ORIGINAL ARTICLE

Family Healthcare Tasks to Prevent the Transmission of Pulmonary Tuberculosis (TB) Among Family Having a Household Contact in Eastern Indonesia

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ABSTRACT

Introduction: Pulmonary Tuberculosis is a serious bacterial contagious infection. Families who live in the same house with active pulmonary tuberculosis are at twice as much risk of being infectious.Therefore, we endeavor to find out the association between family characteristics and family healthcare tasks among families who have a household contact. **Methods:**The study used a cross-sectional design. The sample of the study was 55 families who had a history of household contacts. Data were collected by questionnaire and analyzed by chi-square test. **Result:**The study indicated that 65.5% were at a good level of recognizing tuberculosis, and utilizing health care facilities (83.6%). However, 56.4% of families were unable to make appropriate decisions, and 72.7% were determined at a poor level in taking care of patients. About 72.7% (40 families) were at a poor level regarding the ability to modify a healthy living to prevent tuberculosis transmission. A chi-square test showed that age, occupation, family income, number of family members, and type of family had a significant correlation with the ability of the family to recognize pulmonary tuberculosis and to make the right decision (p<0.001). Furthermore, the family development stages had a significant relationship with the ability of the family to recognize tuberculosis (p=0.006), to make the right decision (p<0.001); and the ability to take care of patients (p<0.001). **Conclusion:** It is crucial to involve family members in taking care of tuberculosis patients and preventing household contact with tuberculosis.

Keywords: Family characteristics, Family healthcare tasks, Tuberculosis, Transmission

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INTRODUCTION

Pulmonary Tuberculosis (TB) is a serious contagious bacterial infection infection that primarily affects the respiratory system (1). Individuals who have smear-positive pulmonary TB are confirmed to be highly contagious(2). Active pulmonary TB patients produce droplet nuclei through coughing, singing, shouting, sneezing, or other forceful expiratory maneuvers that spread breathing from the airways (3). A previous study conducted in Peru found that smear-positive index cases were associated with a higher risk of infection among household contacts(1). An individual with active pulmonary TB will exhale 10^6 contaminated droplets(4). Droplets can stay in the air for hours and when these are inhaled by susceptible persons then they may become infected and develop tuberculosis (3). People living in the same house are at twice the risk of being infected (5). A previous study of household contact screening in India revealed that out of 544 patients, 71 patients had

an abnormal chest radiograph and 29 (5.3%) had TB, and 23 were sputum smear-positive (5).

Pulmonary TB contributes to high morbidity and mortality rates in the community. It is estimated that 2.5 million people die each year (6). The prevalence of Tuberculosis in Indonesia ranked number three (high burden country) after India and China (6). The newly diagnosed TB cases in Indonesia were 1,017,290 in 2019(6–8).Positive TB cases in East Nusa Tenggara were reported to increase dramatically in the last two years, around the vicinity of 20,599 confirmed cases. Kupang City occupied the first position in contributing to tuberculosis, about 359 cases in 2019 (9). It is predicted that it will continue to increase due to ineffective prevention behavior and drop-out of TB treatment (10). The Indonesian Basic Health Research (2018) illustrated that 0.3% of the people of East Nusa Tenggara are diagnosed with TB, 8.8% with TB symptoms like cough > 2 weeks, and 4.0% have symptoms of pulmonary tuberculosis with symptoms of blood in cough (9).

A household contact was defined as a person who lived together and shared utensils, room, or food for at least three months before the diagnosis of TB (5,11). House

is considered as high prevalent area for TB transmission (12). Family members are at high-risk for transmission if preventive behavior does is not implemented properly in the family (12,13). Family members are in the high-risk group for pulmonary TB transmission, especially vulnerable groups such as toddlers and the elderly as well as groups with co-morbidities such as HIV and Diabetes Mellitus (14–16). As they are at a risk of disease transmission, the family members also play important roles to prevent TB transmission and need to practice preventive measures consistently at home (17). Family expectation are high as they play the main role in reducing the risk of pulmonary TB transmission (1,8,18,19). The family should be able to implement the five health family care tasks consisting of 1) recognizing the family health problems, 2) making the appropriate decision regarding a health issue, 3) taking care of the family members who are sick, 4) modifying the environment to support the healing process, and 5) utilizing the health facilities in terms of having a health problem or suffering from a disease (20–22).

