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RISK FACTORS OF HOUSING CONDITIONS ON THE TRANSMISSION OF BTA POSITIVE PULMONARY TB DISEASE IN THE PUBLIC HEALTH CENTER KEMARAYA KENDARI

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ABSTRACT

Background: TB is an infectious disease caused by mycobacterium tuberculosis. The research aims to analyze the risk factors for the incidence of pulmonary TB at the Kemaraya Kendari Community Health Center.. **Methods:** This study used an observational analytic with a case control design. The sample used was 80 respondents with a total sampling technique. Data was collected through interviews and observations, lighting was measured using a luxmeter. Data were analyzed univariately, bivariately using chi-square, and mutivariately using multiple logistic regression. **Results:** The data will be analyzed using the chi-square test with the results showing that there is a significant relationship between length of contact (p-value = 0.004), lighting (p-value = 0.0005) and bedroom (p-value = 0.0005). While the variable that has no significant relationship is gender (p-value = 0.896). **Conclusion:** Insidence of TB was related to length of contact, lighting, and bedroom.

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INTRODUCTION

Pulmonary tuberculosis is a contagious infectious disease caused by the bacteria Mycobacterium Tuberculosis. The source of transmission is through positive BTA tuberculosis sufferers through droplets of phlegm expelled through the mouth. If this disease is not treated immediately or if the treatment is incomplete, it can cause dangerous complications or even death. (Kemenkes 2015). Globally in 2017 the highest number of Tuberculosis (TB) cases occurred in the Southeast Asia and West Pacific regions with 62% of new cases, followed by the African region with 25% of new cases. TB cases occurred in 30 countries amounting to 87%, eight countries accounted for two-thirds of new TB cases, namely India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa. Indonesia, along with 13 other countries, is included in the HBC (high burden countries) list for 3 indicators, namely TBC, TBC/HIV, and MDR-TB. (WHO, 2017).

The World Health Organization (WHO) estimates that in 2018 around 10 million people fell ill from TB with the disease burden varying between several countries, ranging from 5-500 new cases per 100,000 population per year with a global average of 132 new cases per 100,000 population. It is estimated that deaths due to pulmonary TB are 1.2 million among HIV negative people, and the number of deaths among HIV positive people is 251,000 deaths. Pulmonary tuberculosis attacks all genders with the highest burden in men aged ≥ 15 years with a proportion of 57% of all pulmonary TB cases in 2018. In comparison, the proportion for women is 32% and children aged < 15 years is 11%. Among all TB cases, 8.6% are people living with HIV (WHO, 2019).

The World Health Organization (WHO) estimates that in 2018 WHO's strategy to reduce the incidence of TB in the world is Sustainable Development Goals (SDGs) and the end TB strategy. The SDGs target is to end the TB epidemic in the world by 2030, while the end TB strategy target includes a 90% reduction in TB deaths and 80% TB incidence between 2015-2030, with the achievement of 2020 being a 35% reduction in TB deaths and an incidence reduction of 35%. 20%. The incidence of pulmonary tuberculosis (TB) in Indonesia according to WHO data in 2018 was 316 per 100,000 population with the incidence of pulmonary TB in HIV positive 2.5 per 100,000 population. Furthermore, the incidence of death due to pulmonary TB in HIV negative people is 35 per 100,000 and in HIV positive people it is 2.0 per 100,000 population (WHO, 2019).

Indonesia is ranked 2nd with the highest number of TB sufferers in the world after India. Globally, it is estimated that 10 million people suffered from TB in 2019. Although there has been a decline in new TB cases, it is not fast enough to achieve the target of the END TB Strategy in 2020, namely reducing TB cases by 20% between 2015-2020. In 2015-2019 the cumulative decline in TB cases was only 9%. Likewise with deaths due to TB, the number of deaths in 2019 was 1.4 million. Globally, deaths due to TB per year. decreased globally, but did not reach the 2020 END TB Strategy target of 35% between 2015-2020. The cumulative number of deaths between 2015-2019 was 14%, which is less than half of the specified target (Indonesian Health Profile, 2020).

