

The Status of BCG Immunization in Pre-Schoolers in Relation with Pulmonary Tuberculosis Incidence in North Surabaya

Dini Mei Widayanti, Sapto Dwi Anggoro and Ita Hernawati
STIKES Hang Tuah Surabaya, East Java, Indonesia

Keywords : Immunization, Tuberculosis, Pre-schoolers.

Abstract: Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. Immunization is an attempt to provide immunity to pre-schoolers by introducing vaccines into the body. The purpose of this study was to analyze the relationship of BCG immunization status and the incidence of TB in pre-schoolers. The research design used analytical observation with Cross-Sectional approach. Simple random sampling was taken as data collection technique, with population of 80 pre-schoolers and 67 were appointed as the respondents. The instruments were interviews and observations. The data were analyzed by Chi-squared test with significance level of $p < 0.05$. The results of the study indicated that 43 immunized pre-schoolers, 28 of whom were not infected by lung TB, 9 were infected and 6 were suspects. The other group of 24 non-immunized pre-schoolers indicated that 14 were not infected, 1 was infected and 9 were suspects. Chi-square statistical test results showed that BCG immunization status had a relationship with the incidence of TB in pre-schoolers with $p = 0.033$ ($p < 0.05$). The research has come to a conclusion that BCG immunization is very important for pre-schoolers to maintain their immunity. It is expected for parents to be aware of getting their children immunized.

1 BACKGROUND

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium Tuberculosis*. According to Hidayat (2009), immunization is an effort to provide immunity to pre-schoolers and children by entering the vaccine into the body to make antibodies to prevent certain diseases. Based on the high incidence of TB incidence in our country and the unavoidable transmission process, the most effective prevention is through BCG vaccination (Ikatan Dokter Anak Indonesia, 2011). Although there has not been proven the efficacy of BCG immunization consistently, until now the immunization is still effective and safe. BCG is one way to control TB (Rahajoe, 2005 in Welldany Siregar 2008). A child who has been immunized with BCG and yet he is infected with TB bacteria, in general it does not develop into tuberculosis (Mufidah, 2012). But not all diseases can be prevented by vaccination, including BCG vaccination to prevent tuberculosis infection. Reduced protection by BCG is possible due to many factors such as ineffective and efficient BCG administration procedures (Islamiati, 2009 in Miswan efendi 2012). From interviews with a

number of parents it has been found that some pre-schoolers, who have been immunized in North Surabaya are infected with TB.

Pulmonary tuberculosis is one of the chronic infectious diseases that has become global issues targeted in the MDGs and are also listed in the MSS of health. In Indonesia, this disease is one of the national priorities for disease control program because it has a broad impact on life quality and economy, and it often leads to death. Nevertheless, the indicator of MSS of tuberculosis disease is only 'new case finding', whose indicator does not yet fully describe the treatment of tuberculosis (Laksono, 2012). Eight goals of the MDGs that must be implemented by each country that declares them; 1) tackling poverty and hunger, 2) achieving basic education for all, 3) promoting gender equality and empowering women, 4) reducing child mortality, 5) improving maternal health, 6) combating HIV / AIDS, malaria and other infectious diseases, 7) ensuring environmental sustainability, and 8) developing a global partnership for development. Indonesia as one of the participating countries in declaring the MDGs' goals has an obligation to implement efforts to achieve the MDGs targets and

to monitor progress towards achievement (Dr. Afrina Sari).

Tuberculosis (TB) is a serious problem for the world, because it causes the major deaths compared to other infectious diseases. It is estimated that about one-third of the world's population has been infected by Mycobacterium Tuberculosis. An estimated 95% of Pulmonary TB cases and 98% of deaths spread across the world, mostly those in developing countries (Depkes RI 2007). Globally, there are 8,800,000 new cases of TB in the world in 2010. (Hendry J, WHO, Global Tuberculosis Control 2011). In Indonesia every year there are 1.3 million children under 15 years old who are infected with TB germs and annually there are 450,000 child deaths due to this disease as recorded by Samallo in FKUI. A preliminary study conducted by researchers on February 4, 2015, drawn from the data of 5 pre-schoolers at Perak Timur Surabaya Community Health Center, resulted in 40% TB, 20% suspect and 40% non-TB.

