THE DETERMINANTS AFFECTING IRREGULAR TUBERCULOSIS TREATMENT AT RSU ROYAL PRIMA MEDAN

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Abstract. Tuberculosis (TB) remains a major public health issue, and irregular treatment adherence is one of the main challenges in controlling the disease. Irregular TB treatment can lead to drug resistance, prolonged illness, and increased transmission rates. Understanding the determinants affecting irregular TB treatment is crucial to improving patient adherence and treatment outcomes. This paper described aims to identify and analysed the factors influencing irregular pulmonary TB treatment at RSU Royal Prima Medan. A descriptive-analytical study was conducted using a cross-sectional approach. Data were collected through patient interviews and medical record reviews. Factors assessed included patient knowledge, socioeconomic conditions, accessibility to healthcare services, side effects of medication, and healthcare provider support. The findings indicate that irregular TB treatment is influenced by several key factors, including lack of patient awareness about the importance of completing treatment, financial constraints, difficulties in accessing healthcare facilities, adverse drug reactions, and inadequate support from healthcare providers. Among these, socioeconomic factors and side effects of medication were found to be the most significant determinants. Addressing the determinants of irregular TB treatment requires a comprehensive approach, including patient education, financial assistance programs, improved healthcare accessibility, and enhanced healthcare provider engagement. Strengthening these aspects can help improve treatment adherence and overall TB control efforts.

Keywords: Tuberculosis, treatment adherence, determinants, and public health.

I. INTRODUCTION

Transmissible diseases are generally acute and can affect anyone, including children, teenagers, adults, and the elderly. These diseases are prioritized due to their contagious nature and the potential for significant harm. One of the most prevalent infectious diseases in Indonesia is pulmonary tuberculosis (TB). Pulmonary tuberculosis is a chronic infectious disease caused by Mycobacterium tuberculosis. This bacterium is sometimes referred to as Acid-Fast Bacilli (AFB) because of its rod shape and resistance to acid staining. Most TB bacteria infect the lung parenchyma, causing pulmonary TB; however, they can also infect extrapulmonary organs such as the pleura, lymph nodes, and bones (extrapulmonary TB).

Pulmonary TB is an infectious disease caused by Mycobacterium tuberculosis. There are several types of Mycobacteria, including M. tuberculosis, M. africanum, M. bovis, and M. leprae, which are also known as acid-fast bacilli (AFB). In addition, a group of bacteria other than Mycobacterium tuberculosis that can cause respiratory disorders is known as Mycobacterium Other Than Tuberculosis (MOTT), which can sometimes interfere with tuberculosis treatment [1].

Pulmonary TB is commonly found in developing countries, particularly in densely populated urban environments often associated with poverty [2]. To this day, pulmonary TB remains a major public health issue and one of the top ten causes of death worldwide [3]. In 2020, approximately 10 million people worldwide suffered from pulmonary TB, and in 2021, this number increased to 10.6 million. Out of these 10.6 million TB cases in 2021, 6.4 million people received treatment, while the remaining 4.2 million were undiagnosed or unreported [4].

Indonesia ranked second in the world for the highest number of pulmonary TB cases in 2021. In that year, India had 2.9 million cases, Indonesia had 969,000 cases, and China had 780,000 cases. In 2020, Indonesia recorded 819,000 TB cases, which increased to 969,000 in 2021. The number of TB patients who received treatment in Indonesia was 384,025 in 2020 and 432,577 in 2021 [4]. Pulmonary tuberculosis has significant consequences for patients, their families, and the nation. For patients, TB weakens the immune system, making them more susceptible to other infectious diseases and reducing their productivity. TB patients often become a burden on their families and face social stigma from their communities [5]. Although effective TB medications exist, the prevention and eradication of pulmonary TB remain unsatisfactory. High dropout rates (treatment discontinuation), inadequate treatment, and resistance to anti-tuberculosis drugs (MDR-TB) are the main obstacles in controlling pulmonary TB. MDR-TB occurs when a patient discontinues treatment before completion or frequently misses doses

during therapy [6]. Discontinuing pulmonary TB treatment poses both individual and public health risks. Incomplete TB treatment increases transmission rates, drug resistance, and mortality. The transmission rate of TB-positive (AFB-positive) patients is 65%. If one infected person spreads the disease to 10-15 others, the following year could see 5.8 million new cases.

This number will rise if treatment dropout rates continue. According to the Global Tuberculosis Report 2017, the global treatment dropout rate was 22% in 2015. Among the WHO-designated regions, Southeast Asia had the highest TB treatment dropout rates, followed by Africa. In 2016, Indonesia ranked second after India in terms of TB cases, with a treatment success rate of 83% from 2014 to 2016—short of the 90% target [4]. Another consequence of incomplete TB treatment is the development of bacterial resistance to anti-TB drugs, known as Multi-Drug Resistant TB (MDR-TB). If MDR-TB patients continue to be noncompliant, they may progress to Extensively Drug-Resistant TB (XDR-TB), which is an extreme form of drug resistance [7].

