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The Relationship between Scar BCG and the Incidence OF Tuberculosis (TB) in TB Patients at the Basuki Rahmad Health Center, Bengkulu City, Indonesia

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Abstract

Background: Mycobacterium tuberculosis is the bacterium that causes tuberculosis. WHO said the world TB rate had increased since 2014-2017. TB is a world health problem today. Bengkulu Province experienced an increase in the number of TB cases from 2015-2017. **Objectives**: This study aims to determine the relationship between Scar BCG and the incidence of tuberculosis in TB patients. **Methods**: This study uses a case control method. The population is all patients visiting the Basuki Rahmad Health Center in 2016-2017. Sample random sampling technique. Calculation of sample size of 2 proportions with previous P1 researchers using the Lemeshow formula obtained sample results 126 1: 1. **Results**: Of the 126 TB patients who did not have Scar as many as 54 (42.9%) and there were 72 (57.1%) Scar BCG, 69 (54.8%) male sex and 57 female sex (45.2%) people, patients who have a lack of nutritional status as many as 38 (30.2%) people and good nutritional status as many as 88 (69.8%) people, TB patients who have low education as much as 50 (39.7%) people and those who have higher education are 76 (60.3%) people, 58 patients (46.0%) who contact home and 68 (54.0%) non-contact patients, patients <15-50 year as many as 111 (88.1%) people and patients aged> 50 years 15 (11.9%) people. There is a significant relationship between Scar BCG, nutritional status, gender with the incidence of pulmonary tuberculosis in 2016-2017 with p = 0,000 p = 0,000 and p = 0,000. And there is no significant relationship between age, education, household contact with TB incidence in 2016-2017. Counfounding Scar BCG for TB incidence is nutritional status, gender, age and household contact. **Conclusion**: There is a relationship between Scar BCG, nutritional status, gender with the incidence of pulmonary tuberculosis and counfounding Scar BCG with TB incidence there are 4 variables in the Basuki Rahmad Community Health Center, Bengkulu City. Recommendation: Prevention of TB can be carried out by BCG immunization, taking medication regularly.

Keywords: BCG, scar, tuberculosis, Indonesia

Introduction

Tuberculosis (TB) is an infectious disease caused by the bacterium Mycobacterium Tuberculosis. This bacterium is a very strong bacterium that requires a relatively long time for treatment. These bacteria more often infect the lung organs compared to other parts of the human body (Anggraini, 2011). Transmission through the air is contaminated with the bacteria Mycobacterium Tuberculosis released by TB patients when coughing and entering into lung tissue through the airways (droplet infection) to the alveoli so that infection occurs with an incubation period of 4-6 weeks, 1 patient has the potential to transmit 10 to 15 people in 1 year (Setiyarini, 2014).

TB is included in the top ten diseases that cause death to date and is a world health problem that has become a global concern. The incidence of TB every year has increased both the number of new cases and the mortality rate. According to the World Health Organization (WHO) report, the prevalence of TB cases in 2014 was 9.6 million cases, in 2015 there were 10.4 million cases and in 2016 as many as 10.4 million cases, while in 2017 it was 11.1 million case. WHO noted that there were 5 countries contributing the largest number of TB disease in the world, namely India (27%), China (9%), Indonesia (8%), Philippines (6%), and Pakistan (5%), Indonesia was in third place TB in the world (WHO, 2018). In Indonesia TB disease is the third leading cause of death after diabetes mellitus (DM) and cardiovascular disease from the 10 highest killer diseases in Indonesia (WHO, 2018). According to the Ministry of Health (2015) the number of cases of TB

disease in Indonesia is 330,910 cases, and in 2016 there has been an increase of 351,893 cases and in 2017 it has increased again by 360,770 cases. This is caused by the many factors that support the occurrence of TB, namely failure to obtain immunity obtained from BCG immunization (Bacillus Calmette Guerin), contact history, gender, education, malnutrition (malnutrition), age, social status economy, weak immune system conditions, home environment conditions, and behavior.

