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Factors Associated with the Incidence of Pulmonary TB at the Martoba Public Health Center Pematang Siantar City in 2019

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ABSTRACT

Pulmonary tuberculosis is one of the infectious diseases that is a world health problem because approximately 1/3 of the world's population is infected with Mycobacterium tuberculosis. TB attacks the lungs, but it can also attack other organs of the body. The source of transmission is pulmonary TB patients with smear (+) which can infect other people. Through the DOTS (Directly Observed Treatment Short-Course) strategy implemented by the Provincial Health Office on the TB Program at the Martoba Health Center, Pematangsiantar City, it was reported that, for 3 consecutive years (2014 - 2016). In 2014 there were 533 cases, in 2015 there was an increase of 535 cases and in 2016 it increased again to 574 cases. Researchers conducted a direct survey to see the conditions and conducted brief interviews with 2 (two) people with TB. The results of interviews and surveys found that there were several factors related to the incidence of TB based on nutritional status, smoking habits and household contacts at the Martoba Public Health Center, Pematangsiantar City in 2021. There was a significant relationship between nutritional status and the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.05, p = 0.000 was obtained. There is a significant relationship between smoking habits and the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.005, p = 0.000 was obtained. There is a significant relationship between a history of household contact with the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.05, p = 0.021 means that there is a significant relationship between a history of household contact with the incidence of pulmonary TB disease.

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1. Introduction

Tuberculosis (TB) is a direct infectious disease caused by the bacterium Mycobacterium tuberculosis. TB attacks the lungs, but it can also attack other organs of the body. The source of transmission is pulmonary TB patients with smear (+) which can infect people around them, especially those who have long-standing contact. Every one patient with BTA (+) will infect 10-15 people per year (Kemenkes RI, 2014)

Tuberculosis (TB) is still one of the public health problems in the world although control efforts with the DOTS (Directly Observed Treatment Short-Course) strategy have been implemented in many countries since 1995. TB control efforts are carried out through the National Integrated Movement for Tuberculosis Management (Gerdunas-TB) which is a cross-sectoral forum under the coordination of the

Coordinating Minister for People's Welfare and the Indonesian Minister of Health as the technical person in charge. The implementation of the National TB program is carried out by the Directorate of Infectious Disease Control directly. For the provincial level, it is carried out by the head of the Provincial Health Office. In the 2013 WHO (World Health Organization) report, it was estimated that there were 8.6 million TB cases in 2012 of which 1,

WHO data in 2014, Indonesia is a country with the 3rd most pulmonary TB patients in the world after India and China with approximately 10% of the total number of TB patients in the world. It is estimated that in 2004, every year there were 539,000 new cases and 101,000 deaths from TB disease (Depkes RI, 2008).

The TB prevalence rate in Indonesia in 2004 showed that the national TB prevalence was 110/100,000 population. Regionally, the results vary between regions. The prevalence of TB in Sumatra is 160/100,000 population. Eastern Indonesia region 210/100,000 population.

Especially for the province of DIY the prevalence rate of TB is 68/100,000 population (Ministry of Health, 2008). According to research conducted in Pati, Central Java, the factors that are closely related to the incidence of pulmonary TB are poor nutritional status, the risk of pulmonary TB disease is 3.7 times greater than those who have good nutritional status, smoking habits will be at risk of developing TB. Pulmonary TB 2.559 times than non-smokers and a history of contact transmission of family members suffering from pulmonary TB will be able to transmit 79.781 times greater than families who do not suffer from pulmonary TB, residential density that does not meet health requirements will be 5,983 times greater risk of TB than those who meet health requirements and ventilation of less than 10% of the floor area, the risk of pulmonary TB is 16.9 times greater than ventilation more than ventilation of more than 10% (Rusnoto et al, 2006).

Based on data from the North Sumatra Provincial Health Office report, pulmonary TB cases were found with an increase in the number of cases for 3 (three) years. Data in 2014 was around 22,022 people, in 2015 around 23,013 people and in 2016 around 23,144 people (Profile of the Health Office of North Sumatra Province, 2016).

