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Research Article

Factor Affecting Treatment Compliance in TB Patients

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Abstract

Aims: Pulmonary Tuberculosis is a disease caused by *Mycobacterium tuberculosis* that invades the lungs. Indonesia ranks second as the country with the highest number of pulmonary TB in the world. The treatment coverage of Pulmonary TB in Indonesia in 2022 is only 25% of the target (80%). One of the risk factors that cause treatment failure is medication adherence.

Objective: This study aims to determine the factors that influence medication adherence in patients with pulmonary TB.

Methods: This study used a quantitative descriptive design with a cross-sectional study on 33 patients with pulmonary TB who became respondents by using total sampling. This study uses more than one instrument including Morisky Medication Adherence Scale-8, Generic Assessment of Side Effects, Multidimensional Scale of Perceived Social Support. The data analysis that were used in this study are *Pearson Product Moment*, Chi-square, Kruskal-wallis, and Simple Linear Regression.

Results: The results of this study on factors related to medication adherence on TB patients showed that age, level of education, duration of treatment, drug side effects, and family support were related to medication adherence of pulmonary TB patients. alone.

Conclusion: This study showed that to achieve medication adherence requires the continuity of various factors and does not depend on one factor Future researchers are expected to examine other factors that can affect medication adherence in patients with Pulmonary TB.

Keywords:

Compliance; Medication Adherence; tuberculosis

INTRODUCTION

Pulmonary tuberculosis is a chronic infection caused by the bacterium *Mycobacterium tuberculosis* that attacks the lung parenchyma (1). According to the World Health Organization (WHO), tuberculosis is an infectious disease that is included in one of the top 10 causes of death in the world. Tuberculosis is caused by *Mycobacterium tuberculosis* which can be transmitted through the air; For example through coughing. Indonesia ranks 2nd in the country with the highest incidence of tuberculosis in the world (2). According to the World Health Organization (3), an estimated 10 million people suffer from

tuberculosis with 1.2 million children suffering from it, and the death rate from tuberculosis is 1.4 million. The number of TB cases in Indonesia in 2019 was found to be 543,847 cases.

According to the Ministry of Health (2) Coverage of treatment in 2020 will only reach 43% and in 2021 it will only be 25%. whereas TB treatment is an important part because TB can spread and be dangerous. In addition, adherence to taking TB drugs is also very important, because TB treatment should not be interrupted because it can cause drug resistance. Based on research by Nugrahaeni and Rosmalaningrum (4), it was found that one of the risk factors for failure

of pulmonary TB treatment was medication adherence ($p = 0.003$, OR 95% CI = 2.37-51.14), which means that pulmonary TB patients who did not comply with treatment had 11 times greater risk of treatment failure.

Adherence to treatment was defined as drug consumption according to a predetermined treatment plan or the extent to which the patient adhered to predetermined doses and intervals of treatment regimen (5). The World Health Organization states that the factors that influence medication adherence are divided into 5 dimensions, namely socio-economic related factors such as family support, patient-related factors such as age and gender, disease-related factors such as comorbidities, healthcare systems, -related factors such as the patient's relationship with health workers, and treatment-related factors such as side effects. Therefore, it is important that research is needed to find out what factors affect medication adherence, with the hope that if we know what factors influence it, we can improve and increase TB treatment adherence so that TB patients can recover from TB and not spread the disease to others. other.

This study aims to see what factors affect medication adherence in pulmonary TB patients and will be carried out at the Selabatu Health Center and Sukabumi Health Center which are the two health centers with the highest number of pulmonary TB cases in the first and second quarters of 2022 in Sukabumi City.

METHODS

This type of research is quantitative research with a cross-sectional study approach with dependent and independent variables. The dependent variable is medication adherence in pulmonary TB patients and the independent variable is self-characteristics (age, gender, level of final education, occupation, income, length of illness, and length of treatment), family support, and drug side effects. This research

was conducted in two health centers located in Sukabumi City, namely Selabatu Health Center and Sukabumi Health Center. This research was conducted in July 2022. This research has an ethical license with a permit number No. III/064/KEPK-SLE/STIKEP/PPNI/JABAR/IX/2022. The population is pulmonary TB patients in the first and were patients with pulmonary TB in the 1st and 2nd quarters of 2022 at the Selabatu Health Center and Sukabumi Health Center.

