The Factor of Family Support Towards the Success of Tuberculosis Therapy: A Cohort Study

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Abstract—Indonesia ranks second in the world regarding tuberculosis after India. Tuberculosis (TB) is a disease that can be cured if treatment is carried out quickly and precisely. Factors related to adherence to treatment, duration of treatment, socioeconomic, nutritional status, smoking habits, and professions at risk correlate with the success of TB therapy. The purpose of this study was to determine whether family support capacity is associated with the success of TB therapy. Methods: This study used a cohort prospective design. The subjects of this study were 57 patients with pulmonary and extrapulmonary tuberculosis patients. Primary data were collected using standardized questionnaires. Patients’ medical records were recorded for secondary data. Risk ratio, p-value, and 95% confidence interval were calculated using chi-square analysis. Results: The results of the analysis showed that a good family carrying capacity increased the success of tuberculosis therapy with a value of p<0.001 while the Relative Risk (RR) analysis obtained a value of 5.4 indicating a 5.4 times the success of tuberculosis therapy. Conclusion: Family support is needed in tuberculosis therapy as it can increase the success of tuberculosis therapy.

Keywords—tuberculosis, family support, cohort, therapy success

I. INTRODUCTION

Tuberculosis (TB) is an infectious disease that can be transmitted and caused by Mycobacterium tuberculosis, which can attack various organs. The World Health Organization states that tuberculosis (TB) is a global public health emergency. Globally in 2015, it was estimated that there were 10.4 million cases of tuberculosis (TB) (range, 8.7 million to 12.2 million) in which Indonesia was ranked number two in the world after India. The WHO Global Tuberculosis Report 2015 mentions the incidence of tuberculosis in Indonesia ranges from 658-1450 thousand cases where the prevalence survey in Indonesia is now estimated that there are around 1 million new TB cases per year in Indonesia, twice the previous estimate and increasing every year. The surge in tuberculosis (TB) will have several impacts, such as a decrease in the quality of life, social, economic and environmental impacts. The incidence of tuberculosis (TB) surged due to several factors, including the failure of TB therapy which can lead to a greater risk of tuberculosis because it will cause relapse or immune to Anti Tuberculosis Drugs [2]. Almost three of four pulmonary tuberculosis patients who defaulted from their TB therapy still had their sputum sample smear-positive for TB. This can highly lead to transmission to others [3], [4].

Tuberculosis (TB) is a disease that can be cured if treatment is carried out quickly and precisely. Tuberculosis patients who do not recover or do not get treatment completely and correctly do not only pose a serious risk to individuals and the community [5]. Failure of Anti Tuberculosis Drugs therapy can result in the emergence of multidrug-resistant TB (MDR-TB), prolonged infection and poor results of TB treatment.

Tuberculosis (TB) therapy is generally divided into 2 stages, namely the initial and advanced stages. Where this initial stage focuses on reducing the symptoms of TB and decreasing the transmission rate and the advanced stage for killing remnants of germs. The time taken to Tuberculosis treatment for primary patients or who have recently been exposed to TB is about 6 to 9 months. The success of TB therapy in terms of treatment results and supporting examinations, where at the time the treatment ends a negative bacteriological test (BTA) or in one previous test and can also be proven by chest radiology [6].

Non-compliance with tuberculosis treatment at a health care facility is one of the obstacles in achieving a high success rate of tuberculosis treatment. Adherence to treatment factors, duration of treatment, socioeconomic, nutritional status, smoking habits, and occupation is associated with the success of TB therapy [7].

Family support for people with tuberculosis (TB) is very important. The family is also the first line as the person closest to the patient. Tuberculosis (TB) treatment given by family members, the treatment success is higher than that given by non-family members [8]. Family support is one factor in the success of tuberculosis (TB) therapy due to financial difficulties both money and time, difficulty in health facilities, unable to do the routine treatment every day without the help of other people, especially women [9]. Patients’ desire to be cured and will to complete treatment can come from family, neighbors, doctors, and patients themselves. Family and
The success of tuberculosis therapy in this study was defined as tuberculosis patients who were healed or completed the therapy. The criteria of healed tuberculosis patients were patients with a positive bacteriological test at the beginning that has a negative bacteriological test at the end of the treatment, and in one of the bacteriological tests before the end of treatment. Tuberculosis therapy is considered unsuccessful if the patient's therapy fails, namely when the patient whose sputum examination results remain positive or return to be positive in the fifth month or more during treatment or at any time if during the treatment obtained laboratory results that indicate the presence of Anti Tuberculosis Medication retention.

C. Data collection and analysis
The data collected by interviewing respondents using the questionnaire as primary data and the medical record as secondary data. Data on respondents’ characteristics such as age, gender, occupation, and highest education were also collected to get the distribution of tuberculosis patients in this study by sociodemographic characteristics. Data then were analyzed using the Chi-square test to determine the association between the variables. We calculated relative risk (RR) and obtained p-value and 95% confidence interval.