North Sumatra Province has 33 (thirty three) regencies and cities, one of which is Pematangsiantar City. Based on a report from the Pematangsiantar City Health Office with TB cases, it was reported that, for three years there was an increase starting from 2014 - 2016. In 2014 there were 533 TB cases, in 2015 there were an increase of 535 cases and in 2016 it increased again to 574 cases. This TB case occurred in all Puskesmas working areas under the Pematangsiantar City Health Office with the highest number of TB disease at the Martoba Health Center.

Puskesmas Martoba is one of the puskesmas that provides outpatient health services and also has an infectious disease control program, namely TB. The control program is in the form of a DOTS (Directly Observed Treatment Short-Course) Strategy. The data reported that, for 3 years (2014 – 2016) TB cases have increased every year. TB cases were found in 2014 with 39 cases, in 2015 there were 54 TB cases and in 2016 58 TB cases.

The researcher is one of the holders of the TB program for cases of increasing the number of TB patients which increases every year. Researchers conducted a direct survey to see the conditions and conducted brief interviews with 2 (two) people with TB. The results of interviews and surveys found that there were several factors related to the incidence of TB, namely based on age, gender, education, occupation, nutritional status, smoking habits, history of household contacts.

2. Method

2.1 Research design

The design of this research is Case Control, Analytical Observational research type, which aims to determine the factors associated with the occurrence of the disease (Budiman, 2006). The location of this research will be carried out at the Martoba Public Health Center, Pematangsiantar City. The study was conducted in May-August 2019. The population in this study were all patients with pulmonary TB who were recorded at the Martoba Public Health Center, Pematangsiantar City for the period January 2019 - June 2019 as many as 40 people and respondents who did not suffer from pulmonary TB who lived close to their residence. pulmonary TB patients as many as 40 people.

$$n_1 = n_2 = \frac{\left(Z\alpha\sqrt{2PQ} + Z\beta\sqrt{P_1Q_1 + P_2Q_2}\right)^2}{(P_1 - P_2)^2}$$

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= Proportion of exposure suffering from TB cases = 64.2% P_1
P_2 = Proportion of exposure in controls who are not suffering from TB
Required Odds Ratio = 3.789
Significant level of 0.05 = 1.96$Z\alpha$
Strength (*Power*) test of 95% = 0.84$Z\beta$
So we get:
So we get:

$$P_2 = \frac{P_1}{OR\ (1-P_1)+P_1}$$
$$= \frac{0{,}642}{3{,}789(1-0{,}462)+0{,}642}$$
$$= 0{,}321$$
$$Q_1 = 1 - P_1$$
$$= 1 - 0{,}642$$
$$= 0{,}358$$
$$Q_2 = 1 - P_2$$
$$= 1 - 0{,}321$$
$$= 0{,}679$$
$$P = \frac{1}{2}\ (P_1 + P_2)$$
$$= \frac{1}{2}(0{,}642 + 0{,}321)$$
$$= 0{,}48$$
$$Q = \frac{1}{2}\ (Q_1 + Q_2)$$
$$= \frac{1}{2}(0{,}358 + 0{,}6789)$$
$$= 0{,}52$$

$$n_1 = n_2 = \frac{\left(Z\alpha\sqrt{2PQ} + Z\beta\sqrt{P_1Q_1 + P_2Q_2}\right)^2}{(P_1 - P_2)^2}$$
$$= \frac{\left(1{,}96\sqrt{2\ x\ 0{,}48\ x\ 0{,}52} + 0{,}842\sqrt{0{,}642\ x\ 0{,}358 + 0{,}321\ x\ 0{,}679}\right)^2}{(0{,}642 - 0{,}321)^2}$$
$$= 39{,}76$$
$$= 40$$

So the sample size in this study were 40 TB patients and 40 respondents who did not suffer from TB.