Sample selection was done by total sampling where all subjects who met the research inclusion criteria were used as research samples. The total sample is 33 people.

The first part consists of a demographic data questionnaire which includes age, gender, final education level, occupation, income, length of illness, and length of treatment. The second part consists of a medication adherence questionnaire. The instrument used is Morisky

Medication Adherence Scale-8 (MMAS-8) which consists of 8 items, with convergent validity is $r = 0,883$. The third part consists of a questionnaire on drug side effects using the Generic Assessment of Side Effects (GASE) instrument consisting of 36 items, Cronbach's alpha of 0.89. The last part consists of a family support questionnaire. The instrument used is the Multidimensional Scale of Perceived Social Support (MSPSS) which consists of 4 items, Cronbach's alpha value is 0.87 while based on test-retest reliability the results are 0.85 on the family subscale.

The data analysis method used in this research is univariate analysis, bivariate and multivariate analysis. Univariate analysis to see the frequency distribution, mean score, and minimum and maximum values. Bivariate analysis was performed using the Pearson Product Moment, Chi-square, and Kruskal-Wallis statistical tests. The multivariate test was carried out using the Simple linear regression test.

RESULTS

Demographic Characteristics of TB Patients

Table 1.
Demographic Data of Pulmonary TB Patients (n=33)

Variable	Total f (%)
Sex	
male	12 (36.4)
female	21 (63.6)
Level of education	
Primary school	4 (12.1)
Junior high school	6 (18.2)
Senior high school	19 (57.6)
college	4 (12.1)
Profession	
unemployment	12 (36.4)
work	17 (51.5)
Student	4 (12.1)
Salary	
≤ 2.000.000	27 (81.8)
> 2.000.000	6 (18.2)
Months of treatment	
Early stage (≤ 2 month)	17 (51.5)
Advance stage (> 2 month)	16 (48.5)

Based on table 1 above, it was found that most of the respondents were female (63.6%), the last education level was high school (57.6%), worked (51.5%), earned under 2 million (81.8%), and was undergoing treatment stage early (51.5%).

Characteristics of Age and Length of Illness of Pulmonary TB Patients

Table 2.
Age and duration of illness of patients with pulmonary TB (n=33)

Variable	Min-Max	Mean ± SD
Age	18-64	36.33 ± 14.579
Duration of illness	1-7	4.00 ± 2.031

Based on table 2 above, the results show that the average respondent is 36 years old with the youngest age 18 years and the oldest being 64 years old. Respondents on average had suffered from pulmonary TB for 4 months with the longest duration of illness being 7 months.

Characteristics of Side Effects of Pulmonary TB Patients

Table 3.
Characteristics of side effects of drugs in patients with pulmonary TB (n=33)

Variable	Total f (%)
Drug side effects (mean)	9.666 ± 8.631
Min = 0	
Max = 53	
Feel the side effects	28 (84.8)
Don't feel any side effects	5 (15.2)
Side effects	
Headache	11 (33.3)
Vomiting	12 (36.4)
Difficulty urinating	19 (57.6)
Tremor	13 (39.4)
Muscle ache	10 (30.3)
Joint pain	12 (36.4)
Family support	
High family support	20 (60.4)
Moderate family support	13 (39.4)
Compliance	
High compliance	15 (45.5)
moderat compliance	5 (15.2)
Low compliance	13 (39.4)

Table 3 above shows that the lowest score for drug side effects is 0 and the highest score is 53 with a mean value of 9,666 (SD = 8,631). Most of the respondents (84.4%) experienced side effects in the last week of their treatment. The most common side effects felt by respondents were difficulty urinating (57.6%), shaking (39.4%), joint pain (36.4%), vomiting (36.4%), and headache (33.3%). The higher the score obtained by the respondent, the more severe the side effects felt by the patient.