Tuberculosis (TB) is accepted as a major issue. It needs a thorough handling as well as the attention of health care services, government and society as a whole (Wahyu, 2008). Based on the results of the theory of several factors related to the occurrence of lung tuberculosis in children include: immature immune system, close contact with adults with tuberculosis nearby (parents, close relatives, and caregivers), and lack of awareness of parents to immediately vaccinate BCG in newborns (Wahyu, 2008 in Miswan Efendi 2012). Pre-schoolers who suffer from pulmonary TB are mostly due to transmission from adult patients. Transmission of tuberculosis disease from air contaminated by Mycobacterium Tuberculosis released by the patients when cough in the form of droplets (Depkes RI, 2005). One effort to prevent the occurrence of pulmonary TB disease is by immunization. However, reduced protection by BCG is possible due to many factors such as ineffective and efficient BCG administration procedures (Islamiati, 2009 in Miswan Efendi 2012). This study aims at finding the correlation of the BCG immunization status and Pulmonary TB incidence in Preschoolers.

2 METHODS

This research used Analytical observation design with Cross-Sectional approach, by which the researcher intended to describe the relationship of BCG Immunization Status with Pulmonary TB incidence in Toddler in North Surabaya. The

population in this research is all 80 patients of pre-schoolers at Puskesmas Tambak Gringsing, Perak Timur of Surabaya. The sample of this research was a group of 67 respondents who met with the following criteria: inclusive kriteria is mothers possessing KMS (Health Status Card) and mothers with 0-5 year old children. Exclusive kriteria is mothers who were unwilling to participate in the research.

The sampling technique undertaken in this research was simple random sampling. The independent variable was the status BCG immunization. In addition, the dependent variable of this research was the incidence of pulmonary TB in children under five years old.

The instrument used in this research were observations and interviews. The Status of BCG Immunization were looked upon the respondents' Health Status Card or The so-called KMS. It was intended to identify the immunization status. Apart from that medical record document was used to determine the status of TB incidence in pre-schoolers with several criteria of: TB-sufferers (TBSF), TB-suspects (TBSS), and Non-TB-sufferers (NTBSF). In data collection, the researcher asked the for informed consents from the respondents prior to interviews and observations. However, this phase was initiated with a permit from the Head of East Perak region Puskesmas.

2.1 Data Analysis

Data analysis technique is done by statistical test with Chi-Square analysis with significance value 0,05 meaning $p < \alpha$ 0,05 hence hypothesis accepted which mean there is relation of BCG immunization status with the incidence of pulmonary tuberculosis in under five years old children in Tambak Gringsing, Perak Primary Care Unit of Surabaya. If $p > \alpha$ 0.05 means the hypothesis is rejected, which means that there is no relationship between BCG immunization status and the incidence of pulmonary tuberculosis in under five years old children in Tambak Gringsing, Perak Primary Care Unit of Surabaya.

2.2 Research Ethics

This research has undergone ethical procedure in terms of: btaining ethical clearance issued by LP3M Stikes Hang Tuah Surabaya number: SKET/01.a/III/2015/LP3M/SHT, providing Informed Consent sheet, assuring confidentiality and considering anonimity.

3 RESULTS

3.1 Research Results

3.1.1 Respondents' Characteristics

Table 1: Respondents' characteristics based on age.

Characteristics (mother's age)	Frequency	Percentage (%)
<25 year	5	7.5
25-30 year	30	44.8
>30 year	32	47.8
Total	67	100

Table 2: Respondents' characteristics based on the parents' sex.

Characteristic (sex)	Frequency	Percentage (%)
Female	45	67.2
Male	22	32.8
Total	67	100

Table 3: Respondents' characteristics based on the parents' educational background.

Characteristic (pendidikan)	Frequency	Percentage (%)
Uneducated	0	0
Primary	14	20.9
Junior High	25	37.3
Senior High	25	37.3
College	3	4.5
Total	67	100

Table 4: Respondents' characteristics based on the parents' occupation.

