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Non-adherence to anti-tuberculosis treatment and determinant factors during intensive phase treatment of pulmonary tuberculosis

Saimi*, Nursini Juiban Hadi

Universitas Qamarul Huda Badaruddin Bagu, Indonesia.

Corresponding author: *E-mail: saimi.imi@gmail.com

Abstract

Background: The number of Tuberculosis (TB) sufferers in various regions is still high. Efforts to reduce tuberculosis rates carried out by the health service have not produced much results. One of the factors that determines the recovery of TB patients is compliance in taking anti-tuberculosis medication. Tuberculosis sufferers who do not comply with taking intensive phase medication according to the dosage rules set by health workers can develop drug resistance or rifampicin resistance, so the chance of being cured is smaller.

Purpose: To determine factors of non-adherence to anti-tuberculosis treatment during intensive phase treatment of pulmonary tuberculosis

Method: This research uses cross-sectional research. This method is used to examine the relationship between one or more dependent variables and one or more independent variables at a certain time, in this case variables related to patient compliance in the intensive phase of TB treatment. The subjects in this study were 53 patients suffering from pulmonary TB in the working area of the Aikmel Community Health Center, East Lombok. The research sample was selected using the total sampling method. Data collection uses interviews and questionnaires. Data analysis in cross-sectional research involves several steps to describe and interpret the characteristics or variables observed at a particular point in time.

Results: The variables education level, attitude and age have a significant relationship with adherence to taking anti-tuberculosis drugs in the intensive phase. In the education variable, the p-value (Significance Value): 0.008, Relative Influence (PR): 5.989 and Confidence Interval (CI): 1.602 – 22.389, in the attitude variable p-value: 0.038, Relative Influence (PR): 3.473, Interval Confidence (CI): 1.074 – 11.226 and p-value: 0.039, Relative influence (PR) 3.943 and Confidence Interval (CI): 1.075 – 14.468. For the variables Gender, Occupation, Side Effects of Drugs, Role of Health Workers, and Role of Drug Swallowing Supervisor, there is no significant relationship between these variables and adherence to taking anti-TB drugs in the intensive phase.

Conclusion: Based on the research findings, the conclusion that can be drawn is that low education, a supportive attitude, and older age can be significant risk factors for non-adherence to taking intensive phase anti-TB drugs in pulmonary TB patients in the Aikmel Health Center area. The variables gender, occupation, drug side effects, health worker role, and therapeutic drug monitoring (TDM) role did not have a significant relationship. Therefore, intervention strategies and public health approaches can be focused on these risk groups to increase the level of compliance in taking intensive phase anti-TB drugs.

Keywords: Intensive Phase; Treatment Compliance; Tuberculosis Patients.

INTRODUCTION

Pulmonary tuberculosis, or what is often referred to as pulmonary TB, is a bacterial infection caused by *Mycobacterium tuberculosis* (Liu, Yuan, Guo, Huang, & Lin, 2024). This disease generally attacks the lungs, but can also attack other parts of the body such as the kidneys, bones and brain (Liu, Guo, Liu, Guo, Wang, Chai & Ma, 2023). The main symptoms of pulmonary TB include a prolonged cough that may be accompanied by bloody phlegm, fever, night sweats, weight loss, and general weakness (Luies & Du Preez, 2020).

Treatment of pulmonary TB usually involves regular use of antibiotics over a fairly long period of time (usually several months) to ensure that TB bacteria have been completely eliminated (Zhang, Cui, Zang, Feng, Chen, Wang, & Liu, 2023). It is important to detect and treat TB early to prevent the spread of infection and prevent further complications.

Tuberculosis (TB) of the lungs can become a serious condition if not treated or managed properly. Some of the dangers and complications that can arise from pulmonary TB include: Pulmonary TB is contagious and can spread to other people through the air (Sharma, Muthu, Agarwal, Mehto, Pahuja, Grover & Grover, 2023). This can happen when an infected person coughs or sneezes, releasing TB bacteria into the air which can then be inhaled by other people.

If TB is not treated, the infection can significantly damage the lungs and cause serious lung disease, such as pulmonary fibrosis or permanent damage to lung tissue (Meyer, Repnik, Karnaukhova, Schubert & Bramkamp, 2023).

The development of pulmonary tuberculosis (TB) cases in the world and in Indonesia continues to be monitored by global and national health organizations. According to the World Health Organization (WHO), in 2020, it is estimated that there will be around 10 million new cases of TB worldwide. These estimates include all types of TB, not just pulmonary TB. WHO also reports that TB remains one of the main causes of death worldwide (Dodd, Yuen, Jayasooriya, van der Zalm & Seddon, 2021; World Health Organization, 2023).