Based on table 3, it was found that 20 respondents received high family support (60.4%), 13 respondents received moderate family support (39.4%), and there were no respondents with low family support. The higher the score obtained, the higher the family support obtained. And, Table 3 above shows the results that respondents at Sukabumi Health Center and Selabatu Health Center had a high level of adherence of 45.5%, moderate compliance of 15.2%, and low compliance of 39.4%.

Treatment Compliance Relationship

Based on table 4 above, the results show that there is no significant relationship between length of illness and medication adherence ((p-value > 0.05). In the age variable, p-value = 0.047 < 0.05 with (r) = 0.348, which means that age has a significant relationship. significant with medication adherence, which means the correlation coefficient is moderate. In the education level variable, the p-value = 0.029 < 0.05, which means that there is a significant relationship between education and medication adherence.

In the drug side effects variable, the p-value = 0.007 < 0.05, which means that there is a significant relationship between drug side effects and medication adherence with a value of (r) -0.460 which means that the correlation coefficient is moderate. This shows that the lower the perceived side effects, the higher the level of treatment adherence.

Table 4.
**Relationship between Demographic Data and Drug Side Effects
on Treatment Adherence (n=33)**

Variable	Treatment (Ordinal)	compliance	Test statistics used
	<i>p-value</i>	R	
Age (<i>Continuous</i>)	0.047	0.348	<i>Pearson Product Moment</i>
Level education (Ordinal)	0.029		<i>Kruskal-Wallis H test</i>
Duration of sick (Ordinal)	0.899	-0.023	<i>Pearson Product Moment</i>
Side effect (<i>Continuous</i>)	0.007	-0.460	<i>Pearson Product Moment</i>

Table 5.
Results of Chi-square analysis (n=33)

Variable	Total (n=33)	Compliance (ordinal)			<i>p-value</i>	Test statistics used
		Tinggi N%	Sedang N%	Rendah N%		
Sex						
Male	12 (36.4)	4 (12.1)	2 (6.1)	6 (18.2)	0.555	<i>Chi-square</i>
Female	21 (63.6)	11 (33.3)	3 (9.1)	7 (21.2)		
Months of treatment						
Early stage (≤ 2 month)	17 (51.5)	10 (30.3)	4 (12.1)	3 (9.1)	0.027	<i>Chi-square</i>
Advance stage (> 2 month)	26 (48.5)	5 (15.2)	1 (3)	10 (30.3)		
Family support						
High family support	20 (60.6)	12 (36.4)	4 (12.1)	4 (12.1)	0.018	<i>Chi-square</i>
Moderate family support	12 (39.4)	3 (9.1)	1 (3)	9 (27.3)		
Profession						
Unemployment	12 (36.4)	5 (15.2)	2 (6.1)	5 (15.2)	0.538	<i>Chi-square</i>
Work	17 (51.5)	7 (21.2)	2 (6.1)	2 (6.1)		
Student	4 (12.1)	3 (9.1)	1 (3)	0 (0)		
Salary						
$\leq 2.000.000$	27 (81.8)	11 (33.3)	5 (15.2)	11 (33.3)	0.386	<i>Chi-square</i>

Based on table 5 above, it was found that there was no significant relationship between gender and medication adherence with $p\text{-value} = 0.555$. Based on gender, it shows that women have a higher level of medication adherence (33.3%) compared to men (3%).

In the variable length of treatment, the $p\text{-value} = 0.027 < 0.05$, which means that there is a significant relationship between duration of treatment and medication adherence in patients with pulmonary TB at the Selabatu Health Center and Sukabumi Health Center. Based on the length of treatment, respondents with an initial treatment stage of less than two months had a higher rate of treatment adherence (30.3%) compared to a follow-up treatment stage of more than two months (15.2%).

In the family support variable, the $p\text{-value} = 0.018 < 0.05$, which means that there is a significant relationship between family support and treatment adherence in patients with pulmonary TB at the Selabatu Health Center and Sukabumi Health Center. Based on these variables, respondents with high family support tend to have a high

level of medication adherence (36.4%) than respondents with moderate family support (9.1%).