Characteristic (occupation)	Frequency	Percentage (%)
Civil Servant	2	3
Private	11	16.4
Own Business	14	20.9
House-wife	37	55.2
Unemployed	3	4.5
Total	67	100

Table 5: Respondents' characteristics based on parents' income.

Characteristic (income)	Frequency	Percentage (%)
<2.700.000	53	79.1
2.700.000	12	17.9
>2.700.000	2	3
Total	67	100

Table 6: Respondents' characteristics based on children's age.

Characteristics (Current age)	Frequency	Percentage (%)
1-2 year	13	19.4
2-4 year	36	53.7
5 year	18	26.9
total	67	100

Table 7: Respondents' characteristics based on the children sex.

Characteristic (Children's Sex)	Frequency	Percentage (%)
Female	35	52.2
Male	32	47.8
Total	67	100

Table 8: Respondents' characteristics based on under five-year-old children's time of BCG immunization.

Characteristic (Age when Immunized)	Frequency	Percentage (%)
Not immunized	24	35.8
1-5 months	39	58.2
6-10 months	3	4.5
11-15 months	1	1.5
Total	67	100

Based on table 1, it was found that most of the respondents aged > 30 years. Based on table 2, it was found that most of the respondents are female. Based on table 3, it was found that the respondents' education was secondary school. Based on table 4, it was found that the majority of respondents' parents' occupation was house-wife. Based on table 5, it was found that the respondents' family income was <2.700.000. Based on table 6, it is found that the majority of the respondents was 2-4 years 53.7% (36 respondents). Based on table 7 The majority of the respondents' sex was female. Based on table 8, it was found that the respondent's time of getting vaccination was mostly at the age of 1-5 months old.

3.1.2 Variables

Specific data presented table data about the relationship of BCG immunization status with the incidence of pulmonary tuberculosis in under five years old children in Tambak Gringsing, Perak Primary Care Unit of Surabaya. From these results can be known whether or not there is a strong relationship between the two variables with

Table 9: Respondents' characteristics based on immunization status.

Immunization Status	Frequency	Percentage (%)
Non BCG immunized	24	35.8
BCG Immunized	43	64.2
Total	67	100

Table 10: The incidence of pulmonary tb in children under 5 year old.

The Incidence of TB	Frequency	Percentage (%)
Not Infected	42	62.7
TB Suspects	15	22.4
TB Infected	10	14.9
Total	67	100

Table 11: The correlation of BCG immunization status and the incidence of pulmonary tb in children under 5 year old at Tambak Gringsing, Perak.

BCG Immunization Status	Incidence in under 5 Year old Children							
	Non TB		Suspects		TB		Total	
	f	%	f	%	f	%	n	%
No	14	58,3	9	37,5	1	4,2	24	100
Yes	28	65,1	6	14,0	9	20,9	43	100
Total	42	62,7	15	22,4	10	14,9	67	100
Result of <i>Chi-Square</i> didapatkan nilai $p = 0.033 < \alpha = 0.05$								

statistical analysis Chi-Square test. Table 9 showed that respondents based on immunization status who did not immunize BCG were 35.8% (24 respondents), and BCG immunization was 64.2% (43 respondents). Table 10 shows that 62.7% (42 respondents) did not have TB, which suspected TB as much as 22.4% (15 respondents), and 14.9% for TB (10 respondents). Table 11 showed the relationship of immunization status and the incidence of tuberculosis in children. Based on Chi-Square test results obtained value = 0.033 < $\alpha = 0.05$, which means there is a statistically significant relationship between immunization status and the incidence of pulmonary TB in infants.

4 DISCUSSION

4.1 BCG Immunization Status of Children Under 5 Years Old at Tambak Gringsing, Perak Timur of Surabaya

The results of the research in Table 5.9 showed that respondents were 24 respondents (35.8%) who were not immunized and 43 respondents (64.2%) were immunized.

