The Influence of Nutritional Status and Ventilation on the Incidence of Pulmonary Tuberculosis at Langsa

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Abstract

BACKGROUND: Pulmonary Tuberculosis is still a global health threat and the cause of the average of 1.3 million deaths each year.

AIM: The objective of the research was to analyse the influence of ventilation and nutritional status on the incidence of pulmonary tuberculosis at Langsa, in 2018.

METHODS: The population was all pulmonary tuberculosis adult patients at Langsa, in 2018, with AFB+ of 315 people, and the samples were 116 patients in the case group and 116 patients in the control group. The data were analysed by using logistic regression with simple logistic regression test and multiple logistic regression tests.

RESULTS: The result of multiple logistic regression tests showed that there was the influence of nutritional status (p ≤ 0.001; OR = 2.645 (95% CI 1.494-4.683) and ventilation (p ≤ 0.044; OR = 1.816 (95% CI 1.015-3.250) on the incidence of pulmonary tuberculosis.

CONCLUSION: To break off the chain of pulmonary tuberculosis contagion, it is necessary to increase people's awareness of the importance of healthy life behaviour and healthful home by providing health counselling about the requirement for good nutritional status and ventilation.

Introduction

Southeast Asia has the highest incidence rate of Pulmonary Tuberculosis. It is estimated that there are about 44% of pulmonary tuberculosis incidence globally and about 4,440,000 new cases or 226 incidences per 100,000 people. 6% of them are found in Indonesia and 4% of them in the Philippines. Of the 30 countries throughout the world, Myanmar and Thailand had had the highest incidence rate of pulmonary tuberculosis until 2017 with 191,000 cases and 108,000 cases, respectively. The mortality rate of HIV- pulmonary tuberculosis is estimated about 638,000, and HIV+ pulmonary tuberculosis is 28,000. The mortality rate in this area ranks the second after Africa [1].

According to WHO, there had been 842,000 people who were infected by pulmonary tuberculosis in Indonesia until 2017, which ranked the second after India. New cases of HIV+ pulmonary tuberculosis is estimated about 36,000 people, and there are 107,000 people die because of tuberculosis, and about 10,000 people are infected by pulmonary tuberculosis with HIV+ die. According to Kemenkes RI [2], in its Health Profile, the highest rate of the incidence of pulmonary tuberculosis is found in Wes Java (78,698 cases), followed by Central Java (42,272 cases) and East Java (48,323 cases). Among them, there are 101,802 males (60.45%) and 66,610

females (39.55%).

The prevalence of pulmonary tuberculosis in Aceh is considered high since it ranks the 13th of the 34 provinces in Indonesia with 6,013 (0.71%) cases. This number has increased to 5,934 cases since 2016. This disease mostly affects 45-54-year-old people (640 cases or 10.78%), consisted of 422 males and 218 females [2].

Langsa is the town in Aceh Province which has a high rate of pulmonary tuberculosis which is increasing each year. According to the Health Agency of Langsa, new cases of pulmonary tuberculosis at Langsa have increased in the last five years. There were 155 cases in 2014, 177 cases in 2015, 178 cases in 2016, and 183 cases in 2018. This infectious disease had a significant increase in 2018, with 315 cases [3].

The increasing rate of pulmonary tuberculosis each year indicates that Eliminating and Eradicating Pulmonary Tuberculosis Program in public health can be achieved by maintaining the stability and the continuity of the Tuberculosis Control program. The sustainable implementation of this program needs multi-stakeholder involvement. Since 1990, this program has had its contribution of 25% to case finding, and 85% to the success in the treatment for pulmonary tuberculosis patients. The approach should be based on the basic health system (Puskesmas or Public Health Center) so that success can be continued in the long term [4].

The important role in the foremost segment of health care in supporting target fulfilment is seen from the rate of finding new cases of AFB+. The new finding of AFB+ in Aceh Province in 2017 was as follows: there were 1,857 cases (65.04%) of the 4,262 cases of pulmonary tuberculosis in males, and there were 998 cases (34.96%) of the 2,376 cases of pulmonary tuberculosis in females. This number indicates that there was the decrease in 2016 when the finding of a new case of AFB+ in males was 2.207 cases (64.14%) of the 3,683 cases of pulmonary tuberculosis, and AFB+ in females was 1,234 cases (35.86%) of the 2.150 cases of pulmonary tuberculosis.