In 2020 the number of Tuberculosis cases found in Indonesia was 351,936 cases, a decrease compared to all Tuberculosis cases found in 2019, namely 568,987 cases. The highest number of cases was reported from provinces with large populations, namely West Java, East Java and Central Java. Tuberculosis cases in these three provinces account for almost half of all Tuberculosis cases in Indonesia (46%) (Indonesian Health Profile, 2020). When compared by gender, the number of male cases is higher than female cases nationally and in each province. Even in Aceh, North Sumatra and North Sulawesi, cases in men are almost twice as high as in women. The most TB cases were found in the 45-54 year age group, namely 17.3%, followed by the 25-34 year age group at 16.8% and 15-24 year olds at 16.7%. The case notification rate (CNR) in 2020 in Indonesia was 151 cases per 100,000 population with a case detection rate (CDR) of 41.7% and a success rate (SR) of 82.7% (Indonesian Health Profile, 2020).

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41,7% dan succes rate (SR) 82,7% (Profil Kesehatan Indonesia, 2020).

When compared to 2019, Tuberculosis cases in Southeast Sulawesi Province showed a very high number, namely 31,367 cases, of which 2,784 cases (61.17%) were men, and 1,767 (38.83%) were women. The case notification rate (CNR) in 2019 was 168 per 100,000 population with a case detection rate (CDR) of 14.51% and a success rate (SR) of 11.63% (Southeast Sulawesi Provincial Health Service Profile, 2020).

The number of suspected cases of Tuberculosis (suspects) found in the Kendari City area in 2020 was 3,311 cases, of which 249 cases (62.41%) were men and 150 cases (37.59%) were women. So the total number of proportions based on gender of BTA + TB patients is 399, while TB cases in children are 6 people. In 2021, BTA+ TB cases decreased by 2,661 cases, of which 341 cases (60.20%) were men, and 215 cases (39.80%) were women (Kendari City Health Service Profile, 2021).

According to the ST2TB report, there were 440 suspected cases of pulmonary TB in 2020, of which 224 cases (50.9%) were men and 216 cases (49.1%) were women. The number of cases of BTA+ TB disease was 44 cases, of which 24 were men and 20 women. Meanwhile, in 2021 cases of suspected pulmonary TB disease decreased by 267 cases, of which there were 166 cases for men and 101 cases for women. There were 34 cases of BTA+ TB (Kemaraya Community Health Center Profile, 2021).

Tuberculosis is one of the main causes of death where most infections occur in people between the ages of 15 and 54 years which is the most productive age, this causes an increase in the social and financial burden for the patient's family. Tuberculosis is also an infectious disease that causes the second biggest health problem in the world after HIV, this disease is caused by the bacteria Mycobacterium Tuberculosis. Tuberculosis itself can attack any part of the body, but the most frequent and most common is tuberculosis infection in the lungs (Kendari City Health Service Profile, 2020).

Transmission of Tuberculosis germs is influenced by the knowledge, behavior and actions of sufferers, families and communities who do not understand how to prevent the transmission of Tuberculosis disease, such as covering the mouth when coughing and sneezing, spitting in certain places that have been given disinfectant, BCG immunization for babies, avoiding cold air, and make sure sunlight enters the bedroom or into the house. Tuberculosis can be very fatal and cause death, therefore the family's attitude really determines the success of treatment. Preventing the transmission of Tuberculosis is very necessary because if the family's attitude is positive it will influence positive behavior (Izuddin, 2017).

The prevalence and risk of TB transmission has not changed much, due to case management, such as case discovery, treatment and registration not running as originally expected, as a result of various obstacles both in terms of services, health workers and the community. Community participation is primarily expected to support the efforts made by the government, through the participation of individuals, families and the general public to take responsibility for the health of themselves, their families or the community in their environment.

Based on the problems mentioned above, it is necessary to conduct research to determine the risk factors for housing conditions for the transmission of positive smear pulmonary TB disease in household contacts in the Kemaraya Health Center Working Area, Kendari City.

METHODS

The research design used was observational research with a case-control study design. In this study, a comparison was made between the case group (BTA positive pulmonary TB) and the control group (not suffering from pulmonary TB) regarding the presence or absence of risk factors at the previous time. The research was conducted in the Kemaraya Health Center Working Area, Kendari City for 1 month, namely in June - July 2022. Cases: are all smear positive pulmonary TB sufferers in the Kemaraya Health Center Working Area, Kendari City who are recorded in the TB sufferer register book for the period January 2020 - December 2021. Control: are household members who do not suffer from pulmonary TB. Data was collected through interviews and observations, lighting was measured using a luxmeter. Data were analyzed univariately, bivariately using chi-square, and mutivariately using multiple logistic regression.