The study aimed to identify the relationship between characteristics of the family with the history of household contacts and family health care tasks in preventing the transmission of pulmonary tuberculosis. The specific objectives are as follows: 1) to identify the characteristics of families who had a history of household contacts with pulmonary TB patients (age of the head of households, the occupation of the head of households, family income, type of family, number of household members, and family development stage); 2) to identify the five family healthcare tasks of the family with pulmonary TB to prevent pulmonary TB transmission; and 3) to analyze the correlation between family characteristics and five family healthcare tasks in the effort to prevent pulmonary TB transmission within the family.

MATERIALS AND METHODS

The cross-sectional design was used to identify and analyze the characteristics of the family that had a history of tuberculosis patients and to figure out the five family healthcare tasks, particularly to prevent the transmission of pulmonary TB. The study was conducted in Kupang, East Nusa Tenggara, Indonesia, in 2019.

Out of 359 families with positive pulmonary TB patients, 55 families were determined as subjects of the study. Purposive sampling was used to recruit families who meet the inclusion criteria: 1) had a history of household contacts with pulmonary TB patients, 2) agreed to participate in the study. The study consisted of independent variables and dependent variables. Independent variables are family characteristics as follows: age of the head of households (early adulthood, 20-40 years and middle adulthood, more than 40 years old), occupation of the head of households (farmers/laborers, employees-private/civil servants), current

household income (≤2 million Rupiahs, >2 million rupiahs), type of family (nuclear family, extended family), number of household members (>5 people, ≤5 people), and family development stage (families with pre-school children, school-age children, middle years, and in retirement and old age).

The dependent variable was examined using five family healthcare tasks based on the theory of family-centered care by Friedman. The five family health care tasks consist of recognizing/knowing pulmonary TB and how it is transmitted, making the right decision of healthcare and treatment, taking care of family members who suffer from pulmonary TB, modifying a healthy living environment to prevent TB transmission, and utilizing health care facilities for healthcare and treatment (23). The data were collected on the selected households through questionnaires and interviews. Data collection was conducted from July 2019 to June 2020 through a set questionnaire after obtaining informed consent from all participants.

Family healthcare tasks were analyzed with a set of questionnaires with two categories: No (0) for activities that are not conducted by families and yes (1) for items that are conducted. Furthermore, the answer is measured into two categories of the families' ability to perform the five healthy family tasks; good when 80–100% items are done by families; and less than 80% items performed were categorized as poor level.The independent and dependent variables were entered into the chi-square test to determine the statistical significance with 95% confidence intervals. A value of $p<0.05$ was considered statistically significant. The study was conducted after receiving an exempt determination from the IRB of the health polytechnic of Kupang where the researcher belongs (IRB No. LB.02.03/I/0072/2019).

RESULTS

Families' Characteristics
The study findings indicated that the majority of the head of the family household was early adulthood/20-40 years old (54.5%), the occupation of the head of the family was farmers/laborers (69.1%), the family income was less than 2 million rupiahs (69.1%0, 70.9% of families were categorized as an extended family,and the number of family members were more than five people (63.6%). Regarding the family development stage, 43.6% of families were the families of school children age, followed by families of middle years (29.1%) (Table I).

Five Family Healthcare Tasks
In terms of the five family health care tasks, the findings illustrated that almost all tuberculosis patient families recognized or knew the tuberculosis issue (definition, the main causes, signs, and symptoms, mode of transmission, preventive measures of TB), accounting for 65.57% at

Table I: Characteristics of families

Variables	Frequency	Percentage
Age of the head of household		
Early adulthood	30	54.54
Middle/late adulthood	25	45.45
Occupation of the head of household		
Farmers/Laborers	38	69.09
Employees (private and civil servant)	17	30.91
Family Income		
≤ 2 million Rupiah	38	69.09
>2 million rupiah	17	30.91
Number of household members		
> 5 people	18	32.73
≤ 5 people	22	40.00
Type of family		
Extended family	39	70.91
Nuclear family	16	29.09
Family development stages		
Families with pre-school children	8	14.55
Families with school-age children	24	43.64
Families of middle years	16	29.09
Families in retirement and old age	7	12.73