There were 2,613 AFB+ patients (51.13%) who were treated and recovered, and 2,498 patients (48.7%) were under complete treatment. It was found that not all new AFB+ patients could be recovered, and this condition could be the source of contagion among the people that would eventually increase new cases of pulmonary tuberculosis each year [5], [2].

According to Permenkes RI No. 1077 on the Guideline for restoration to good air in rooms, healthful homes, viewed from physical factor, is influenced by some aspects such as minimal lighting is 60 lux, floors are waterproof and not moist, room temperature is 18°C-30°C, room moisture is 40%-60%, ventilation is the minimum of 10% of the floor area [6]. Resident's density calculated based on the need for space for each person is 9 m^2, with the average height of the ceiling of 2.80 m [7].

Government Regulation No. 66/2014 states that environmental health is an effort to prevent sickness or health disorder from environmental risk factors to realise healthful environmental quality in the physical, chemical, biological, and social aspects. Health environment includes all physical, social, and biological factors of human beings and all other factors which can influence their behaviour. Condition and control from environmental health can potentially influence health [8].

The increase in the incidence of pulmonary tuberculosis at Langsa can be influenced by unhealthful home environment. A preliminary study conducted in five puskesmas and two hospitals at Langsa showed that in 2018 there were 315 AFB+ patients. All patients who were under complete treatment were recovered, while those who were under incomplete treatment had to take more medicines in the long term. It was found that not all patients who were under regular treatment, without intervals, within six months, on and off, had the risk for undergoing long term medication with the possibility of medicinal resistance.

It seems that pulmonary tuberculosis does not tend to decrease at Langsa. On the other hand, it has been increasing each year. There were 183 cases in 2017 and increased sharply to 315 cases in 2018. In the preliminary survey on visiting people's homes, it was found that, on the average, the houses of pulmonary tuberculosis patients were physically dingy and unhealthful.

The objective of the study was to analyse the influence of nutritional status and ventilation on the incidence of pulmonary tuberculosis at Langsa.

Material and Methods

Types of the Study

The study used the observational analytic method with a case-control design.

Source of Data

The population was all pulmonary tuberculosis AFB+ patients at each health facility of the public health facilities at Langsa. The samples were 116 patients in the control group and 116 patients in the case group (the ratio of 1:1) so that the total samples were 232 respondents, taken by using purposive sampling technique. It was used to determine the research samples according to the

criteria which had previously been determined.

Gathering of Data

The research variables consisted of natural lighting in rooms, floors, temperature, moisture, size of ventilation, resident's density, smoking habit, and nutritional status. The data were gathered by distributing questionnaires and conducting the direct observation. Statistical analysis was done by using multiple logistic regression tests.

Results

Description of Nutritional Status and Ventilation

Of the 116 cases of nutritional status variables, 55.2% of them (64/116) were BMI < 18.5, while of the 116 controls, 68.1% of them (79/116) were BMI ≥ 18.5.
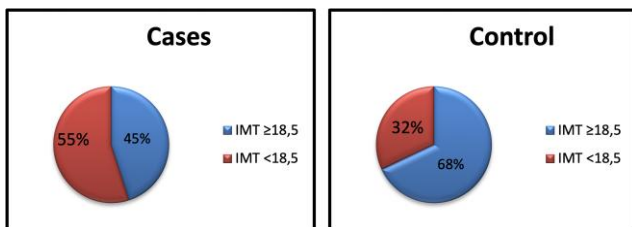

Figure 1: The percentage of nutritional status was indicated

Of the 116 cases of ventilation variables, 71.6% of them (83/116) were ineligible, while of 116 controls, 44.8% of them (52/116) were eligible (Figure 1 and Figure 2).
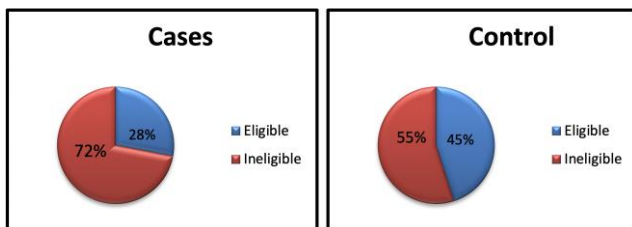

Figure 2: The percentage of ventilation was indicated

Correlation of Nutritional Status and Ventilation with the Incidence of Pulmonary Tuberculosis

The result of simple logistic regression test showed that there was the correlation of nutritional status $p ≤ 0.001$; OR = 2.628 (95%CI 1.539-4.487) and ventilation ($p = 0.010$; OR = 2.044 (95%CI 1.185-3.523) (with the incidence of pulmonary tuberculosis, as it was indicated in Table 1.