Indonesia consists of 34 provinces that have BCG immunization coverage in 2107 of 89.1% and there are 3 provinces with a high incidence of tuberculosis, namely West Java Province 78,698 cases, East Java Province 48,323 cases and Central Java Province 42,272 cases. Of the three provinces contributed TB incidence of 44% of the total number of new cases in Indonesia (Ministry of Health, 2016). Among the Provinces in Indonesia there is Bengkulu Province which is located on the island of Sumatra which has a population in 2017 of 1,934,269 with the number of BCG immunization coverage in 2016 as many as 33,784 and in 2017 amounting to 34,040 with the number of babies in 2016 which is 36,500 and in 2017 amounting to 36,416 (Bengkulu Provincial Health Office, 2016-2017). Bengkulu Province when viewed from the number of infants immunized by BCG, the Province of Bengkulu has achieved a very good target in giving immunity to infants to prevent TB disease by 90% but Bengkulu Province has always experienced an increase in the number of TB cases each year. This is allegedly because the BCG immunization factor is not yet in

accordance with the indicators of the success of BCG injections and giving wages is still below the UMR (Regional Minimum Wage) so that many causes of risk factors for TB disease and other diseases. In 2015 there were 1,379 cases with smear (+) TB among 171 toddlers and easy age, in 2016 there were 1,634 cases, toddlers or easy-to-reach children totaling 120 people, AFB (+) as many as 910 cases, whereas in 2017 there was an increase of 1,971 cases, infants, children and easy age as many as 247 people and the number of smear (+) cases was 1,058 (Bengkulu Provincial Health Office, 2015-2017).

Bengkulu Province has 10 Regencies / Cities, with 134 Subdistricts, which have 3 major TB incidence rates, namely Bengkulu City 225 cases. 179 cases of Rejang Lebong Regency and North Bengkulu Regency 154 cases. According to the highest number found in the city of Bengkulu, which has 20 health centers with the highest TB rates in Basuki Rahmad Health Center (Bengkulu Provincial Health Office, 2016-2017).

Basuki Rahmad Health Center is located in the middle of a city that is densely populated and often experiences rotation of Puskesmas program holders so that program holders must always adapt to their new work, this can lead to errors in their actions for BCG immunization. Basuki Rahmad Community Health Center has a number of TB cases in 2016 totaling 38 cases in adults and 4 children with AFB (+), whereas in the year from 2015-2017, Bengkulu Province experienced an increase in the number of TB cases. This study aims to determine the relationship between Scar BCG and the incidence of tuberculosis in TB patients.

Method

This research was conducted at the Basuki Rahmad Community Health Center, Selebar City Bengkulu District in 2016-2017, in March-June 2019. This study used a study design of a control case (Retrospetif) which in this study TB incidence had occurred at the time of the study and assessed the relationship between Scar BCG and the incidence of tuberculosis, then compared between groups who are sick (cases) in this case are patients suffering from tuberculosis with a group that is not ill TB (control), in patients who visit, patients do treatment that has the same symptoms as disease TB (Suspect TB) at Basuki Rahmad Health Center. The population is all patients visiting the Basuki Rahmad Health Center.

The sampling technique must meet the inclusion criteria. Case taking is done randomly or simple random sampling where each TB patient has the same opportunity to be elected directly from the entire population. The way to do this is to give a number to each case recorded on the TB TB 01 book in Basuki Rahmad Health Center for 2016-2017 then begin with numbers 1,2,3 onwards, then the number is randomly selected until the number of samples needed is obtained. Taking control samples in patients suspected of tuberculosis who have symptoms of tuberculosis with smear (-) ie patients who do not get TB disease who are registered in the register of general poly patients, KIA poly registers, TB register 04, tuberculosis 06 in 2016-2017. Next, make a list

in the sampling frame and number 123 until the next, then random sampling is done until you get the desired number of controls according to the calculation results.