RESULTS

Table 1. Distribution of Pulmonary TB Patients in Household Contacts Based on Duration of Contact

Variables	Frequency (n)	Percentage (%)
The incidence of TB		
- Yes	40	50
- No	40	50
Length of Contact		
- Tightly	6	15
- Not Tight	34	85
Lighting		
- Not eligible	28	70
- Eligible	12	30
Bedroom		
- Not eligible	49	55
- Eligible	26	45

Based on Table 1, the results of univariate analysis showed that the incidence of TB are 50% with not eligible lighting as many as 70% and not eligible bedroom are 55%, and length of contact are 15%.

Table 2. Risk Factors Associated with Tuberculosis Incidence

Variables	Kejadian TB Paru				Total	Odds Ratio	Cl 95 %	P value
	Case		Control					
	n	%		%				
Length of Contact	6	37.5	10	62.5	16	1.529	0.172-1.631	0.004
- Tightly	34	53.1	30	46.9	64			
- Not Tight								
Lighting	28	82.4	6	17.6	34	13.22	4.400-39.732	0.0005
- Not eligible	12	26.1	34	73.9	46			
- Eligible								
Bedroom	22	34	35	66	53	8.556	2.777-26.358	0.0005
- Not eligible	40	50	40	50	80			
- Eligible								

Table 3 Risk Factors of Duration of Contact, Lighting, Rooming on the Incidence of Pulmonary TB in Household Contacts in the Work Area of the Kemaraya Health Center, Kendari City in 2022

Variables	B	P value	Exp (B)	95 % CI for Exp B	
				Lower	Upper
Length of Contact	0.268	0.734	0.765	0.163	3.592
Lighting	3.100	0.000	8.045	0.011	15.187
Bedroom	2.648	0.000	1.071	0.017	5.298

DISCUSSION

The length of contact a person with pulmonary TB sufferers has with those around them is one of the determining factors in the process of transmitting tuberculosis bacteria to family members around them. It is assumed that the longer the contact with the sufferer, the greater the chance of being infected with pulmonary TB disease. These results are supported by similar results by several previous researchers, including Reichler et al (2012), who found high rates of TB case transmission in residents of low economic class housing areas, where most of the housing facilities did not meet the requirements, which was exacerbated by the high density of residents.

The results of this study showed that 16 respondents with a long period of close contact experienced 6 (37.5%) cases of pulmonary TB. Meanwhile, of the 64 respondents who experienced pulmonary TB with less close contact, 34 (53.1%).

The results of the hypothesis test used were the Chi Square test with a P value of 0.004, meaning that statistically there is a significant relationship between length of contact and the incidence of pulmonary TB in household contacts.

The results of statistical analysis obtained an Odds Ratio (OR) = 1.529 with a 95% CI of 0.172 – 1.631, so it can be said that respondents with a long period of close contact were 1.529 times more likely to experience pulmonary TB in household contacts compared to respondents with a less close contact period. Because the OR value is greater than 1, length of contact is a risk factor for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City.

Apart from that, the transmission capacity of TB is very dependent on several environmental factors, including; (i) the area of the room where frequent contact occurs; (ii) inadequate ventilation, which hinders the dilution of droplet nuclei in the air;

(iii) Improper air circulation; (iv) sanitation of food and drink places that do not meet the requirements (WHO, 2005).

Close family relationships are thought to influence TB transmission through the quality and frequency of contact between sufferers and other household members. Close family relationships provide greater quality and frequency of contact compared to family relationships that are not close.

These results are also in accordance with research by Myers, et al (2009) regarding an ecological study of TB disease transmission in California, where in their research it was found that there was an influence of close family relationships on the occurrence of TB case transmission. This researcher gave the reason that TB transmission is more influenced by inadequate housing sanitation factors; especially those related to humidity and air circulation in the house.

Based on the results of measurements of lighting in the house, it was found that the case group had lower lighting, namely 39.2 ± 9.96 lux compared to the control group, namely 49.3 ± 9.78 lux. The results of statistical tests also show that these differences are significant. The mechanism of transmission of pulmonary TB disease with lighting conditions that do not meet the requirements is because the intensity of light entering the house is less than 50 lux or with lamp light of less than 25 watts, the TB germs in the house do not die, so TB germs can be inhaled by people. other people living in the same house can cause disease transmission. Besides that, insufficient lighting is also related to high humidity and low room temperature. Although the results of measurements of room temperature in this study showed no significant difference, namely 32.9 ± 2.89 °C in the case group's house and 31.4 ± 2.65 °C in the control group.

