



FACTORS THAT INFLUENCE MEDICATION COMPLIANCE IN PULMONARY TUBERCULOSIS PATIENTS

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ABSTRACT

Pulmonary tuberculosis is a chronic infectious disease that has a significant impact on global health, including Indonesia. Bandar I Health Center, Batang Regency was chosen as the research location because it has a low complete rate of taking medication (29.09%). Objective to analyze factors that influence medication compliance in pulmonary tuberculosis patients, including knowledge, attitudes, access to health services, drug side effects, family support, and support from health workers. An analytical observational design with a cross-sectional method. Data were collected through questionnaires from 68 pulmonary tuberculosis patients who met the inclusion criteria. Bivariate analysis used the Chi-Square test to determine the relationship between each independent variable and compliance, while multivariate analysis was performed to determine the dominant influencing factors. The knowledge, attitude, family support, and health worker support had a significant relationship with patient compliance ($p < 0.05$). Health worker support was a dominant factor with an Exp(B) value of 28.7, which means that patients with good health worker support have a 28.7 times greater chance of compliance. In contrast, access to health services did not show a significant relationship ($p > 0.05$). The compliance of tuberculosis patient's is influenced by education, positive attitude, family support, and attention from health workers. Interventions focused on strengthening patient education and increasing support from health workers are recommended to improve the success of tuberculosis treatment.

Keywords: compliance; education; health center; pulmonary tuberculosis; support

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INTRODUCTION

Pulmonary tuberculosis (TB) is an infectious disease of the lungs characterized by the formation of granulomas and tissue necrosis. Pulmonary TB as an infectious disease has a chronic nature that can have a negative impact on the quality of human resources (Highsmith et al., 2019). The source of transmission of pulmonary TB occurs through respiratory droplets of tuberculosis sufferers with positive BTA (acid-fast bacilli) results, when coughing, sneezing, or talking (Pangestika et al., 2019). Tuberculosis has a high morbidity rate worldwide. The World Health Organization (WHO) report states that the global incidence of tuberculosis is 132 cases per 100,000 population or an estimated 10 million people in the world currently have tuberculosis. The highest incidence was found in the African region with 231 cases per 100,000 populations, followed by the Asian region with 220 cases per 100,000 populations, then the Mediterranean region, the West Pacific, America, and finally Europe with 28 cases per 100,000 populations. The incidence of tuberculosis is relatively low in developed countries. Examples of countries with the highest incidence of tuberculosis per 100,000 population include China (61 cases), Brazil (45 cases), Angola (355 cases), India (199 cases), and Indonesia (316 cases) (WHO, 2020). Meanwhile, the highest prevalence of

tuberculosis nationally was found in Banten Province with a prevalence of 0.8%. East Java Province is in 25th position out of 34 provinces with a prevalence of 0.2% (Kementerian Kesehatan RI, 2018).

Tuberculosis medication involves a special antibiotic regimen that must be taken for a relatively long period of time, namely 6 months, so that medication compliance is one of the important challenges in managing tuberculosis cases (Kemenkes RI, 2020). National data shows that the tuberculosis dropout rate is still relatively high in Indonesia. Data from 2020 shows that the success rate of taking tuberculosis medication is 90% in Community Health Centers, 79% in government hospitals, 81% in private hospitals, 88% in government clinics, and 80% in private clinics (Kementerian Kesehatan RI, 2022). Various factors have been reported influenced the tuberculosis medication compliance. Some previous research reported that these factors include patient knowledge, patient attitudes, drug side effects, access to health services, and family support (Tukayo et al., 2020). Other studies state that the level of patient knowledge, patient attitudes, and family support do not affect patient compliance in taking anti-tuberculosis drugs (Wulandari et al., 2020). Research by (Samory et al., 2022) also reported that knowledge about tuberculosis, education level, distance to health facilities, family support, and attitudes were not related to patient compliance in taking tuberculosis medication, the related factor was motivation to take medication. Research by (Adhanty & Syarif, 2023) reported age, occupation, drug side effects, distance, knowledge related to tuberculosis, the role of the family in providing supervision, and support in taking medication as factors that influence compliance to taking tuberculosis medication. Research by (Rosadi, 2020) only reported knowledge as a factor that influences patient compliance in taking tuberculosis medication.