Secondary data Data collection was carried out in this study using secondary data obtained from TB 01 patient register, TBC 04 (laboratory register) and TBC 06 (suspected list of sputum examined), general poly and KIA patient registers (Maternal Health)) who visited the Basuki Rahmad Health Center in 2016-2017.

Primary Data Data collection was carried out by researchers by collecting data directly to TB patients (as a case) who visited to do treatment at Basuki Rahmad Health Center according to the schedule for taking OAT drugs. Direct data collection on patients who were not tuberculosis (as controls) who visited that day (who had a scheduled return visit that day) distributed questionnaires with several questions, namely having contacted TB patients, gender, education, nutritional status, and age. by using questionnaires.

In this study before data analysis, numerical data was converted into categorical data based on the reference value or reference concentration found in the operational definition. Then the data is analyzed by statistical programs on computers (SPSS) with the following stages: Univariate Analysis with

Frequency Descriptions (Bivariate Analysis (Chi-square Test) Multivariate Analysis (Logistic Regression).

Results

Analysis of the relationship of Scar BCG to the incidence of tuberculosis statistically showed a significant relationship. Respondents who did not have Scar were more at 15.00 times more likely to be exposed to TB than respondents who had Scar.

The covariate variables examined in this study consisted of 5 variables, namely household contact, gender, education, nutritional status, and age. From the results of the analysis it was found that only 2 variables had a significant relationship namely nutritional status and gender. Nutritional status has a large risk of 25.00 times greater exposure to tuberculosis in respondents who are malnourished compared to respondents who have good nutrition. While sex has a risk of 5.47 times the incidence of tuberculosis in male sex compared to female sex. The other three covariate variables, namely household contact, education, and age, there was no statistically significant relationship with the significance level of 95% C1 which passed the value of 1 (Table. 1).

Table 1. Bivariate Analysis of the Relationship between Scar BCG and Covariate Variables with TB Events in TB Patients in Bengkulu City Basuki Rahmad Health Center

	Case	%	Control	%	n (126)	%	value P	OR	CI 95%
Scar **BCG**									
- There is no Scar	45	71,4	9	14,3	54	42,9	**0,000**	**15,00**	6,144-36,622
- There is Scar	18	28,6	54	85,7	72	57,1	-	-	-

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	TB incidence						value P	OR	CI 95%
	Case	%	Control	%	n (126)	%			
Contact Home									
- Contact	24	38,1	34	54,0	58	46,0	0,108	0,52	0,258-1,068
- No Contact	39	61,9	29	46,0	68	54,0	-	-	-
Gender									
- Man	47	74,6	22	34,9	69	54,8	**0,000**	**5,474**	2,539-11,802
- Woman	16	25,4	41	65,1	57	45,2	-	-	-
Education									
- Low	28	44,4	22	34,9	50	39,7	0,363	1,49	0,727-3,056
- High	35	55,6	41	65,1	76	60,3	-	-	-
Nutritional status									
- Less	35	55,6	3	4,8	38	30,2	**0,000**	**25,00**	7,080-88,271
- Good	28	44,4	60	95,2	88	69,8	-	-	-
Age									
- <15-50 year	53	84,1	58	92,1	111	88,1	0,271	0,45	0,147-1,423
- > 50 year	10	15,9	5	7,9	15	11,9	-	-	-

Table 2. The final results of the interaction test showed no Scar BCG interaction with nutritional status and age.

Variabel	B	P value	OR	95% CI
Scar BCG	3,501	0,000	33,14	7,69-142,78
Contact	-1,18	0,022	0,21	0,06-0,80
Sex	1,728	0,004	5,62	1,73-18,28
Educational level	0,244	0,684	1,27	0,39-4,12
Nutritional status	3,219	0,000	25,00	5,44-114,91
Age	1,388	0,209	4,00	0,45-35,01

In the final modeling results, counfounding variables were obtained, namely household contact, gender, nutritional status and age. Based on the results of multivariate analysis using logistic regression, the OR value of Scar BCG was at most 33.67, meaning that respondents who did not have Scar BCG were 33.67 times more at risk of developing TB compared to respondents who had Scar BCG after controlled nutritional status counfounding variables. sex, age and household contact. (Table 3).