In the work variable, the $p\text{-value} = 0.538 > 0.05$, which means that there is no significant relationship between work and medication adherence in patients with pulmonary TB at the Selabatu Health Center and Sukabumi Health Center. Based on employment status, respondents who work tend to have high medication adherence (21.2%) and respondents who do not work tend to have a low level of adherence (15.2%).

In the income variable, the $p\text{-value} = 0.386 > 0.05$, which means that there is no significant relationship between income and medication adherence in patients with pulmonary TB at the Selabatu Health Center and Sukabumi Health Center. Based on the total income, respondents with income below 2 million tend to have a high level of compliance (33.3%) but at the same time respondents with income above 2 million also tend to have a low level of compliance (33.3%).

Table 6.
Linear Regression Test Results

Variable	Kepatuhan Pengobatan		95.0% Confidence Interval for B		p-value
	Unstandardized		Lower Bound	Upper Bound	
	B	Std error			
Age	-0.006	0.027	-0.061	0.048	0.818
Level of education	0.790	0.458	-0.149	1.729	0.096
Months of treatment	-0.982	0.431	-1.865	-0.098	0.031
Family support	0.381	0.178	0.016	0.746	0.041
Side effect	-0.046	0.018	-0.082	-0.009	0.016

R Square = $0.623 \times 100\% = 62.3\%$

Based on table 6 above, the results obtained are linear regression with p-value on age variable of $0.818 > 0.05$, education level of $0.096 > 0.05$, p-value of treatment duration of $0.031 < 0.05$, p-value of family support of $0.041 < 0.05$, and the p-value of drug side effects is $0.016 < 0.05$. Based on the table above, the value of R Square = 0.623, which means the influence of the independent variable on the treatment adherence variable is 62.3%.

DISCUSSION

Adherence is defined as the extent to which a person's behavior in taking medication, following changes in diet and/or lifestyle, is in accordance with agreed recommendations from healthcare practitioners (6). There are many factors related to TB treatment adherence such as personal characteristics, relationship between healthcare providers and patients, treatment regimens and healthcare settings (3). WHO states that there are five dimensions of medication adherence, namely social and economic factors, therapy-related factors, disease-related factors, patient-related factors, and healthcare system-related factors.

In this study, it was found that several factors influenced adherence to pulmonary TB treatment at the Selabatu Health Center and Sukabumi Health Center, namely age, final education level, duration of treatment, drug side effects, and family support.

The results of this study showed that the age of the respondent had a significant relationship with medication adherence with a p-value of $0.047 < 0.05$ and a correlation coefficient (r) of 0.348, which means a moderate correlation coefficient. This is in line with the research of Sahputri & Khairunnisa (7) which states that there is a relationship between age and adherence to pulmonary TB treatment with p-value = 0.001. This can be due to the productive age having a lot of activities and interacting more with other people. This busyness can make sufferers forget to take their

medicine. According to WHO (3) chronic disease patients with older age are more likely to adhere to their treatment. Patients with older age tend to be more obedient to treatment because their activities are not too busy compared to younger patients so they can seek treatment regularly. According to Hayati in Kondoy (8) in the United States, people with an older age tend to follow doctor's instructions because they are more responsible, orderly, thorough, moral, and devoted compared to younger people.

The respondent's final education level had a significant relationship with medication adherence with a p-value of $0.029 < 0.05$, which means that there was a significant relationship between education level and medication adherence. According to Setyowati & Mutmainah in Absor et al (9) education is an effort that has been planned so that individuals can do what is taught by educational behavior. A person with a higher education level will increasingly need healthcare facilities for himself and his family when he feels sick. The higher a person's educational level, the more that person realizes that health is important for life so that he is motivated to come to healthcare facilities. In addition, a high level of education can also affect the understanding of the information provided by health workers. A high level of education makes individuals more open to learning new things and expanding their knowledge. This is in line with the research by Absor et al (9) which states that there is a relationship between the level of education and adherence to treatment in pulmonary TB patients with p-value = $0.026 < 0.05$. This study proves that the lower the education level of patients with pulmonary TB, the more people who do not comply with their treatment.