The research that has been conducted shows contradictory results about the factors that influence the decision to take medication, so research on these factors needs to be conducted to confirm the results that have been reported. This study choose the Bandar I Health Center, Batang Regency, as the research location because the cases of tuberculosis treated at this Health Center are one of the highest in Batang Regency with a very low complete rate of taking medication, which is 29.09% (Dinas Kesehatan Kabupaten Batang, 2020). The objective of this study is to analyze factors that influence medication compliance in pulmonary tuberculosis patients, including knowledge, attitudes, access to health services, drug side effects, family support, and support from health workers

METHOD

An observational analytical research used cross-sectional design. The subjects of the study were pulmonary TB patients undergoing treatment at the Bandar I Health Center, Batang Regency. The criteria for patients selected were pulmonary TB patients without comorbidities with a minimum sample size calculated using the Lemeshow formula at a 90% confidence level and a sample error of 10% and an estimated proportion in an unknown population of 0.5, so the minimum sample size needed is 68 pulmonary TB patients. This study used a questionnaire as a research instrument, containing questions related to knowledge, attitudes, access to health facilities, drug side effects, family and health worker support and the level of compliance of pulmonary TB patients in taking medication. The knowledge of pulmonary TB patients was assessed using 8 questions about pulmonary TB treatment with true and false answer choices differentiated as good (score 6-8), sufficient (score 4-5), and less (score 1-3). Patient attitudes were measured by 8 questions with true and false answer choices, then differentiated as good (score 5-8) and less (score 1-4).

Access to health care facilities was measured by 8 questions with yes and no answer choices, then differentiated into good (score 5-8) and less (score 1-4). Drug side effects were also

measured by 8 questions with true and false answer choices, then differentiated into no side effects (score 0), mild side effects (score 1-4) and severe side effects (score 5-8). Family support and health worker support were also measured from 8 questions with yes and no answer choices, then differentiated into good (score 5-8) and poor (score 1-4). Medication compliance was measured using the Morisky Medication Compliance Scale (MMAS-8) compliance questionnaire consisting of 8 questions and the level of compliance is measured from a range of 0 to 8. That questionnaire has validity score 0.824 and reliability score 0.881 (Fatmawati et al., 2023). Response categories consists of yes or no for question items 1 to 7, scored 1 if the answer is yes no and 0 if the answer is yes. While question item No. 8 is scored with 5 Likert scale with values 1 = never, 0.75 = occasionally, 0.5 = sometimes, 0.25 = usually, and 0 = always. Medication compliance is then divided into high (value 8), moderate (value 6 - <8) and low (value <6). Identification of factors influencing medication compliance bivariately was analyzed using the chi square test followed by a multivariate test using the logistic regression test for factors with a p value <0.25. This study was conducted during December 2024 - January 2025 in accordance with the principles of research ethics where TB patients selected as samples had signed an informed consent and this study had also received approval from the Medical and Health Research Bioethics Commission, Faculty of Medicine, Unissula Semarang No. xx / xx / xx / Bioethics Commission.