Factors Affecting TB Treatment Adherence According to [8], two major factors influence treatment adherence in pulmonary TB patients: internal and external factors. Internal factors include patient characteristics and behaviors such as gender, occupation, age, and education level. External factors include environmental and social factors, such as housing conditions, medication adherence, and social support [8].

Age is one of the factors influencing TB treatment completion. As people age, lymphocyte production decreases, weakening the immune system. A compromised immune system reduces the body's ability to fight infections effectively. Gender also plays a role in treatment adherence, as men tend to have lifestyles that may interfere with recovery. For instance, smoking and alcohol consumption can weaken the immune system and hinder TB treatment effectiveness [6].

Involving 75 respondents found a significant relationship between age and TB treatment completion (p = 0.012) [9]. Similarly, Marleni et al. (2020) conducted a study with 37 respondents and found a significant relationship between gender and TB treatment success (p = 0.047). Knowledge is another factor affecting TB treatment adherence. A patient's level of understanding about the disease and its treatment plays a crucial role in their commitment to completing therapy. Rini (2020) found a significant relationship between knowledge and TB treatment success (p = 0.000).

II. RESEARCH METHODS

This study is quantitative analytical research using a cross-sectional approach. Quantitative analytical research aims to determine why a health problem occurs and then analyze its relationships. A cross-sectional study is conducted only once, without any follow-up [10]. The study will be conducted at RSU Royal Prima Medan, located at Jl. Ayahanda No. 68A, Sei Putih Tengah, Medan Petisah, Medan, North Sumatra, 20118. The population in research is crucial as it serves as the source of information. The population refers to the entire group of subjects or objects under study [11]. The population in this research

consists of pulmonary TB patients at RSU Royal Prima Medan from January to September 2024, totaling 261 patients. According to [12], a sample is a subset of the population that retains its characteristics. A sample represents a smaller group selected from the total population and serves as a representation of the larger group [11].

The sampling technique used in this study is proportional random sampling, a method where all members of the population have an equal chance of being selected according to their proportions [10]. The sample size will be determined using the following formula:

$$n = \frac{N}{1 + N(e)^2}$$

1) **Formula Explanation:**

- **n** = Sample size
- **N** = Population size
- **e** = Margin of error (acceptable level of inaccuracy due to sampling error), e.g., **5% (0.05)**

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{261}{1 + 261\,(0,05)^2}$$

$$n = \frac{261}{1 + 0,6525}$$

$$n = \frac{261}{1,6525}$$

$$n = 157,94 \; = \; 158$$

The results of the Slovin formula calculation yielded a sample size of 158 samples. In this study, there are two types of variables: independent variables and dependent variables. According to [13], there are five types of variables commonly used in research: independent variables, dependent variables, intervening variables, moderating variables, and control variables. In this study, only two types of variables are used: independent and dependent variables.

The independent variables in this study are:

1. Age (X1)
2. Gender (X2)
3. Education (X3)
4. Knowledge (X4)
5. Attitude (X5)
6. Motivation (X6)

The dependent variable in this study is the irregularity in the treatment of pulmonary tuberculosis (Y).

III. RESULTS AND DISCUSSION

A. Frequency Distribution of Respondent Characteristics

Below is the frequency distribution of the respondent characteristics in this study, which includes age, gender, and education of the respondents.

TABLE I
Frequency Distribution of Respondent Characteristics

Ages	n	%
≤ 20 Year	11	7
21 - 30 Year	47	29,7
31 - 40 Year	81	51,3
≥ 41 Year	19	12
Total	**158**	**100**
Gender	**n**	**%**
A Man	61	38,6
Woman	97	61,4
Total	**158**	**100**
Educated	**n**	**%**
SMP	14	8,9
SMA	41	25,9
D3	42	26,6
D4/S1	57	36,1
S2	4	2,5
Total	**158**	**100**

Table 1 explains the results of the study on the frequency distribution of respondent characteristics in this study, including age, gender, and education. The results show that the respondents in this study who were under 20 years old were 11 people, accounting for 7%. Respondents aged 21-30 years were 47 people, accounting for 29.7%, those aged 31-40 years were 81 people, accounting for 51.3%, and those aged over 41 years were 19 people, accounting for 12%.

In terms of gender, the respondents in this study were 61 men, accounting for 38.6%, and 97 women, accounting for 61.4%.

As for education, 14 respondents had completed junior high school (SMP), accounting for 8.9%; 41 respondents had completed senior high school (SMA), accounting for 25.9%; 42 respondents had completed a diploma (D3), accounting for 26.6%; 57 respondents had completed a bachelor's degree (D4/S1), accounting for 35.1%; and 4 respondents had completed a master's degree (S2), accounting for 2.5%. The total number of respondents in this study was 158 people.

B. Results of Univariate Analysis

This table will show the results of univariate analysis to determine the percentage of respondents' answers regarding their knowledge about the treatment of Pulmonary TB.