According to Meintarini in Dwiningrum et al (10) a person affected by pulmonary TB will undergo pulmonary TB treatment for approximately 6-8 months consisting of an intensive phase for the first two months and a continuation phase for the next four

months. The long duration of treatment can make patients feel bored and of course can be one of the factors that can affect the level of compliance of pulmonary TB patients. Not a few sufferers at the advanced stage of treatment decide to stop their treatment because they feel they have recovered or are bored with the treatment. If the treatment for 6 months is not successful, then the treatment will take longer so that the patient can recover from his illness.

The respondent's treatment duration had a significant relationship with medication adherence with a p-value of $0.027 < 0.05$, which means that there was a significant relationship between treatment duration and medication adherence. This is in line with the results of research by Dwiningrum et al (10) with p-value = 0.001 and OR value = 2.667 (1.705-4.171) which means that there is a relationship between length of treatment and adherence to treatment for pulmonary TB patients and respondents with treatment duration of more than two months. risk 2.7 times more likely to be non-adherent compared to respondents with treatment duration of less than two months. According to Yulianti (9), TB treatment takes about 6-9 months, the length of treatment makes TB sufferers feel bored and tired which can result in decreased adherence in taking medication. According to Pameswari et al (11) there are several things that can cause pulmonary TB patients not to take drugs, namely drugs that must be consumed in the long term, feeling healed due to reduced symptoms of the disease after undergoing treatment for 1-2 months so that patients tend to be lazy to continue treatment, and the side effects felt by the patient even though at the beginning of the treatment there was counseling about the treatment of pulmonary TB.

In this study, drug side effects had a significant relationship with medication adherence with a p-value of $0.007 < 0.05$, which means that there was a significant relationship between drug side effects and medication adherence. This is in line with

the results of the research by Seniantara et al (12), where p-value = $0.000 < 0.05$, which means that there is a significant relationship between drug side effects and adherence to TB treatment with a correlation coefficient (r) = -0.568 so it can be concluded that the effect drug side effects on adherence are not unidirectional. The more severe the side effects felt by the patient, the more disobedient the patient is in carrying out his treatment and vice versa. Patients who experience side effects from the drugs given will act not to take the drugs (13). According to Rahmi et al (14) patients who experience side effects of treatment and remain obedient in their treatment are influenced by other variables, while patients who are not compliant and experience side effects of treatment are caused because patients with pulmonary TB do not know that OAT can cause complaints. Most of the respondents with a lot of side effects said that they became lazy to take the medicine because of the complaints they felt after taking the TB medicine.

Family support is one of the important coping strategies because it can be seen by family members as something that can help to overcome problems. Family support can make individuals feel comfortable, cared for, and feel able to accept their condition. According to Friedman et al (15) family support is needed by TB sufferers in reducing anxiety, helping emotional mastery, and increase family morale.

The respondent's family support had a significant relationship with medication adherence with a p-value of $0.018 < 0.05$, which means that there was a significant relationship between family support and medication adherence. This is in line with the results of the research by Hamidah & Nurmalasari (16), where p-value = 0.001 was obtained, which means that there is a relationship between family support and adherence to treatment for pulmonary TB patients. Family support is very important to improve family health. According to Setiadi in Hamidah & Nurmalasari (16), a supportive family environment has been

shown to be associated with decreased mortality, easier recovery from disease, cognitive function, physical, and emotional health. The positive effect of family support is on adjustment to life events.

According to Chen & Zhang (17) the attitude of family members can influence the patient's decision to stop or continue treatment. Patients who were supervised to take their medication by their families and those who were encouraged by their families were more likely to have high levels of adherence. This can be caused because TB patients usually have a fear of treatment failure and lack confidence in their recovery so that it hinders their treatment.

CONCLUSION

The results of this study, it was found that age, education level, duration of treatment, side effects, and family support had a significant relationship with medication adherence in pulmonary TB patients at Sukabumi Health Center and Selabatu Health Center. Gender, occupation, income, and length of illness did not have a significant relationship with treatment adherence in pulmonary TB patients at Sukabumi Health Center and Selabatu Health Center. It is hoped that further research can examine other factors that can affect treatment adherence in pulmonary TB patients so that TB treatment adherence is more optimal.

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