D. Ethics
This study has received ethical clearance from the ethics committee of the Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta, Indonesia.

III. RESULTS AND DISCUSSION
At the beginning of the study, we were able to include 66 patients from three hospitals as respondents. One patient died and one patient was transferred to another city. Six patients were lost to follow up, and one patient rejected to be interviewed at the end of the follow-up period. Eventually, there were a total of 57 patients that completed this study.

A. Characteristics of Subjects
Descriptive analysis was done to determine the distribution of patients based on age, gender, occupation, highest education and tuberculosis-related characteristics such as duration of treatment, the success of therapy, and type of TB. The result of the descriptive analysis is shown in table 1.

| Characteristics          | n  | %   |
|--------------------------|----|-----|
| Age                      |    |     |
| Late Youth               | 12 | 21.1|
| Early Adult              | 16 | 28.1|
| Late adults              | 5  | 8.8 |
| Early Elderly            | 9  | 15.8|
| Late Elderly             | 10 | 17.5|
| Old man                  | 5  | 8.8 |
| Gender                   |    |     |
| Male                     | 35 | 61.4|
| Female                   | 22 | 38.6|
| Occupation               |    |     |
| Unemployed               | 12 | 21.1|
| Farmers/laborers         | 8  | 14.0|
| Private                  | 9  | 15.8|
| Civil servants           | 6  | 10.5|
| Student                  | 10 | 17.5|
| Entrepreneur             | 10 | 17.5|
| Other                    | 2  | 3.5 |
| Highest education        |    |     |
| Not completed in primary school | 1 | 1.8 |
Based on table 1, more than half of the respondents were male and the most age group was early adulthood. More male than female respondents in this study was due to the trend in lifestyle factors of men who smoke and drink alcoholic beverages. This is consistent with research which stated that pulmonary TB sufferers tend to be higher in men because more men have the ability to smoke [11]. Cigarettes and alcoholic drinks can reduce the body's immune system, so it is susceptible to pulmonary TB [12]. In addition, most men work outside the home so that the possibility of contracting TB germs is greater [13]. This is consistent with surveillance evidence from WHO related to the incidence of tuberculosis based on age and sex which states that the highest TB disease incidence is in the 15-34 age category with the male sex greater than women [14].

Most of the respondents' work was unemployment. A large number of respondents who do not work can show a low economic level and it is closely related to tuberculosis. One of the main causes of the burden of the tuberculosis problem is poverty in various community groups related to sanitation, clothing, food, poor housing [6].

By the highest education, respondents were dominated by high school graduates. Education is related to patient knowledge and affects the success of a patient's treatment. Knowledge is very important for the formation of one's actions, behavior based on knowledge will be more lasting than behavior that is not based on knowledge. The higher the level of education, the better the reception of information about treatment and illness so that the treatment process and treatment will be more complete, including tuberculosis [15]. Based on tuberculosis-related characteristics, most of this study respondents were pulmonary tuberculosis patients who underwent treatment for 6 months and successfully underwent tuberculosis therapy.

### B. Factors of Tuberculosis Therapy Success

In order to determine factors that led to the success of tuberculosis therapy, a chi-square test was used and risk ratio alongside p-value and 95% confidence interval were calculated. The results of the analysis by the data collected in the first month of therapy can be seen in table 2.

| Characteristics       | n   | %   |
|-----------------------|-----|-----|
| Elementary school     | 10  | 17.5|
| Junior high school    | 6   | 10.5|
| High school           | 32  | 56.1|
| Higher education      | 8   | 14.0|

| Duration of treatment | n   | %   |
|-----------------------|-----|-----|
| 6 months              | 55  | 96.5|
| 9 months              | 2   | 3.5 |

| Success of therapy     |          |
|------------------------|----------|
| Succeeded              | 47       |
| Has not succeeded      | 10       |

| Type of TB             |          |
|------------------------|----------|
| Pulmonary              | 47       |
| Extrapulmonary         | 10       |

As shown in table 2, it is known that almost all patients with successful tuberculosis therapy received good early family support capacity or in the first month of therapy. We also analyzed the condition of tuberculosis patients with the success of tuberculosis therapy. The results of the analysis were shown in table 3.