TABLE II
Knowledge

Knwledge	n	%
Good	117	74,1
Not Good	41	25,9
Total	**158**	**100**

Table 2 explains the results of the univariate analysis on respondents' knowledge about the treatment of Pulmonary TB. The research findings show that 117 respondents (74.1%) have good knowledge about the treatment of Pulmonary TB, while 41 respondents (25.9%) have poor knowledge, out of a total of 158 respondents in this study.

C. Regularity of Pulmonary TB Treatment

The following are the results of univariate analysis to determine the percentage of respondents' answers regarding regularity in pulmonary TB treatment.

TABLE III
Regularity of Pulmonary TB Treatment

Regularity of Pulmonary TB Treatment	n	%
Regular	102	64,6
Irregular	56	35,4
Total	**158**	**100**

Table 3 explains the results of univariate analysis on respondents' regularity variables in pulmonary TB treatment. The research results show that the respondents in this study who were regular in pulmonary TB treatment were 102 respondents with a percentage of 64.6%, the respondents who were irregular in pulmonary TB treatment were 56 respondents with a percentage of 35.4% of the total respondents in the study. This was 158 respondents.

D. Bivariate Analysis Results

The Influence of Age on Irregular Pulmonary TB Treatment at RSU Royal Prima Medan the following are the results of a bivariate analysis to determine the effect of age on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan.

TABLE IV
Effect of Age on Irregular Pulmonary TB Treatment at RSU Royal Prima Medan

Variable	Sig. (2-tailed)	Pearson Correltion
Age on Irregular Treatment of Pulmonary TB	0,475	-0,057

From table 6 above, it shows that between age and irregular pulmonary TB treatment there is a correlation coefficient (r) of -0.057 with the level of influence or relationship in the very weak category, and this correlation is not significant because $p > 0.05$ $(0.475 < 0.05)$.

This shows that there is no influence between age on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan.

E. The Effect of Age on the Irregularity of Pulmonary TB Treatment at RSU Royal Prima Medan

Here are the results of the study on the effect of age on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. The study shows that 11 respondents (7%) are aged < 20 years, 47 respondents (29.7%) are aged 21-30 years, 81 respondents (51.3%) are aged 31-40 years, and 19 respondents (12%) are aged > 41 years.

The bivariate analysis using Pearson correlation shows that the correlation coefficient (r) between age and irregular pulmonary TB treatment is -0.057, indicating a very weak relationship. Furthermore, the correlation is not significant because $p > 0.05$ (0.475 < 0.05). This suggests that there is no significant effect of age on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. The findings are consistent with the research conducted [14] on the difference in age and gender regarding the completion of pulmonary TB treatment at health centers in Kupang City. The results indicated that there was no effect of age on the completion of TB treatment in the health centers.

Age refers to the period since a person was born and can be measured in terms of time. From a chronological perspective, individuals of the same age typically exhibit similar anatomical and physiological development [15]. Age is one of the factors that can affect the completion of pulmonary TB treatment, where the aging process can impact the production of lymphocytes. A decrease in lymphocyte production can weaken the immune system, affecting its ability to respond to infections. Additionally, lifestyle factors, such as smoking and alcohol consumption, which are more common among men, can affect the immune system and hinder the successful completion of TB treatment. The following presents the results of the study on the effect of gender on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. The study indicates that 61 male respondents (38.6%) and 97 female respondents (61.4%) participated in the study. Bivariate analysis using Pearson correlation shows that the correlation coefficient (r) between gender and irregular pulmonary TB treatment is 0.320, indicating a weak relationship. Moreover, the correlation is significant because $p < 0.05$ (0.000 < 0.05). This indicates that gender has an effect on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. The findings align with the study [15] titled "The Relationship Between Age, Gender, and the Treatment of MDR TB." The research shows a relationship between gender and MDR TB treatment outcomes. Gender is a social construct that categorizes individuals as male or female based on cultural and behavioral attributes. It involves aspects of social, cultural, psychological, and non-biological influences. Gender helps to identify the differences between men and women in terms of social culture, and it encompasses roles and activities typically associated with being male or female [16]. Gender is one of the factors that can influence treatment adherence. Men and women differ in various aspects, such as social relationships, environmental influences, lifestyle habits, and biological and physiological differences. However, both men and women have equal access to information, including about TB treatment, and both are offered the same TB treatment programs. Treatment completion is based on the individual's decision to undergo treatment, aiming for recovery. Therefore, both genders have the same opportunity to achieve treatment success if they adhere to the prescribed regimen.

IV. CONCLUSIONS

Here are the conclusions from the study titled "Determinants Affecting the Irregularity of Pulmonary TB Treatment at RSU Royal Prima Medan": There is no effect of age on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. There is an effect of gender on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. There is an effect of education on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. There is an effect of patient knowledge on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. There is an effect of patient attitude on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. There is an effect of patient motivation on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan. The variable that most influences the irregularity of pulmonary TB treatment at RSU Royal Prima Medan is the patient motivation variable. The combined effect of gender, education, knowledge, attitude, and motivation on the irregularity of pulmonary TB treatment at RSU Royal Prima Medan is 71.5%.

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