Table 3. Final Modeling of Multivariate Scar BCG Logistic Regression Analysis and Covariate Variables with Tubercolosis in the City of Bengkulu Wide District 2016-2017.

Variabel	B	P value	OR	95% CI
Scar BCG	3,517	0,000	33,67	7,82-144,90
Contact	-1,514	0,022	0,22	0,06-0,80
Sex	1,721	0,004	5,58	1,72-18,09
Nutritional status	3,227	0,000	25,20	5,49-115,61
Age	1,349	0,211	3,85	0,46-31,98
Constant	-3,614	0,003	0,027	

Discussion

Relationship between Scar BCG and TB incidence

The results obtained from 63 group respondents who did not have Scar BCG were 71.4% of respondents and respondents who had 28.6% Scar BCG. While in the control group the majority of respondents had Scar BCG as much as 85.7% and only 14.3% of respondents did not have Scar. The results of the analysis showed that respondents who did not have Scar BCG had a 15 times greater risk of developing TB compared to respondents who had Scar BCG. This is because BCG immunization can provide immunity to the body to protect humans against Mycobacterium Tubercolosis bacteria.

BCG immunization is the provision of vaccination containing attenuated Bacillus Calmette-Guerin bacteria which is given to infants aged 0-3 months to prevent the occurrence of TB disease. The normal reaction that will be caused is small swelling, red at the injection site for 2 weeks, which will then become a small abscess with a diameter of 10 mm, this wound will heal itself and leave scar tissue called Scar with a stripe of 3-7 mm (MOH, 2017). The results of this study are in line with the results of Fajriah (2014) research which shows that each respondent who did not get BCG immunization and did not have Scar would be 4.96 times more likely to develop TB disease than respondents who received BCG immunization and had Scar.

Relationship between home contact with TB incidence

The results of the study in the case group showed 61.9% of respondents did not make household contact with TB patients and 38.1% of respondents had had household contact. Whereas in the control group there were 46.0% of respondents not in house contact and 54.0% of respondents in household contact. In the relationship analysis showed that respondents who had household contact with TB patients only had 0.52 times the risk of getting TB compared to respondents who did not contact. This is because from the results of interviews and observations of the researchers it was found that respondents could know how to prevent TB transmission from sufferers. The results of this study are in line with the results of Herman's research (2014) which shows that each respondent who made contact only had a risk of 2.19 times for TB disease with p value 0.26 statistically there was no significant relationship.

Relationship between Gender and TB Incidence

In the results of gender research with TB incidence in the case group, it was found that male sex suffered from TB more than 74.6% of respondents, in women only 25.4% of respondents while in the male sex control group only 34.9 % of respondents and female sex doubled the number of men, which is as much as 65.1%. From the results of the analysis it was found that male sex was more at risk of developing TB 5.47 times greater than female sex. The gender in this study is defined as the apparent differences between men and women

in terms of values and behavior. The results of this study are in line with the theory obtained from several research results. In 1996 the number of male TB sufferers was almost double compared to the number of women with TB who were 42.34% in men and 28.9% in women.