According to Maryanti, et al (2011) BCG immunization is a preventive effort for the type of tuberculosis infection (TB) in children. An immunization used to prevent the occurrence of severe TB disease due to the incidence of primary or minor TB disease can occur despite BCG immunization, prevention of BCG immunization for severe tuberculosis such as tuberculosis in the lining of the brain, tuberculosis Milier (in all lung fields) or TB BCG bone immunization is a vaccine containing TB germs that have been attenuated.

The frequency of BCG immunization is 0-11 months, but it is generally given to 2 or 3 months of age (Hidayat, 2009).

4.2 The Incidence of Pulmonary TB

The result of the research in table 5.10 shows that the respondents of lung tuberculosis cases in infants as many as 42 respondents (62.7%) did not suffer tuberculosis with respondents who vaccinated at 1-5 months of age as many as 25 (64.1%) respondents, 6-10 months 2 (66.7%) of respondents, and 11-15 month olds as many as 1 (100%) respondents, while unvaccinated were 14 (58.3%) respondents.

Because BCG immunization is an immunization given to infants aged 0-2 months who aims to prevent tuberculosis. Due to an imperfect immune system, close contact with adults with tuberculosis around them (parents, close relatives, and carers) (Wahyu, 2008).

According to Herry (2011), there are three pulmonary TB risk factors, namely density, density of residence affecting the cause of disease transmission. The more densely settled, the more rapid the disease transmitted through the air, the temperature in the room closely related to the density of shelter and ventilation. Pulmonary TB germs will become inactive by sunlight that can kill the vital function of the organism. Density of residence set by Depkes (2008).

Contact history, close and prolonged contact with adult TB sufferers who live at home, also facilitate the occurrence of TB transmission. House contact with TB patients is one of the risk factors for TB.

4.3 The Correlation of BCG Immunization Status and The Incidence of Pulmonary TB

The relationship between immunization status relationship with the incidence of pulmonary tuberculosis in infants as shown in Table 5.11 according to Chi-Square test results obtained $p = 0.033 < \alpha = 0.05$, it means statistically there is a relationship of BCG immunization status with the incidence of pulmonary tuberculosis in toddlers at Tambak Gringsing, Perak Timur Primary Care Unit of Surabaya..

Based on the research data, 67 (100%) were not immunized with BCG of 24 people (62.7%) and those who did not have TB 14 people (58.3%) were more dominant than those who did not immunize with the suspect as many as 9 people (37.5%), immunization with TB as much as 1 (4.2%). BCG immunization is an immunization given to infants aged 0-2 months who aims to prevent tuberculosis (TB). According to Maryanti, et al (2011) BCG vaccine given to infants aged 0-12 months by intracutan injection with a dose of 0.05 ml. BCG vaccine otherwise successful when tubercular conversion occurs at the injection site.

Based on the result of the immunization research, there were 43 people (64.2%) who had not TB 28 people (65.1%), the TB 9 people (20.9%), and the suspect 6 people (14.0%). According to Rahajoe, 2005 in Welldany siregar 2008 Although it has not proven the efficacy of BCG immunization consistently, so now the immunization is still effective and safe given. BCG is one of the efforts of TB prevention efforts. The occurrence of pulmonary tuberculosis in children can be caused by several things other than due to contact with adult patients and BCG immunization.

Other factors include children occupying densely populated homes, children's homes in humid conditions, house ventilation and children's inadequate temperature, insufficient house lighting, exposure to cigarette smoke, economic status, nutritional status and toddlers who are not exclusively breastfed.

5 CONCLUSIONS

Based on the results of the research that has been done in Ponds Gringsing Area Puskesmas Perak Timur Surabaya, it can be concluded as follows: 1) BCG immunization was mostly given to pre-schoolers; 2) Most pre-schoolers do not suffer from Pulmonary TB; 3) There is a relationship between the status of BCG immunization with the incidence of pulmonary tuberculosis. This study could be accepted as a source of information for future research, healthcare services, as well as parents. However, this study could be lack of accuracy in determining Limitations of the study were in terms some technical problems in collecting data that might affect the accuracy of data report.

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