RESULT

The total number of patients diagnosed with TB and undergoing TB treatment at the Bandar I Health Center, Batang Regency in December 2024 - January 2025 was 82 patients with 6 patients excluded (5 patients had comorbid DM and 1 patient had HIV), leaving 76 people. The total sample required during this study was 68 samples taken randomly from that number. The characteristics of the patients in this study are shown in Table 1. According to age, the most patients (32.4%) were aged 18-25 years, the least at the age of <18 years and >65 years (4.4% each). Male patients (52.9%) were more than female (47.1%). The highest level of education was junior high school (44.1%) and some patients were working (60.3%). Patient knowledge about pulmonary TB is relatively lacking (shown by 47.1%), the attitude of some patients (52.9%) towards pulmonary TB treatment tends to be lacking. More than half of patients (51.1%) gave a good perception of access to health services. Patients generally (82.4%) experienced mild drug side effects, some (57.4%) patients received less support from their families, some (58.8%) also received less support from health workers and more than half (52.9%) had low medication compliance. Bivariate analysis of factors influencing medication compliance is shown in Table 2. The results of the bivariate analysis using the chi square test of factors influencing medication compliance in Table 2 show that almost all are significant (p<0.05) except for the factor of access to health services (p=0.626).

Table 1.
Distribution of Characteristics of Pulmonary TB Patients at Bandar I Health Center, Batang Regency

Data Characteristics	f	%
Age		
< 18th	3	4.4
18-25th	14	20.6
26-45th	22	32.4
46-55th	15	22.1
56-65th	11	16.2
>65th	3	4.4
Gender		
Man	36	52.9
Woman	32	47.1

Data Characteristics	f	%
Education		
Elementary school	21	30.9
Junior high school	30	44.1
Senior high school	14	20.6
College	3	4.4
Work		
Work	41	60.3
Doesn't work	27	39.7
Knowledge		
Not enough	32	47.1
Enough	21	30.9
Good	15	22.1
Attitude		
Not enough	36	52.9
Good	32	47.1
Access to health services		
Not enough	33	48.5
Good	35	51.1
Drug side effects		
There isn't any	0	0
Mild side effects	56	82.4
Serious side effects	12	17.6
Family support		
Not enough	39	57.4
Good	29	42.6
Support for health workers		
Not enough	40	58.8
Good	28	41.2
Medication compliance		
Low	36	52.9
Currently	14	20.6
Tall	18	26.5

Table 2. Results of bivariate analysis of factors influencing medication compliance

Factor	Medication Compliance [n, (%)]			p
	Low	Currently	Tall	
Knowledge				
Not enough	26 (38.2)	6 (8.8)	0 (0.0)	0,000
Enough	10 (14.7)	5 (7.4)	6 (8.8)	
Good	0 (0.0)	3 (4,4)	12 (17.6)	
Attitude				
Not enough	32 (47.1)	4 (5.9)	0 (0.0)	0,000
Good	4 (5.9)	10 (14.7)	18 (26.5)	
Access to health services				
Not enough	9 (13.2)	2 (2.9)	3 (4,4)	0.626
Good	27 (39.7)	12 (17.6)	15 (22.1)	
Drug side effects				
There isn't any	0 (0.0)	0 (0.0)	0 (0.0)	0.039
Mild side effects	26 (14.7)	12 (7.4)	18 (8.8)	
Serious side effects	10 (0)	2 (4.4)	0 (0)	
Family support				
Not enough	32 (47.1)	4 (5.9)	3 (4,4)	0,000
Good	4 (5.9)	10 (14.7)	15 (22.1)	
Support for health workers				
Not enough	32 (47.1)	4 (5.9)	4 (5.9)	0,000
Good	4 (5.9)	10 (14.7)	14 (20.6)	

Further multivariate analysis in three stages obtained the results in Table 3.

Table 3.
The results of multivariate analysis of factors influencing medication compliance by stepwise method

	Factor	B	SE	p	Exp(B)
Stage 1	Knowledge	1,223	0,922	0.185*	2,786
	Attitude	1,735	1,074	0.106*	5,668
	Drug side effects	-1,092	1,339	0.415	0.336
	Family support	3,058	1,243	0.014*	21,295
	Support for health workers	3.218	1,199	0.007*	24,975
Stage 2	Knowledge	1,262	0.902	0.162	3,531
	Attitude	1,921	1,037	0.064*	6,829
	Family support	3,037	1,227	0.013*	20,843
	Support for health workers	3.205	1,202	0.008*	24,645
Stage 3	Attitude	2,437	1,023	0.017	11,441
	Family support	2,858	1,216	0.019	17,428
	Support for health workers	3.358	1,168	0.004	28,744