2.2 Data Type

The type of data in this study is the type of categorical data which is the result of data from classification and classification. Categorical data or variables generally contain nominal and ordinal scale variables. In this study, sampling was done by purposive sampling. Purposive sampling is based on certain considerations made by the researchers themselves, based on the characteristics and characteristics of the population, namely TB patients and non-TB patients with the following criteria:

a. Inclusion Criteria

1) Patients with pulmonary TB
2) Not a patient with pulmonary TB
3) Registered in the Medical Record of the Martoba Health Center
4) Lives in the Working Area of the Martoba Health Center
5) Physically and mentally healthy
6) Can read and write
7) Willing to be a respondent

b. Exclusion Criteria

1) Not recorded in the Medical Record of the Martoba Health Center
2) Lives in the Working Area of the Martoba Health Center
3) Being sick
4) Can't read and write

2.3 Data collection

Primary data is data obtained directly from respondents, namely TB patients and non-TB patients. Secondary data is data obtained from health agencies such as Pematangsiantar City Health Office and Martoba Pematangsiantar Health Center. The first step, the researcher submitted an application letter from Efarina University to the research site, namely the Martoba Pematangsiantar Health Center. After obtaining approval, the researcher distributed a willingness and consent sheet to respondents to fill out a questionnaire that had written questions about age, gender, education, occupation, smoking habits and history of household contacts with TB patients from each of the variables studied. After the questionnaire was completed by the respondent, the researcher observed and recorded the completeness of the respondent's data. final step,

2.4 Research Instruments

The research instrument or measuring instrument that will be used for data collection is in the form of a questionnaire (a list of questions). In this study, the researcher designed his own questionnaire

2.5 Data analysis

Univariate analysis was conducted to obtain an overview of each independent variable and dependent variable. The data will be presented in the form of a frequency distribution. Bivariate analysis was conducted to determine the relationship between the independent and dependent variables. The analysis was carried out using the Chi-Square test with a 95% confidence level (= 0.05).α

The decisions taken from the results of Chi Square are:

a. If the p value > (0.05), Ho is accepted, it means that the sample data is not related or does not support a significant difference (not significant).
b. If the p value < (0.05), Ha is rejected, meaning that the sample data is related or supports a significant (significant) difference (Hastono, 2007).

3. Results and Discussion

Martoba Health Center is an Outpatient Health Center, located on Jln. TB Simatupang No. 117 North Siantar District Pematangsiantar City.

The Martoba Health Center has the following administrative boundaries:

a. To the north, it is bordered by Bane Village
b. To the south, it is bordered by Naga Pita Village
c. In the west, it is bordered by Suka Dame Village
d. In the east, it is bordered by Kahean Village

The population covered by the Martoba Public Health Center in Pematangsiantar City is 21,114 people.

Table 1
Distribution of Area, LK, RW, RT, Number of Households and
Number of Population by Village in the Working Area of Martoba Health Center
Pematangsiantar City in 2019

No	Ward	Area(Km^2)	LK	RW	RT	House Ladder	Amount Population
1.	Sigulang	0.580	2	8	25	1,310	6.331
2.	Martoba	0.320	3	10	33	2,045	9,300
3.	Like Dame	0.510	2	9	28	1,239	5.483
	Amount	1,410	7	27	86	4,594	21.114

Source: BPS, Pematangsiantar Urban Village Monograph

Based on the table above, it can be seen that the area is located in the Sigulang - gulang village area, which is 0.580 Km^2, while the smallest sub-district is in Martoba Village with an area of 0.320 Km^2.

3.1 Data analysis

a. **Univariate Analysis**

Based onThe results of research conducted by researchers are tabulated in the frequency distribution table of age, gender, education, occupation, independent variables and dependent variables as follows:

1) Sociodemography

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Table 2

Distribution of Sociodemographic Frequency with Incidence of Pulmonary TB Disease Based on Age, Gender, Education, Occupation at the Health Center Martoba Pematangsiantar City in 2019.