Table 1: Correlation of Nutritional Status and Ventilation with the Incidence of Pulmonary Tuberculosis

Variables	Pulmonary Tuberculosis		Non-Pulmonary Tuberculosis	
	n	%	n	%
Nutritional Status				
Good	52	44.8	79	68.1
Bad	64	55.2	37	31.9
P ≤ 0.001; OR = 2.628 (95% CI 1.539-4.487)				
Ventilation				
Eligible	33	28.4	52	44.8
Ineligible	83	71.6	64	55.2
P = 0.010; OR = 2.044 (95% CI 1.185-3.523)				

The Influence of Nutritional Status and Ventilation on the Incidence of Pulmonary Tuberculosis

The result of the study showed that the two variables (nutritional status and ventilation) had the influence on the incidence of pulmonary tuberculosis. The variable which had the most dominant influence on the incidence of pulmonary tuberculosis at Langsa was nutritional status at the value of OR = 2.645 (95%CI 1.494-4.683) which indicated that respondents who had BMI less than 18.5 had a risk of 2,645 times for pulmonary Tuberculosis exposure compared to respondents whose BMI was greater or equal to 18.5 (Table 2).

Table 2: The Influence of Nutritional Status and Ventilation on the Incidence of Pulmonary Tuberculosis

Variables	B	Sig.	OR	95% CI
Nutritional Status	0.973	0.001	2.645	1.494-4.683
Ventilation	0.597	0.044	1.816	1.015-3.250
Constanta	-.503	-	-	-

Discussion

The result of the research showed that most of the nutritional status of the majority had poor nutritional status. The statistical test results obtained that there was a significant effect between nutritional status on the incidence of pulmonary tuberculosis, and nutritional status was the most dominant variable affecting the incidence of pulmonary tuberculosis. The results of this study are in line with Oktavia's study [9]. That respondents with poor nutritional status increased the risk of 16.7 times exposed to pulmonary tuberculosis compared to respondents with normal/excessive nutritional status. This study was also in line with Ernawati [10]. That malnutrition was significantly associated with pulmonary tuberculosis with a value of $p ≤ 0.001$.

Nutritional status has a very close relationship with the risk of suffering from pulmonary TB. Individuals with poor nutritional status will be easier to switch status from Latent pulmonary tuberculosis to active pulmonary tuberculosis than individuals with good nutrition. Low nutritional status related to food intake that is not by the body's needs due to lack of knowledge (ignorance and low awareness) of the urgency to fulfil the needs of this aspect in society.

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Poor nutrition in the poor also makes it easy to suffer from various diseases.

Tuberculosis and macroeconomics have a two-way relationship according to Aulia [11]. Tuberculosis has an impact on macroeconomic development and vice versa. Macroeconomic aspects have an impact on the increasing incidence and prevalence of pulmonary tuberculosis. The increase from the aspect of inflation has resulted in high prices that must be paid by the population to fulfil their daily needs. Inflation causes a large portion of the population to be unable to meet nutritious food needs, which affects the nutritional status of the community.

The poverty rate of the population of Langsa City in 2018 is high at 10.79 percent [12]. This is also influenced by the low capacity of the Langsa City government in carrying out development due to low Regional Original Income (PAD). Population density is also part of the macroeconomy which has led to an increase in cases. The uncontrolled population makes the availability of various aspects and facilities limited so that the limitation for healthy living occurs and the vulnerability to illness increases including pulmonary tuberculosis.

In conclusion, nutritional status and ventilation have the influence on the incidence of pulmonary tuberculosis. Nutritional status has the most dominant influence on the incidence of pulmonary tuberculosis. In order to break off the chain of pulmonary tuberculosis contagion, it is necessary to increase people's awareness of the importance of healthful houses and healthy life behavior by providing health counseling about the requirements for good ventilation and nutritional status.

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