Table II: Family healthcare tasks of household contact families

1. The ability of the family to recognize pulmonary TB

Do not		Do	
f	%	f	%
19	34.5	36	65.5

2. The ability of the family to make the right decision to prevent pulmonary TB transmission

Do not		Do	
F	%	f	%
31	56.4	24	43.6

3. The ability of the family to take care of patients with TB

Do not		Do	
F	%	f	%
40	72.7	15	27.3

4. The ability of the family to modify the environment to prevent transmission

Do not		Do	
F	%	f	%
40	72.7	15	27.3

5. The ability of the family to utilize health facilities for treatment

Do not		Do	
F	%	f	%
9	16.4	46	83.6

a good level. Regarding the second family healthcare task (the ability of families to make the right decision, 56.4% of families made inappropriate decisions in terms of treatment and related caring practiced for the sufferer.In terms of taking care of the family members who were diagnosed with tuberculosis, it was found that the majority of families (72.7%) determination was at a bad level; only 15families (27.3%) were at a good level. The indicators for taking care of the sufferer include delivering the patients to health facilities, encouraging and reminding TB patients to close mouth and nose with a tissue when they cough, sneeze or laugh, preparing tools for sputum isolation, being a good tuberculosis drugs supervisor for patients, encouraging and preparing healthy foods, drying the mattress used routinely by pulmonary TB patients and facilitating plenty of rest for the patients (Table II).

Furthermore, concerning the ability of families to utilize healthcare facilities for consultation, treatment, and counseling, it was clear that most of the families were categorized at a good level, accounting for around 83.6% and the rest were at a bad level (16.4%), in contrast with the other family healthcare tasks, the ability of families to modify a healthy living environment (balanced ventilation systems, enough natural light for the patient from the sun which can kill TB bacteria by opening windows of the house every day), drying the mattress, pillows, and bed. Spitting should be at certain places and that area must be treated with a disinfectant (detergent) and all items used by the patient must be separated as well as the patient's items must not be used

by others to prevent TB transmission found 72.7% (40 families) ata poor level and 27.3% of them grouped at a good level.

A chi-square test was applied to examine the relationship between family characteristics and five family health care tasks. Regarding the age of the head of households, it showed that this had a statistically significant relationship with two of the family healthcare tasks, including the family's ability to recognize pulmonary TB (p<0.001), and to make the right decision to reduce TB transmission (p<0.001). Likewise, the occupation of the head of household, family income, number of the household members, and type of family hadalso meaning in the family's ability to recognize pulmonary TB and tomake the right decision of health care for the TB patients (p<0.001); which showed a strong and positive correlation. Furthermore, the family development stages had a significant relationship with the ability of the family to recognize the TB problems (p=0.006), to make the right decision of healthcare for the TB patients (p<0.001); and the ability to take care of TB patients (p<0.001) (Table III).

DISCUSSION

Findings illustrated that most of the heads of the household of a family which had a household contact with TB patient were farmers or laborers, accounting for 69.1% (38 people). It was found that farmer families are two times more likely to have pulmonary TB. This

Table III: The Relationship between Family Characteristics (Age of the head of household, Occupation of the head of household, family income, number of household members, type of family, and family development stages) and Family Health Care Tasks in preventing transmission of tuberculosis

Age of the head of household	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
Early adulthood	17	56.7	13	43.3	30	100	0.001
Middle/late adulthood	2	8	23	92	25	100	
Total	19	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
Early adulthood	26	86.7	4	13.3	30	100	0.001
Middle/late adulthood	5	20	20	80	25	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
Early adulthood	24	80	6	20	30	100	0.306
Middle/late adulthood	16	64	9	36	25	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
Early adulthood	25	83.3	5	16.7	30	100	0.103
Middle/late adulthood	15	60	10	40	25	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilize health facilities for treatment							
Early adulthood	5	16.7	25	83.3	30	100	1.000
Middle/late adulthood	4	16	21	84	25	100	
Total	9	16.4	46	83.6	55	100	