No	Sociodemography	f	Percentage (%)
1	**Age**		
	15 – 50 Years	60	75
	> 50 Years	20	25
	Total	**80**	**100**
2	**Gender**		
	Man	60	75
	Woman	20	25
	Total	**80**	**100**
3	**Level of education**		
	No school	0	0
	Elementary School	6	7.5
	High school graduate	17	21.25
	finished high school	51	63.75
	Graduated PT	6	7.5
	Total	**80**	**100**
4	**Work**		
	PNS/ABRI/Retirees	4	5
	Traders/Private Employees	34	42.50
	Laborer/Becak Driver/Driver	24	30
	Doesn't work	18	22.50
	Total	**80**	**100**

Based on the table above, it can be seen that the characteristics of respondents based on sociodemography at the Martoba Health Center in 2019. The distribution of respondents according to the majority age group is in the age group of 15 – 50 years (productive age) which is 60 people (75%), according to gender, the majority is male, namely 60 people (75%), according to the level of education the majority were in high school education, namely 51 people (63.75%), while according to occupation the majority were in jobs as traders/private employees, namely 34 people (42.50%).

2) Nutritional status

Table 3

Frequency Distribution of Nutritional Status with Incidence of Pulmonary TB Disease in Martoba Health Center Pematangsiantar City 2019

No	Nutritional status	Case	
		F	%
1	Skinny : < 18.5	21	26.2
2	Normal : 18.5-25.0	57	71.3
3	Fat : >25	2	2.5
	Total	**80**	**100**

Based on the table above, it can be seen that the distribution of respondents based on nutritional status at the Martoba Pematangsiantar Health Center in 2019, was 21 people (26.2%) in the category of underweight nutritional status, 57 people (71.3%) in the category of normal nutritional status and (2.5%). %) category of obese nutritional status.

3) Smoking habit

Table 4

Frequency Distribution of Smoking Habits With TB Disease Incidence Lungs at the Martoba Public Health Center, Pematangsiantar City in 2019.

No	Smoking Habits	Case	
		F	%
1	There is a smoking habit	48	60
2	No smoking habit	32	40
	Total	**80**	**100**

Based on the table above, it can be seen the distribution of respondents, based on smoking habits

at the Martoba Pematangsiantar Health Center in 2019, 48 people (60%) had a smoking habit and 32 people (40%) did not smoke.

4) Household Contact History

Table 5
Frequency Distribution of Household Contact History With Disease Incidence Pulmonary TB at the Martoba Public Health Center, Pematangsiantar City in 20219

No	Household Contact History	Case	
		F	%
1	There is a family member at home who suffers from pulmonary TB	5	6.3
2	There is no family member in the household who suffers from pulmonary TB	75	93.8
Total		**80**	**100**

Based on the table above, it can be seen the distribution of respondents based on Household Contact History at the Martoba Pematangsiantar Health Center in 2019, namely 5 people (6.3%) there are family members at home who suffer from pulmonary TB, 75 people (93.8%) have no family members at home who suffering from pulmonary tuberculosis.

5) The incidence of pulmonary TB disease.

Table 6
Distribution of Frequency with Incidence of Pulmonary TB at Puskesmas Martoba Pematangsiantar City in 2019

No	TB disease incidence	Case	
		F	%
1	Suffer	40	50
2	No Suffering	40	50
Total		**80**	**100**

Based on the table above, it can be seen the distribution of respondents based on the incidence of pulmonary TB disease at the Martoba Public Health Center, Pematangsiantar City in
In 2019, 40 people (50%) had pulmonary TB, and 40 people (50%) did not suffer from pulmonary TB.

3.2 Bivariate Analysis

a. Relationship between Nutritional Status and Incidence of Pulmonary TB.

Table 7
Relationship between Nutritional Status and Incidence of Pulmonary Tuberculosis in Puskesmas Martoba Pematangsiantar City in 2019.