Indonesia is one of the countries in the world that has quite high TB cases. According to data from the Ministry of Health of the Republic of Indonesia, in

2019, there were around 845,000 TB cases in Indonesia (Ministry of Health of the Republic of Indonesia, 2022). This figure includes all types of TB, including pulmonary and extra-pulmonary TB. The Indonesian government continues to strive to improve efforts to prevent, early detect and treat TB through public health programs.

The duration of treatment for pulmonary tuberculosis (TB) can vary depending on the type of TB, severity, and individual response to treatment (Tedla, Medhin, Berhe, Mulugeta & Berhe, 2020). TB treatment generally involves a combination of antibiotics given over a long enough period of time to ensure that all TB bacteria have been destroyed (Wang, Campino, Phelan & Clark, 2023).

In general, latent TB (inactive TB) is treated with antimicrobial drugs such as isoniazid for 6 to 9 months. For active TB without drug resistance, treatment usually involves a combination of several anti-TB drugs and lasts 6 to 9 months (Rosenfeld, Gabrielian, Hurt & Rosenthal, 2023). Standard treatment regimens may include rifampicin, isoniazid, pyrazinamide, and ethambutol.

In cases of TB with drug resistance, such as multi-drug resistant TB (MDR-TB) or extensively drug-resistant TB (XDR-TB), treatment can require the use of more specific drugs and last longer, even up to 18 to 24 months or more (Maseko, Ngubane, Letsoalo, Rambaran, Archary, Samsunder, Perumal, Chinappa, Padayatchi, Naidoo & Siro, 2023). Full adherence to the treatment regimen in the intensive phase is critical for successful TB treatment and to prevent the development of drug resistance (Gashu, Gelaye & Tilahun, 2021). Therefore, close collaboration between the patient and the healthcare team during the intensive phase is emphasized. However, there are still patients in the treatment phase who stop taking their intensive phase medication while treatment is still ongoing, resulting in treatment failure (World Health Organization, 2022).

Utilizing DOTS (Direct Observed Treatment Short-course) strategies for implementing drug control and short-term anti-tuberculosis drug combinations are two methods to ensure the recovery of tuberculosis patients during the treatment period. According to (Sholihati et al., 2019)

Saimi*, Nursini Juiban Hadi

Universitas Qamarul Huda Badaruddin Bagu, Indonesia.
Corresponding author: *E-mail: saimi.imi@gmail.com

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if patients do not take intensive phase medication regularly during the treatment period, even if accompanied by reliable tuberculosis medication guidance, the results will usually be disappointing.

RESEARCH METHOD

This research uses cross-sectional research. The cross-sectional method is an observational research design conducted at one point in time or over a short time span to collect data from research participants and analyze the relationship between certain variables.

This method aims to provide an overview of situations or events in a population at a certain time. This method is used to examine the relationship between one or more dependent variables and one or more independent variables at a certain time, in this case variables related to patient compliance in the intensive phase of TB treatment.

The subjects in this study were 53 patients suffering from pulmonary TB in the working area of

the Aikmel Community Health Center, East Lombok. The research sample was selected using the total sampling method. Data collection uses interviews and questionnaires. Research participants are interviewed or asked to fill out questionnaires containing structured or semi-structured questions. Researchers ask pre-designed questions to obtain the desired information.

Data analysis in cross-sectional research involves several steps to describe and interpret the characteristics or variables observed at a particular point in time. The first step is to carry out a statistical description for each observed variable. The aspects described include calculating measures of data centering such as mean, median, and mode, as well as measures of dispersion such as standard deviation or range. The second step is to analyze the relationship between variables using SPSS. After data analysis is carried out, the data is interpreted, sorted according to the pattern and conclusions are drawn.

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Universitas Qamarul Huda Badaruddin Bagu, Indonesia.
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RESEARCH RESULTS

Table 1. Characteristic of Respondents (N=53)