Occupation of the head of household	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
Farmers/Laborers	19	50	19	50	38	100	0.001
Employees (private and civil servant)	0	0	17	100	17	100	
Total	19	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
Farmers/Laborers	31	81.6	7	18.4	38	100	0.001
Employees (private and civil servant)	0	0	17	100	17	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
Farmers/Laborers	28	73.7	10	26.3	38	100	1.000
Employees (private and civil servant)	12	70.6	5	29.4	17	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
Farmers/Laborers	29	76.3	9	23.7	38	100	0.514
Employees (private and civil servant)	11	64.7	6	35.3	17	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilize health facilities for treatment							
Farmers/Laborers	7	18.4	31	81.6	38	100	0.705
Employees (private and civil servant)	2	11.8	15	88.2	17	100	
Total	9	16.4	46	83.6	55	100	

Family Income	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
≤ 2 million Rupiah	19	50	19	50	38	100	0.001
>2 million rupiah	0	0	17	100	17	100	
Total	19	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
≤ 2 million Rupiah	31	81.6	7	18.4	38	100	0.001
>2 million rupiah	0	0	17	100	17	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
≤ 2 million Rupiah	28	73.7	10	26.3	38	100	1.000
>2 million rupiah	12	70.6	5	4.6	17	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
≤ 2 million Rupiah	29	76.3	9	23.7	38	100	0.514
>2 million rupiah	11	64.7	6	35.3	17	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilizehealth facilities for treatment							
≤ 2 million Rupiah	7	18.4	31	81.6	38	100	0.705
>2 million rupiah	2	11.8	15	88.2	17	100	
Total	9	16.4	46	83.6	55	100	

Number of household members	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
> 5 people	18	54.5	15	45.5	18	100	0.001
≤ 5 people	1	4.5	21	95.5	22	100	
Total	19	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
> 5 people	28	84.8	5	15.2	33	100	0.001
≤ 5 people	3	13.6	19	86.4	22	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
> 5 people	21	63.6	12	36.4	33	100	0.122
≤ 5 people	19	86.4	3	13.6	22	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
> 5 people	25	75.8	8	24.2	33	100	0.757
≤ 5 people	15	68.2	7	31.8	22	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilize health facilities for treatment							
> 5 people	7	21.2	26	78.8	33	100	0.413
≤ 5 people	2	9.1	20	90.9	22	100	
Total	9	16.4	46	83.6	55	100	

Type of family	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
Extended family	11	28.2	28	71.8	39	100	0.001
Nuclear family	8	50	5	50	16	100	
Total	29	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
Extended family	16	41	23	59	39	100	0.001
Nuclear family	15	93.8	1	6.3	16	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
Extended family	31	79.5	8	20.5	39	100	0.122
Nuclear family	9	56.3	7	43.7	16	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
Extended family	27	69.2	12	30.8	39	100	0.757
Nuclear family	13	81.3	3	18.7	16	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilize health facilities for treatment							
Extended family	5	12.8	34	87.2	39	100	0.413
Nuclear family	4	25	12	75	16	100	
Total	9	16.4	46	83.6	55	100	

Family development stages	The ability of the family to recognize pulmonary TB				Total		P-value
	Do not		Do				
	N	%	N	%	n	%	
Families with pre-school children	5	62.5	3	37.5	8	100	0.006
Families with school age children	12	50	12	50	24	100	
Families of Middle years	2	12.5	14	87.5	16	100	
Families in retirement and old age	0	0	7	100	7	100	
Total	19	34.5	36	65.5	55	100	
The ability of the family to make the right decision to prevent pulmonary TB transmission							
Families with pre-school children	8	100	0	0	8	100	0.001
Families with school age children	18	75	6	25	24	100	
Families of Middle years	3	18.8	13	81.2	16	100	
Families in retirement and old age	2	28.6	5	71.47	7	100	
Total	31	56.4	24	43.6	55	100	
The ability of the family to take care of patients with TB							
Families with pre-school children	1	12.5	7	87.5	8	100	0.001
Families with school age children	16	66.7	8	33.3	24	100	
Families of Middle years	16	100	0	0	16	100	
Families in retirement and old age	7	100	0	0	7	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to modify the environment to prevent transmission							
Families with pre-school children	7	87.5	1	12.5	8	100	0.787
Families with school age children	17	70.8	7	29.2	24	100	
Families of Middle years	11	68.8	5	31.3	16	100	
Families in retirement and old age	5	71.4	2	28.6	7	100	
Total	40	72.7	15	27.3	55	100	
The ability of the family to utilize health facilities for treatment							
Families with pre-school children	1	12.5	7	87.5	8	100	0.137