### TABLE II. Respondents' Characteristics in the First Month of Therapy as Factors of Tuberculosis Therapy Success.

| Variables                      | Success of therapy | Not successful | p-value | RR (95% CI) |
|--------------------------------|--------------------|----------------|---------|-------------|
| Type of TB                     |                    |                |         |             |
| Pulmonary                      | 38 (66.7)          | 9 (15.8)       | 0.490   | 0.47 (0.700 - 1.152) |
| Extrapulmonary                 | 9 (15.9)           | 1 (1.8)        |         |             |
| Age                            |                    |                |         |             |
| Late Youth                     | 11 (19.3)          | 1 (1.8)        | 0.395   | 1.50 (0.282 - 0.701) |
| Early Adult                    | 13 (22.8)          | 3 (5.3)        |         |             |
| Late adults                    | 4 (7.0)            | 1 (1.8)        |         |             |
| Early Elderly                  | 8 (14.0)           | 1 (1.8)        |         |             |
| Late Elderly                   | 7 (12.3)           | 3 (5.3)        |         |             |
| Old man                        | 4 (7.0)            | 1 (1.8)        |         |             |
| Gender                         |                    |                |         |             |
| Male                           | 29 (50.9)          | 6 (10.5)       | 0.920   | 1.07 (0.266 - 4.335) |
| Female                         | 18 (31.6)          | 4 (7.0)        |         |             |
| Occupation                     |                    |                | 0.539   | 1.58 (0.854 - 1.365) |
| Employed                       | 28 (49.1)          | 7 (12.3)       |         |             |
| Unemployed                      | 19 (33.3)          | 3 (5.3)        |         |             |
| Highest education              |                    |                | 0.989   | 0.99 (0.223 - 4.392) |
| Low level                      | 14 (24.6)          | 3 (5.3)        |         |             |
| High level                     | 33 (57.9)          | 7 (12.3)       |         |             |
| Early Family Support Capacity  |                    |                | <0.001  | 69.0 (6.576 - 723.978) |
| Good                           | 46 (80.7)          | 5 (8.8)        |         |             |
| Not good                       | 1 (1.8)            | 5 (8.8)        |         |             |

*a Chi-square test*
Table 3 shows the condition of tuberculosis patients with successful tuberculosis therapy. In addition to improved laboratory tests, clinical conditions also improved. The clinical condition is not experiencing coughing, phlegm, fever, weight loss, shortness of breath, and chest pain.

C. Family Support as A Factor to Achieve Tuberculosis Therapy Success

Family support as a factor of tuberculosis therapy success was analyzed using the Chi-square test to obtain relative risk (RR) and 95% confidence interval (95% CI). Results of the analysis done for family support were shown in table 4.

The results of the chi-square test in table 4 showed that good early family support significantly associated with the success of tuberculosis therapy (p<0.05). Compared to the patient with poor early family support, tuberculosis patient with good early family support or good family support received within the first month of therapy has 69 times higher chance in succeeding the therapy. Patient with good family support throughout the tuberculosis therapy also has 46 times higher chance of achieving therapy success compared to the patient with poor family support, with a significant association.

Family and social support interventions for tuberculosis patients have been recommended by WHO as a management program for tuberculosis therapy and become a strategy to prevent drug resistance [14]. The family plays a supportive role during the therapy, healing, and recovery of the patient. If there is no such support, the success of therapy, healing or recovery is greatly reduced [10], [16]. Family can assist patients in daily routine activities, taking medication, give financial support and motivational or emotional support to finally complete the tuberculosis therapy [9], [17], [18].

Lack of support is one of the main causes of non-compliance among Tuberculosis patients thus reducing the success rate of therapy. Other studies say many tuberculosis patients who do not get family support are forced to seek support both financially and emotionally themselves so that patients feel worthless and fatigue in their daily lives and in treatment [19]. Social support and family support are found to be the main driving factors for completing tuberculosis therapy. Attention and support from family, environment, neighbors and the community are the most important driving factors for tuberculosis patients to complete and carry out therapy so they can recover [20]. Lack of social support for most patients is an important factor for matters relating to adherence, stigma, effects, and duration of treatment. Support is an important factor for triggering other things that help the success of therapy [21], [22].

Support from family was very necessary by patients to support the healing process and therapy. Such support is like reminding to conduct a re-examination, reminding to take medicine, a comfortable living environment, daily needs and nutrition that is considered. In a study stated that if family...
support such as reminding to always take medicine, paying attention to the schedule of routine examinations will make patients better in therapy [17]. A cluster randomized controlled trial in Ethiopia tried to give psychological counseling and adherence education TB patients. Unmarried TB patients have a higher chance of getting non-adherence to TB treatment compared to married TB patients. Even one family member can make a change in TB treatment adherence, furthermore, treatment success [15].

Tuberculosis patients who are the main breadwinners in most families have negative results between family support and successful therapy. Patients feel irresponsible and cannot provide what a breadwinner should give. Patients tend to feel guilty and feel embarrassed so that the family is expected to help patients not to feel like these things [23]. In addition, the most needed thing from family support is emotional support compared to material and instrumental support even though both are needed. This is in line with a study conducted in Ghana, where the most important thing is the family’s love and attention [24].

IV. CONCLUSION

Family support is needed in tuberculosis therapy as it can increase the success of tuberculosis therapy. Both family support for the first month of therapy and family support for 6 or 9 months of therapy significantly associated with the success of tuberculosis therapy. Patient with good family support throughout the tuberculosis therapy has 46 times higher chance of achieving therapy success. Hospitals and health workers should educate both patients and patients’ families that family support can increase the success of therapy that can reduce patients who are drug-resistant.

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