Educational Relationship with TB Events

The results of the study in the case group showed that the respondents who had higher education were more than 55.6% of the respondents with a basic education of 44.4%. Whereas in the control group respondents who were highly educated 65.1% and had basic education as much as 34.9%, and analysis showed that respondents who had higher education had a risk of getting TB by 1.49 times compared to respondents with low education. The results of this study show inversely proportional to the results of previous research studies that stated 2-fold low education is more at risk of developing TB than those with higher education. In this study the theory of knowledge is in line with the level of Know, the level of comprehension and Application, where at this level respondents only apply what they know from what they get from the education bench of each department (Notoajmodjo, 2012)

Relationship between Nutritional Status and TB Incidence

From the results of the research in the case group it was found that respondents who had less nutrition were as much as 55.6% and respondents with good nutritional status 44.4% while in the control group respondents with malnutrition were only 4.8% and respondents with good nutrition were almost reaching 100% which is equal to 95.2%. The results of the

analysis showed that respondents with nutrition were more or less at risk of 25 times being exposed to tuberculosis compared to respondents who had good nutritional status. The results of this study are in line with the results of the Firdaus Fatwa study (2015) showing that people with nutritional status have a 3.7 times higher risk of suffering from tuberculosis compared to people with good nutritional status. This is because of the state of malnutrition or lack of calories, protein, vitamins, iron and will affect a person's immune system so that it is susceptible to TB disease.

Age Relationship with TB Events

The results of the analysis of the study in the case group found that respondents with age <15-50 years were more that 84.1% of respondents aged> 50 years who were only 15.9% while in the control group respondents who were <15-50 years old were more again that is 92.1% and respondents aged> -50 years are 7.9%. The results of the analysis found that respondents with age <15-50 years had a risk of 0.457 times exposed to tuberculosis compared to> 50 years,

The highest incidence of pulmonary tuberculosis is usually about the age of young adults because of this age they are still very active in activities and interacting with other people so that they have a large risk of exposure to the bacterium Mycobacterium tuberculosis. The results of Nurjana Agus Made's research. (2015) stated that 18-59 years of age and infant age, toddlers are also included in the risk factors for TB disease because they are still vulnerable at this age. The results of previous studies and existing theories are not in line with the results

of this study because this study has a low level of risk, it is estimated that the age group <5-50 years is not exposed to TB patients and already has knowledge of TB disease, but this study is in line with research conducted by Muaz (2014) which states that there is no significant relationship between age and incidence of tuberculosis with a risk level of only 1.80 for respondents who have <15-50 years of age compared to age> 50 years.

Relationship between Scar BCG and Variable Counfounding Home Contact, Gender, Nutritional Status and Age with TB Incidence.

In the multivariate analysis using logistic regression risk factor model, it was found that there was no interaction between Scar BCG and counfounding variables, namely nutritional status and education variables, but there were several variables which became counfounding variables, namely household contact, gender, nutritional status, and age. The relationship analysis found that Scar BCG before being controlled by counfounding variables of household contact, gender, nutritional status and age only had a risk of 15 times the risk in the community in the Basuki Rahmad Health Center area for the incidence of tuberculosis. After controlling these 4 variables Scar BCG had a greater risk of TB incidence in residents who did not have Scar BCG which was 33.67 times more risky than respondents who had Scar BCG.

Conclusion

Scar BCG variable, gender, nutritional status, there was a significant relationship There was no relationship between age,

household contact, education and incidence of tuberculosis. The counfounding variable The relationship between Scar BCG and TB incidence is; gender, nutritional status, age, household contact. It is hoped that the spirit in undergoing treatment properly and correctly, never feel ashamed of tuberculosis, and always pay attention to the conscious behavior of TB to prevent transmission to others, always apply clean, healthy lifestyle for themselves and their families. It is hoped that the local community will pay more attention to BCG immunization status and bring their children to health services to be properly immunized by BCG. in order to get protection in the form of immunity obtained from the Baccillus Guarin (BCG) vaccine against tuberculosis. It is expected that TBC program holders will be able to fill in the identity of respondents in TB 01 in full so that they can track TB patients with youth and can provide more complete services to patients. It is expected to be able to improve health programs such as environmental health programs that have been listed in the Permenkes Number 13 of 2015 concerning the implementation of environmental health services in Puskesmas to reduce morbidity rates. Then increase TB program, and improve immunization programs. To reduce TB pain.

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