could be assumed due to some related conditions such as the location of residence, the density of residence and nutritional status, and economic status (24,25). Farmer house which made by the bamboo will increase the risk of exposure. However, not all farmer families experience pulmonary tuberculosis, and there are still families with good health status. Concerning family income, it was claimed that 69.1% (38 families) with low-level income families tended to get pulmonary TB (26,27). A chi-square test found that the job of the head of household had a strong and positive correlation with the level of the family's ability to recognize the TB problems and to decide preventive measures.

The more the people living in the same house with TB patient, the higher the risk of infection, especially in a small house. This study indicated that families with TB patients are mostly extended family (70.9%) with more than five members live in the same house. Crowding, on one hand, is generally accepted and identified as a risk factor for TB transmission in terms of exposure to Mycobacterium tuberculosis. On the other hand, it will advantage for the family in terms of making the right decision for caring and treatment, taking care of TB patients, and modifying the environment to prevent disease transmission in terms of sharing duties, and ideas of caring for family members (28–30). Likewise, the large number of family members supports a quick decision-making process within the family (1,28,31). Considering the stage of family development stages, findings indicated that most of the TB families were at the stage of families with school children; about 43.6%. At this stage, children are susceptible to contracting pulmonary TB due to nutritional problems and environmental problems, both at home and at school (27,32).

Findings also indicated that the majority of the family recognized health problems, including the understanding, symptoms, treatment, and prevention of TB transmission (7,22). A survey conducted by Marwansyah and Sholikhah (2015) pointed out that 62.5% of families have a better understanding of pulmonary TB (24). Family members have been exposed to various information from TB program managers in public health centers(33). During the length of time of being diagnosed with TB information must be available and must be obtained from health workers during the visits to the healthcare centre. Furthermore, the family accepted that pulmonary TB is quite dangerous and needs to be treated properly maintaining the standard protocol. This is congruent with the ability of families to use health facilities'services and obtain TB drugs as standard,which accounted for 83.6%.Conversely, more than half of the family (56.4%) were categorized at a bad level of the ability to make decisions and generally influenced by the prominence of the problems felt by the family. Decision-making capacity is defined as the ability to understand the benefits and risks of alternatives to proposed healthcare and includes the ability to reach

an informed decision (34). The family views health problems based on the urgency and severity that need to be immediately addressed (22).The families are not fully aware of the possibility of TB transmission to the family members.

In terms of modifying a healthy living environment to prevent transmission, most families were determined at a bad level, which means that many families did not perform all the preventive measures of TB transmission, such as opening the windows, drying mattresses, pillows and providing tools for sputum isolation. Another study conducted by Dahwan et al., (2020) stated that TB transmission occurred with high prevalence in inadequate ventilation, along with crowded and enclosed spaces, and according to the duration of exposure (35). In contrast with the ability of the family to recognize TB, the study indicated that the majority of the families were categorized at a poor level in terms of the ability to take care of TB patients. There were still many families that do not dry the mattresses, open windows, which increase the chances of transmission to family members staying in the same house. Regarding TB transmission, there are still many patients/families that allow patients to cough without covering their mouths with a handkerchief/tissue(36). The main cause of this situation is the lack of knowledge regarding the modes of transmission of TB(37). According to Erlinda (2015),an unclear health message provided by the healthcare provider will lead the family to practice unhealthy behavior. Providing the health messages effectively is, therefore, essential to achieve optimal outcomes(36).Good knowledge will increase awareness to behave well.

CONCLUSION

The study has several results concerning the fact that household contactswere more likely to occur in farmers/laborers families with family income less than 2 million rupiahs, extended family, and families with school-age children. In terms of five family health tasks, many of them were categorized at a poor level in terms of making the right decision for preventing TB transmission, taking care of the tuberculosis patients, and modifying the home environment. Family characteristics had a significant correlation with the capability of the family to conduct the five family health tasks. Family plays an important role to stop pulmonary TB transmission among family members. Therefore, family nursing care is essential for promoting healthy behavior and facilitating families to implement the five family health care tasks.

ACKNOWLEDGEMENT

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