Variables	Anti-tuberculosis treatment	
	Adherence (n=46)	Non-adherence (n=7)
Age (n/%)		
15-19 years old	3/6.5	0/0
20-44 years old	27/58.7	0/0
45-59 years old	6/13.1	4/57.1
≥ 60 years old	10/21.7	3/42.9
Gender (n/%)		
Male	17/36.9	5/71.4
Female	29/63.1	2/28.6
Education Levels (n/%)		
Basic school	2/4.3	0/0
Junior	4/8.7	3/42.9
Senior	36/78.3	4/57.1
University	4/8.7	0/0
Employment Status (n/%)		
Student	3/6.5	0/0
Housewife	6/13.1	2/28.6
Farmer	13/28.3	3/42.8
Civil Servants	5/10.9	0/0
Private Sector	18/39.2	2/28.6
Knowledge Levels (n/%)		
Poor	3/6.5	2/28.6
Fair	8/17.4	5/71.4
Good	35/76.1	0/0
Attitude during treatment (n/%)		
Negative	2/4.3	1/14.3
Neutral	11/23.9	6/85.7
Positive	33/71.8	0/0
Side Effects of The Medications (n/%)		
Appear	11/23.9	6/85.7
Disappear	35/76.1	1/14.3
DOT (Directly Observed Treatment) Support (n/%)		
Poor	1/2.2	2/28.6
Fair	5/10.9	4/57.1
Good	40/86.9	1/14.3

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Based on the descriptive statistics presented in table 1, it can be seen that all variables contribute to the problem of patient non-compliance in the intensive phase of treatment. In the age group, non-compliance was highest in the 45-59 year age group. The gender group that is most disobedient is male. In the type of work group, non-compliance often occurs among farmers. Non-compliance also occurs frequently in groups with inadequate and insufficient attitudes and levels of knowledge. In the aspect of TDM support, non-compliance often occurs in patients who still do not receive enough TDM support, in fact cases of non-compliance still occur in groups of patients who already receive sufficient support from the TDM.

Table 2. Relationship Between Variables and Medication Adherence

Variable	p-value (Significance Value)	Relative Influence (PR)	Confidence Interval (CI)
Education	0.008	5.989	1.602 – 22.389
Attitude	0.038	3.473	1.074 – 11.226
Age	0.039	3.943	1.075 – 14.468

Based on table 2, it can be seen that in the education variable there is a significant relationship between the level of education and adherence to taking anti-TB drugs in the intensive phase. This can be seen from the magnitude of the P-value (Significance Value): 0.008, Relative Influence (PR): 5.989 and Confidence Interval (CI): 1.602 – 22.389. This can be interpreted that patients with low education have a higher chance of being non-compliant in taking intensive phase anti-TB drugs compared to those with higher education. In the Attitude Variable, there is also a significant relationship between attitudes towards treatment and adherence to taking anti-TB drugs in the intensive phase, with P-value: 0.038, Relative Influence (PR): 3.473, Confidence Interval (CI): 1.074 – 11.226. These data can be interpreted to mean that patients with a supportive attitude are more likely to be non-compliant in taking the intensive phase of anti-TB drugs compared to those who have a supportive attitude. The age variable also indicates that there is a significant relationship between patient age and adherence to taking intensive phase anti-TB drugs. This can be seen from the magnitude of the P-value: 0.039, relative influence (PR) 3.943 and confidence interval (CI): 1.075 – 14.468. In the age variable, it can be interpreted that older patients have a higher chance of being non-compliant in taking the intensive phase of anti-TB drugs compared to those who are younger. The results of statistical tests on the variables Gender, Occupation, Side Effects of Drugs, Role of Health Workers, and Role of TDMs show that

there is no significant relationship between gender, occupation, side effects of drugs, role of health workers, and role of TDMs with adherence to taking anti-TB drugs in the intensive phase. This can be interpreted that these factors do not play a significant role in predicting adherence to taking intensive phase anti-TB drugs in pulmonary TB patients based on the results of this study.

DISCUSSION

The level of education can influence non-compliance with taking intensive phase Anti-Tuberculosis Medication in pulmonary Tuberculosis (TB) patients for several reasons (Yeti & Usman, 2021). The level of education has a close relationship with the patient's understanding of the disease. Higher education tends to increase a person's understanding of the disease and the need to follow treatment properly (Hidayati, Waluyo, & Winarni, 2021). A more educated patient may be better able to understand the importance of taking medication regularly to cure TB. The level of education is also related to health awareness. People who have a higher level of education may have a better level of health awareness. They tend to better understand the risks and consequences of non-adherence to TB treatment, and are therefore more likely to adhere to treatment. The level of education is also related to access to information. Higher levels of education are often associated with better access to health information. More educated patients find it easier to obtain information about TB,

Saimi*, Nursini Juiban Hadi

Universitas Qamarul Huda Badaruddin Bagu, Indonesia.
Corresponding author: *E-mail: saimi.imi@gmail.com

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its treatment, and the impact of non-adherence through medical literature, consultations with health professionals, or other sources of information (Abdu, Ali, Anteneh, Yesuf, Birhanu, Mohamed & Hussien, 2021).