No	Nutritional status	Incidence of Pulmonary TB				*P Value*
		Case		Control		
		F	%	F	%	
1	Skinny : <18.5	19	23.7	2	2.5	0.000
2	Normal : 18.5-25.0	21	26.3	36	45	
3	Fat	0	0	2	2.5	
Total		**40**	**50**	**40**	**50**	

Based on the table above, it can be seen that the respondents with underweight nutritional status and suffering from pulmonary TB disease were 19 people (23.7%), who did not suffer from pulmonary TB disease were 2 people (2.5%). Respondents with normal nutritional status and suffering from pulmonary TB disease were 21 people (26.3%), who did not suffer from pulmonary TB disease were 36 people (45%) and respondents with obese nutritional status and had no pulmonary TB disease were 19 people (23.7%), who did not suffer from pulmonary TB disease as many as 2 people (2.5%)

Based on the Chi-Square test at a significant level of 0.05, p = 0.000 means that there is a significant relationship between nutritional status and the incidence of pulmonary TB disease.

b. The Relationship of Smoking Habits With The Incidence Of Pulmonary Tuberculosis.

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Table 8
The Relationship of Smoking Habits With The Incidence Of Pulmonary Tuberculosis Disease Martoba Health Center Pematangsiantar City 2019

No	Smoking habit	Incidence of Pulmonary TB				P Value	OR
		Case		Control			
		F	%	F	%		
1	There is a smoking habit	33	68.8	15	31.2		
2	No smoking habit	7	21.0	25	78.1	0.000	7,857
	Total	**40**	**50**	**40**	**50**		

Based on the table above, it can be seen that 33 respondents (68.8%). Respondents who do not have a smoking habit and suffer from pulmonary TB disease are 7 people (21.9%), who do not suffer from pulmonary TB disease are 25 people (78.1%).

Based on the Chi-Square test at a significant level of 0.05, p = 0.000 means that there is a significant relationship between smoking habits and the incidence of pulmonary TB disease, and the OR = 7.857, meaning that people who have smoking habits are at risk of suffering from pulmonary TB 7 times greater. pulmonary TB disease than non-smokers.

c. Relationship History Household Contact With TB Disease Incidence**Lungs.**

Table 9
Relationship History Household Contact With Incidence of Pulmonary TB Disease at the Martoba Public Health Center, Pematangsiantar City in 2019

No	Household Contact History	Incidence of Pulmonary TB				P Value	OR
		Case		Control			
		F	%	F	%		
1	There is a family member at home who suffers from pulmonary TB	5	100	0	0.00		
2	There is no family member in the household who suffers from pulmonary TB	35	46.7	40	53.3	0.021	2,143
	Total	**40**	**50**	**40**	**50**		

Based on the table above, it can be seen that there are 5 respondents with a history of contact with family members who suffer from pulmonary TB and who suffer from pulmonary TB disease (100%), who do not suffer from pulmonary TB as many as 0 people. Respondents who have no history of contact with family members who suffer from pulmonary TB and suffer from pulmonary TB disease are 35 people (46.7%), who do not suffer from pulmonary TB disease are 40 people (53.3%).

\Based on the Chi-Square test at a significant level of 0.05, p = 0.021 means that there is a significant relationship between a history of household contact with the incidence of pulmonary TB disease. and the OR value = 2.143, meaning that people whose family members have a history of pulmonary TB are at risk of developing pulmonary TB disease.

3.3 Discussion

a. Nutritional status

The results showed that 19 people (23.7%), who did not suffer from pulmonary TB disease were 19 people (2.5%). Respondents with normal nutritional status and suffering from pulmonary TB disease were 21 people (26.3%), who did not suffer from pulmonary TB disease were 36 people (45%) and respondents with obese nutritional status and had no pulmonary TB disease were 19 people (23.7%), who did not suffer from pulmonary TB disease as many as 2 people (2.5%)\

Based on the Chi-Square test at a significant level of 0.05, p = 0.000 means that there is a significant relationship between nutritional status and the incidence of pulmonary TB disease. This is in line with research conducted by Supariasa (2002) that people who are under normal weight have a risk of developing pulmonary TB infection. And Astuti (2003), that pulmonary TB is more common in people with poor nutritional status and weak physical conditions (Taslim NA, 2005).