The results of the study showed that 34 respondents whose lighting did not meet the requirements experienced pulmonary TB incidents as many as 28 (82.4%). Meanwhile, of the 46 respondents whose lighting met the requirements, 12 (26.1%) experienced pulmonary TB.

The results of the hypothesis test used were the Chi Square test with a P value of 0.000, meaning that statistically there is a significant relationship between lighting and the incidence of pulmonary TB in household contacts. The results of statistical analysis obtained an Odds Ratio (OR) = 13.222 with a 95% CI of 4.400 – 39.732, so it can be said that respondents whose lighting did not meet the requirements were 13.222 times more likely to experience pulmonary TB in household contacts compared to respondents whose lighting met the requirements. Because the OR value is greater than 1, lighting is a risk factor for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City.

This is confirmed by research conducted by Kusnindar et al (2009) who said that the number

of sufferers in the house depends on the intensity of light as well as the area of windows and ventilation. Other research results that found the role of lighting and room temperature in the transmission of respiratory infections, including TB, are Collins et al (1986 and 2010), Somervile, M. et al (2000). The results of their research showed that the rate of transmission of respiratory tract diseases was found to be higher in houses that had low lighting and room temperatures. It was further explained that the increasing rate of transmission in this situation was caused by the large number of germs or viruses that liked the environment to survive, including tuberculosis bacilli.

In terms of lighting, it can be seen that the case groups are separated. 70% had houses that did not meet the requirements, and only 15% were found in the control group. This shows that lighting greatly influences the occurrence of TB transmission in the home. The role of lighting in the transmission of TB cannot be separated from its relationship with sunlight and room humidity. Insufficient lighting can prolong the life span of droplet nuclei, thus increasing the possibility of transmission among household members (Mendell, 2012). In this study, it was found that houses with lighting that did not meet the requirements increased the chances of TB transmission by 13,222 times compared to houses that had lighting that met the requirements.

In terms of roomization, it also shows that there is a significant relationship with the incidence of pulmonary TB ($p<0.05$). The number of chamberizations in cases that did not meet the requirements was greater than the number of chamberizations in controls. The results of the study showed that 27 respondents with chamberization did not meet the requirements and 22 (81.5%) experienced pulmonary TB. Meanwhile, of the 53 respondents who met the requirements, 18 (34.0%) experienced pulmonary TB.

The results of the hypothesis test used were the Chi Square test with a P value of 0.000, meaning that statistically there is a significant relationship between bedroomization and the incidence of pulmonary TB in household contacts. The results of statistical analysis obtained an Odds Ratio (OR) = 8.556 with a 95% CI of 2.777 – 26.358, so it can be said that respondents with chamberization that did not meet the requirements were 8.556 times more likely to experience pulmonary TB in household contacts compared to respondents with roomization that met the requirements. Because the OR value is greater than 1, chamberization is a risk factor for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City.

The occurrence of TB transmission, viewed from a bedroom perspective, is related to the distribution of air flow containing TB germs in the house. This is proven by the results of research by Hetherington et al (2009) and Mac Neil et al (2005), where in their research they found high rates of transmission among prisoners in prisons whose rooms only had iron bars. In this study, it was found that chambering that does not meet the requirements increases the chance of TB transmission by 8.556 times compared to chambering that meets the requirements.

In this study there are several research limitations, including: the use of case-management research methods where the source and time of transmission to sufferers is unknown, whether it comes from household contacts or contacts outside the home; taking control samples from neighbors of cases makes matching difficult, for example for this type of research it was found that there were more women in the case group than in the control group; absence of data on house renovation history; host mechanisms such as nutritional status and/or immunity.

CONCLUSION

Based on the results of research and discussion of risk factors for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City, the duration of close contact has a risk of 1.529 times compared to the duration of less close contact for the incidence of Pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City. ;Lighting that does not meet the requirements has a risk of 13.222 times compared to lighting that meets the requirements for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City; Rooming that does not meet the requirements has a risk of 8.556 times compared to roomization that meets the requirements for the incidence of pulmonary TB in household contacts. in the Kemaraya Health Center Working Area, Kendari City; The lighting variable that is most at risk for the incidence of pulmonary TB in household contacts in the Kemaraya Health Center Working Area, Kendari City.

For the Kemaraya Health Center, Kendari City, targeted actions should be taken to improve the pulmonary TB control program, especially with regard to cross-programs and cross-sectors, for example by improving health education in a coordinated manner with related agencies through both electronic and print media.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest. The author declare that no conflict of interests in this work.

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