Health literacy, or a person's ability to understand and use health information, can be influenced by level of education. Patients with higher health literacy can better understand medication instructions and other health information. Education level is often related to social networks and support. Patients with higher levels of education have access to better social support, including support from family or friends, which can motivate them to adhere to treatment. More educated patients are better able to understand and properly manage medication side effects, which can be a significant factor in choosing to adhere to treatment.

A person's attitude can influence non-compliance with taking intensive phase Anti-Tuberculosis Medication in pulmonary Tuberculosis (TB) patients. Some reasons why attitudes can play an important role in patient adherence to TB treatment include: Perception of Treatment Needs. Attitudes towards the need for treatment can influence the extent to which a person views TB treatment as important (Wang et al., 2023). If patients feel that treatment is not that important or does not provide significant benefit, their attitudes may influence adherence to treatment. Belief in Treatment Effectiveness. Attitudes towards the effectiveness of TB treatment can play a large role in non-adherence (Kapustin, Krasnova, Khokhlova, Stashevskaya, Pudova, & Pozdnyakova, 2023). If patients have high confidence that treatment will be successful, they may be more likely to adhere to the treatment plan.

Understanding Side Effects. Attitudes towards drug side effects can also influence non-adherence (Wu et al., 2023). If patients have a good understanding of side effects and feel confident they can cope or manage them, they may be more likely to adhere to treatment.

Attitudes Toward Health in General. Attitudes towards health in general can reflect how seriously someone views the importance of maintaining their health (Balasaniantc, 2022). If patients have a positive attitude towards health and well-being, they may be more likely to adhere to a TB treatment plan.

Psychosocial Needs. Attitudes toward psychosocial needs may play a role. If patients experience emotional distress or psychosocial problems that influence their attitudes towards treatment, this may contribute to non-adherence.

Expectations of the Treatment Process. Attitudes towards the treatment process, including the duration and amount of medication to be taken, can influence adherence (Kibirige, Andia-Biraro, Kyazze, Olum, Bongomin, Nakavuma, & Critchley, 2023). If patients perceive the treatment process as too complicated or tiring, this may affect their motivation to adhere to the treatment plan. The attitudes of the people around the patient, including family and friends, can also have an influence.

Social support or pressure can play an important role in shaping attitudes and, therefore, the level of patient compliance. Identifying and understanding patient attitudes can help health professionals design more effective treatment approaches, including strategies to increase patient understanding of the importance and safety of TB treatment.

Age can influence non-compliance with taking intensive phase Anti-Tuberculosis Medication in pulmonary Tuberculosis (TB) patients due to several factors, including: Cognitive Ability: In general, cognitive ability can decrease with age (Albano, Follman, Patel, Gantotti, Reilly & Hermes-DeSantis, 2021). Older patients may have difficulty understanding medication instructions or remembering medication schedules. This can lead to non-compliance due to lack of understanding or forgetting.

Physical Health. Older patients experience physical health problems that may affect their ability to take medications regularly (Kapustin et al., 2023). For example, vision or mobility problems may make it difficult for them to access medication or follow a treatment plan.

Comorbidity. In general, older patients tend to have more comorbidities (Balasaniantc, 2022). Medications for other medical conditions may interact with anti-TB drugs or cause additional side effects, which may impact adherence rates. Perception of Risks and Benefits.

Perceptions of the risks and benefits of treatment may vary based on age. Older patients may have a different understanding of the benefits of treatment

Saimi*, Nursini Juiban Hadi

Universitas Qamarul Huda Badaruddin Bagu, Indonesia.
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and the risks of non-adherence, which may influence their attitudes and behavior towards TB treatment (Butarbutar, Lasmawanti, Purba, & Bangun, 2022). Communication with Health Professionals. Communication between patients and health professionals can be influenced by generational differences (Snobre et al., 2023). Older patients may feel less comfortable or have barriers communicating with healthcare professionals, which may impact understanding and adherence to treatment plans. It is important to understand that these factors may vary between individuals and each patient has unique needs and challenges. A care approach that considers these aspects holistically can help improve patient adherence to TB treatment.

CONCLUSION

Based on the research findings, the conclusion that can be drawn is that low education, a supportive attitude, and older age can be significant risk factors for non-adherence to taking intensive phase anti-TB drugs in pulmonary TB patients in the Aikmel Health Center area. The variables gender, occupation, drug side effects, health worker role, and TDM role did not have a significant relationship. Therefore, intervention strategies and public health approaches can be focused on these risk groups to increase the level of compliance in taking intensive phase anti-TB drugs.

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