density

Introduction

Pulmonary tuberculosis (TB) is one of the largest infectious diseases in the world. This disease is still a serious problem, especially in developing countries like Indonesia¹. The number of new cases of AFB (+) pulmonary TB in Indonesia was recorded at 1561723 and 74.96% of it belonged to the productive age with a Case Detection Rate (CDR) of 60.59%. South Sulawesi Province was one of the provinces that had the largest AFB (+) cases, namely 12.972 cases and a prevalence of 257 per 100.000 population².

The case of pulmonary TB in Makassar City showed fluctuating numbers. There were 2.166 cases in 2014, then increased to 2.372 new cases of positive AFB TB in 2015. In 2016, the total cases became 3.917 cases, but

new positive AFB cases decreased to 1.850³. Although new cases had decreased, the prevalence of TB in the community was still quite high. This high prevalence rate allowed a large number of infections to occur. This was supported by the high density of Makassar City and residential environment that supported TB transmission, especially in the western part of Makassar City, which was a populous and poor coastal area.

Coastal area is vulnerable to the spread of infectious diseases, including tuberculosis (TB). One of the coastal areas in Makassar City that had a quite high number of pulmonary TB cases was the working area of Kaluku Bodoa Community Health Center. Based on the data of Public Health Office of Makassar³ the number of cases in Kaluku Bodoa Village was 77 cases with the proportion of positive AFB reaching 46.6% of the number of suspected

pulmonary TB found. In addition to poor environmental condition, several things also became risk factors for TB cases, such as age, occupancy density, socioeconomic status, smoking behavior, distance between houses, and contact history. Those factors contributed to the increase of TB cases in an area⁴. Therefore, this research was to find out risk factors that affected TB cases in the coastal areas of Makassar City.

Material and Method

This was an observational research with a Case Control research design. Data was obtained from Kaluku Bodoa Health Center in Makassar City. Case population was positive AFB pulmonary TB patients recorded in TB 03 form (TB register) in 2018 and 2019. Control population was suspected TB patients recorded in TB register. Sample was 120 people divided into case and control group with a ratio of 1: 1 so that each group

consisted of 60 people. Sample calculation used was the Lameshow formula. Sampling technique used was the simple random sampling. Data collection instrument used was a structured questionnaire. The data were analyzed in descriptive, bivariate, and multivariate analysis.

Results

Results of the descriptive analysis can be seen in table 1. The case group was dominated by male respondents, namely 43 people (71.7%). The number of respondents was higher in the Productive age group (11-50 years old) in the case group by 41 people (68.3%) and in the control group by 43 people (71.7%). The education background of respondents was mostly in the high school graduate group by 21 people (35%) and 30 people (50%). The occupation of respondents was dominated by workers and housewives in both case and control group.

Table 1. Distribution of respondents' characteristics in the coastal area of Kaluku Bodoa Village, Makassar City

Respondents' Characteristics	Pulmonary TB case				Total	
	Case		Control			
	n	%	n	%	n	%
Sex						
Male	43	71.7	33	55.0	76	63.3
Female	17	28.3	27	45.0	44	36.7
Age group						
Children	1	1.7	0	0.0	1	0.8
Productive	41	68.3	43	71.7	84	70.0
Elderly	18	30.0	17	28.3	35	29.2
Education						
Not Attending School/Not Completing Elementary School	6	10.0	1	1.7	7	5.8
Elementary School Graduate	18	30.0	15	25.0	33	27.5
Junior High School Graduate	9	15.0	12	20.0	21	17.5
Senior High School Graduate	21	35.0	30	50.0	51	42.5
College Graduate	6	10.0	2	3.3	8	6.7
Occupation						
Jobless	7	11.7	6	10.0	13	10.8
Housewife	11	18.3	20	33,3	31	25.8

Cont... Table 1. Distribution of respondents' characteristics in the coastal area of Kaluku Bodoa Village, Makassar City

Labor	18	30.0	18	30.0	36	30.0
Entrepreneur	10	16.7	5	8.3	15	12.5
Motorcycle taxi driver	1	1.7	1	1.7	2	1.7
Private employee	5	8.3	6	10.0	11	9.2
State Civil Apparatus	4	6.7	1	1.7	5	4.2
Student	4	6.7	3	5.0	7	5.8

Table 2 presents the results of risk factors analysis for pulmonary TB cases in the coastal area of Makassar City. From the analysis results, it was found that there were 2 main variables that were statistically significant as risk factors for pulmonary TB cases in the coastal area of Makassar City, namely residential density and contact history with patients with pulmonary TB. Respondents with occupancy density that did not meet the requirements (<10m²/person) had 2.33 times greater

risk of developing pulmonary TB disease compared to respondents with qualified occupancy density (95% CI: 1.103-4.935). In addition, the research results also showed that people with a history of household contact with pulmonary TB patients having 9 times greater risk (95% CI: 1.098-75.02) for the case of pulmonary TB disease compared to people who did not have any history of household contact with pulmonary TB patients. The results were statistically significant.

Table 2. Results of Bivariate Analysis of Pulmonary TB Risk Factors

The research results also showed that there were two research variables that had no statistically significant relationship, namely the poor family variable with an OR value of 1.909 (95% CI: 0.811-4.493) and smoking behavior with an OR value of 1.336 (95% CI: 0.463 -3.856). Nevertheless, it can be seen that this variable had the potential to become a risk factor. One of them was the poor economic/financial family condition. Poor families who had pulmonary TB was 18 people (30%) greater in proportion than poor families who did not have pulmonary TB, which was 11 people (18.3%). Smoking status also showed no statistically significant results, because the proportion of smokers in both the case and control groups was relatively the same, namely 53 (88.3%) people in case group and 51 people (85%) in control group.