According to Almatsier (2002) nutritional status is a picture of the balance between the body's need for nutrients for maintenance of life, growth, maintenance of normal body functions and for energy production and intake of other nutrients (Anindya, 2008). Nutrients needed for a healthy life are:

carbohydrates, proteins, fats, vitamins, and minerals. In the body, these nutrients function as a source of energy or energy (especially carbohydrates and fats), a source of building blocks (proteins), especially to keep growing and developing and to replace damaged cells, a source of regulatory substances (vitamins and minerals). . As a result of malnutrition, the stored nutrients in the body are used to meet needs. If this situation lasts a long time, then the nutrient stores will be depleted and eventually there will be tissue deterioration.

The state of malnutrition (lack of calories, protein, iron, etc.) will affect the body's resistance so that it will reduce resistance to various diseases including tuberculosis. This factor is very important to people in poor countries, both adults and children (Crofton, 2002).

From the cross tabulation between nutritional status and occupation, it turns out that respondents with poor nutritional status work as laborers, pedicab drivers and drivers where I assume that those who work as laborers, pedicab drivers, drivers are in a weak socio-economic condition so that it affects their nutritional fulfillment.

b. Smoking habit

Based on the table above, it can be seen that 33 respondents (68.8%). Respondents who do not have a smoking habit and suffer from pulmonary TB disease are 7 people (21.9%), who do not suffer from pulmonary TB disease are 25 people (78.1%).

Based on the Chi-Square test at a significant level of 0.05, p = 0.000 means that there is no significant relationship between smoking habits and the incidence of pulmonary TB disease, and the OR value = 7.857, meaning that people who have a smoking habit are at risk of suffering from pulmonary TB 7 times greater incidence of pulmonary TB disease than non-smokers.

c. Household Contact History

The results showed that 5 respondents (100%) with a history of contact with household members who suffered from pulmonary TB and had pulmonary TB disease (100%), who did not suffer from pulmonary TB disease, as many as 0 people. Respondents who have no history of contact with family members who suffer from pulmonary TB and suffer from pulmonary TB disease are 35 people (46.7%), who do not suffer from pulmonary TB disease are 40 people (53.3%).

Based on the Chi-Square test at a significant level of 0.05, p = 0.021 means that there is a significant relationship between a history of household contact with the incidence of pulmonary TB disease. and the OR value = 2.143, meaning that people whose family members have a history of pulmonary TB are at risk for pulmonary TB disease.

A history of contact with patients in the same family with other family members who are suffering from pulmonary TB is very important because the Mycobacterium tuberculosis as the cause of pulmonary TB is very small in size, is aerobic and can survive in dry air or in cold conditions. and very easily transmitted through inhalation excretion either through breath, coughing, sneezing or talking (droplet infection). So that there are family members who suffer from active pulmonary TB, then all other family members will be vulnerable to the incidence of pulmonary TB, including close family members. In addition, all contacts of smear-positive pulmonary TB patients with the same symptoms should be examined for sputum (Depkes RI, 2008).

The power of transmission of a patient is determined by the number of germs that are removed from his lungs. The higher the positive degree of sputum examination results, the more infectious the patient is (Hiswani, 2004).

4. Conclusion

There is a significant relationship between nutritional status and the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.05, it was obtained p = 0.000. There is a significant relationship between smoking habits and the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.05, it was obtained p = 0.000. There is a significant relationship between a history of household contact with the incidence of pulmonary TB disease. Based on the Chi-Square test at a significant level of 0.05, p = 0.021 means that there is a significant relationship between household contact history and the incidence of pulmonary TB disease.

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