* Factors that are dropped in the next stage of regression

Three stages of logistic regression analysis conducted showed that attitude, family support, and health worker support were independent factors of medication compliance in pulmonary TB patients at the Bandar I Community Health Center, Batang Regency. The most influential variable in this study was health worker support with an Exp (B) value of 28.744, which means that patients with good health worker support are 28.744 times more likely to be compliant in taking medication compared to tuberculosis patients who stated that health worker support was lacking.

DISCUSSION

The relationship between knowledge and medication compliance in this study supports the previous research (Gashu et al., 2021; Mekonnen & Azagew, 2018; Sahputri & Khairunnisa, 2022; Tang et al., 2015; Woimo et al., 2017) and can provide implications that good patient knowledge regarding TB prevention and transmission methods encourages and needs to be emphasized in the need for ongoing public education regarding TB prevention, treatment, and care (Adisa et al., 2021). The attitude of pulmonary TB patients which has also been proven to be related to medication compliance also supports previous research that there is a statistically significant relationship between attitude and medication compliance with a p value = 0.039 and an OR value of 2.450 (Sofiana et al., 2022). The compliance stage is the stage where individuals follow recommendations without self-awareness and obey the recommendations because they are afraid of the sanctions they will receive and the identification stage is the stage where individuals will obey something because they feel interested or admire a figure so that they want to imitate the actions of that figure. Attitude plays an important role in the treatment process, a positive attitude that a person has towards their illness will also give rise to positive behavior and actions so that it is hoped that this positive attitude will guide a person to complete their treatment. Attitude has several main components, namely the first is beliefs, ideas and concepts, the second is emotional life and the third is the tendency to act.

Access to health services has not been shown to be related to medication compliance. These results support the findings of Dachi et al (2024) which prove that there is no relationship between access to health services and medication compliance in tuberculosis patients at the Lahomi Health Center, West Nias. Health services are places that function to carry out health efforts that include promotive, preventive, curative and rehabilitative efforts driven by the government. One of the good health services is easy to reach in terms of location (Dachi et al., 2024). Distribution and health facility arrangements are very important. However, in this

study, there were 14 patients who had inadequate access to health services. Side effects are also a factor that has been shown to be associated with medication compliance. Similar results have also been shown that side effects of tuberculosis treatment can cause failure in pulmonary tuberculosis treatment and have been identified as one of the factors that can increase the risk of non-compliance in treatment (Andira et al., 2024).

The relationship between family support and medication compliance shown in this study was also found by (Sugiyanto & Sigala, 2023) that family support and compliance of pulmonary TB patients in taking medication are the keys to success in the treatment process ($p = 0.042$), while according to (Sriyanah et al., 2022) family support is the action and acceptance of the family towards supportive family members, always ready to provide help and assistance, information, advice, and guidance to patients. Support from health workers is the most influential variable on medication compliance in tuberculosis patients with an OR of 28.744. In line with the research of (Adima & Arini, 2025) on TB patients at Dr. Saiful Anwar Regional General Hospital, Malang, and showed that the most influential support is instrumental support which involves providing practical assistance, which can range from helping with transportation to medical appointments to helping with medication management. Research conducted only in one research location does not describe the factors of medication compliance in tuberculosis patients in a broad scope. Several other factors of medication compliance have also not been analyzed, such as economic factors, social factors and government policy factors which are limitations of the study.

CONCLUSION

Knowledge and attitudes of pulmonary TB patients, drug side effects, and support from family and health workers are factors that influence medication compliance. The last three factors are independent predictors of medication compliance, with the most dominant factor being support from health workers. The results of this study still need to be followed up with research in a wider scope, and involve economic factors, social factors and government policy factors.

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