Table 3. Multivariate logistic regression analysis

No	Risk Factors	B	OR	95% CI	p-value
1	Occupancy Density	0.806	2.239	1.041-4.817	0.039
2	Contact History	2.135	8.461	1.006-71.169	0.049
	Constant	-0.441	0.643	-	0.074

Table 3 shows the results of the multivariate logistic regression analysis of the independent variables affecting pulmonary TB. From the analysis results, a suitable model was obtained with the equation as follows:

$$\ln \left(\frac{p}{p-1} \right) = -0.441 + 0.806 \text{ occupation density} + 2.135 \text{ contact history}$$

With this equation, it was possible to calculate the chance of pulmonary TB occurring in the coastal area of

Makassar city on subjects whose house density was <10 m²/person and had a history of contact with pulmonary TB patients with the following calculation:

$$= -0,441 + (0,806 \times 1) + (2,135 \times 1) = 2.5$$

The result was:

$$P = 1 / (1 + \exp^{(-2.5)}) = 0.92 \text{ or } 92\%$$

So, the chance of pulmonary TB case in the coastal area of Makassar city on subjects whose house density was <10 m²/person and had a history of contact with pulmonary TB patients was 92%.

Discussion

Occupancy density is a risk factor for pulmonary TB case. Dense housing allows the proliferation of microbes that is quite high and increases the risk of high pulmonary TB transmission, especially if there are people with pulmonary TB in the house. This condition can increase the risk if the house environment has less ventilation and unqualified lighting⁵. This is also supported by previous research conducted by Wulandari et al (2015)⁶, showing that one of the factors that have proven to be influential as risk factors for pulmonary TB disease is the occupancy density factor ($p = 0.002$).

The research results also show that household contact with previous pulmonary TB patients has a high risk of transmission of pulmonary TB. This indicates that household contact is a significant threat to other family members because the exposure occurs in the environment around the house. So, the risk for contracting is very high. The similar case occurs in research by Fitriani (2013)⁷, which shows the correlation between contact history and pulmonary TB.

The rate of TB transmission in the environment of patients' family is quite high, in which a patient can transmit it to 2-3 people in his/her home, while the risk of transmission for households with more than one patient with pulmonary TB is 4 times greater than households with only one patient with pulmonary TB. Other research by Mahpudin and Mahkota (2007)⁸ shows that the source of household contact is significantly associated with the case of AFB (+) pulmonary TB. Those who live in a house with contacts are at risk of suffering from tuberculosis 3.46 times greater than those who have no

household contact. Likewise, research by Kirenga *et al* (2015)⁹ in Uganda find that contact with TB patients has 11.5 times risk (95% CI: 8.4-15.2) to suffer pulmonary TB. Delay in health check/pulmonary TB screening can result in late treatment which can worsen pulmonary TB disease suffered by other family members. TB program implementation in each region is constrained by several factors, one of which is the discovery of new cases that are still lacking and the limited human resources of the TB program will be a challenge in reducing the case of pulmonary TB¹⁰.

The research results also find that poor family status and smoking habits are not risk factors for pulmonary TB events. However, the poor family variable has the potential to be a risk factor because the proportion of poor families who suffer from TB is greater than those without pulmonary TB. This is due to the early examination and relatively cheap pulmonary TB treatment since underprivileged members of the community are supported by the government through the Indonesian National Health Insurance (BPJS kesehatan). Research in Uganda show different results, income below the poverty threshold (1.25 USD/day) generates a high risk of tuberculosis transmission with an OR = 39.5 (95% CI: 34.4-44.7)⁹. Likewise, research by Mahpudin and Mahkota,⁸ states that in the health aspect, those with poor economic capacity find it difficult to meet the nutritional needs, healthy shelter, and health care so that the risk of pulmonary TB disease is very high.

In addition, the smoking variable in this research has no correlation with the case of pulmonary TB. Research by Wen *et al*¹¹ shows different results, which mention that smoking is a risk factor for the case of pulmonary TB with an OR value of 1.17 (95% CI: 1.1-1.3).

However, the results of our research are relatively similar to research in India conducted by Bhat *et al*¹², which also indicates that smoking is not a risk factor for TB with an OR value of 1.03 (95% CI: 0.72-1.48). Similarly, research in Wonogiri Regency, Central Java, shows that smoking is not a risk factor for the case of pulmonary TB with an OR value of 1.4 (95% CI: 0.5-3.7)¹³.

In principle, smoking behavior is not the cause of pulmonary TB. The pulmonary TB agent, namely *Micobacterium tuberculosis*, is transmitted through air/

droplet. Smoking is a factor that exacerbates pulmonary TB¹⁴.

Conclusions And Suggestion

Conclusions

From the research results, it can be concluded that:

1. Occupancy density (<10 m²/person) and contact history with pulmonary TB patients are risk factors for pulmonary TB.

2. Poor family status and smoking behavior are not risk factors for pulmonary TB.

3. The probability of pulmonary TB case in the coastal area of Makassar city on subject with a house density of <10 m²/person and a history of contact with pulmonary TB patients is 92%.

Suggestions

1. Special attention needs to be paid to coastal communities, especially those who live in densely populated settlements with high occupancy density. They need to learn clean and healthy living behaviors and ways to reduce the risk of pulmonary TB transmission.

2. Families who have family members suffering pulmonary TB should use masks and separate tableware with the patients to minimize transmission. They also need to check their health frequently at the health center if symptoms of pulmonary TB appear so that treatment can be performed quickly.

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