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A simple model for describing non-adherence to medication in tuberculosis patients in a tropical area, Indonesia

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ORIGINAL ARTICLE

A SIMPLE MODEL FOR DESCRIBING NON-ADHERENCE TO MEDICATION IN TUBERCULOSIS PATIENTS IN A TROPICAL AREA, INDONESIA

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ABSTRACT

Indonesia has the second-highest number of tuberculosis (TB) cases in the world. Many TB patients did not take their medicine at health care centers causing an increase in taking medication. This study aimed to develop a simple model for describing non-adherence to medication in TB patients. This study used an analytical with a cross-sectional approach. The following criteria were used in selecting the respondent: adolescent, able to read and write, and willingness to be a respondent. A total of 93 participants were recruited randomly. Data were collected through questionnaires and analyzed using logistic regression. The predisposing factors were knowledge, attitude, belief (p = 0.000), trust (p = 0.013), and values (p = 0.001). Family support (p = 0.034) and healthcare personnel support (p = 0.022) were reinforcing factors. The enabling factor was the healthcare facility (p = 0.000). This study found that the most dominant factor is knowledge (B = 56.4). The model was Logit (Pi) = 22.363 + 56.4 knowledge (1) + 22.56 belief (1) + 2.9 family support (1) + 0.577 healthcare support (1) + 0.061 healthcare facility (1). This study suggests that TB patients' knowledge must be increased to improve their TB treatment and management.

Keywords: *Medication; non-adherence; tuberculosis*

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INTRODUCTION

Tuberculosis (TB) is an infectious disease with high morbidity and mortality rates worldwide (Mekonnen & Azagew, 2018; World Health Organization, 2021). These high rates are because TB treatment takes a minimum of six months. Therefore, TB patients must take their medication regularly. Most drug-susceptible TB cases can be cured with 2-intensive months of therapy followed by advanced phases of 4-7 months of therapy. Completing the treatment would result in only a 5-8% chance of return. However, non-compliance with TB medications will likely result in multidrug-resistant TB (MDR-TB) or post-TB sequelae (Bea et al., 2021; Mekonnen & Azagew, 2018). TB patients irregularly undergoing treatment, increase their rate of treatment failure and drug resistance (Adane et al., 2013) and relapse, leading to prolonged infection, transmission, and mortality (Woimo et al., 2017).

Non-adherence to medication is a form of health behavior. According to Lawrence Green's hypothesis, three elements—predisposing factors, precipitating factors, and enabling factors—impact health behavior (Green & Frankish, 1994). However, the non-adherence model has not been explored with non-adherence to medication for TB patients.

In Indonesia, the morbidity rate due to TB decreased in 2021. Nevertheless, Indonesia is still second after India for TB prevalence (World Health Organization, 2021). According to the Ministry of Health of the Republic of Indonesia in 2020, there were approximately 845,000 TB patients in Indonesia, 569,899 of them being notified. Therefore, 32% of cases have

not been reported. Moreover, 73% of the 90% target for successful treatment has been achieved.

Furthermore, Indonesia is one of the ten countries contributing to drug resistance rates yearly. Surabaya contributed the highest TB rate for East Java. In 2019, the number of TB cases at the East Perak Health Center was the 2nd highest in Surabaya and was comprised almost entirely of adolescents. The Global TB Report released by the World Health Organization in October 2021 estimated that there are currently 24,000 cases of drug-resistant TB in Indonesia. However, only 7,921 patients had laboratory confirmation, and 5,232 have started new treatments (World Health Organization, 2021).

TB medication adherence is critical for achieving successful treatment (Bea et al., 2021). However, ensuring adherence to TB drugs can be challenging due to the duration of treatment. Many factors affect the non-compliance of TB patients in taking medications. Treatment failure of TB patients is caused by socio-demographic and economic problems, knowledge and perception, and the effect of TB treatment (Pradipta et al., 2020). Nurses are health workers who are always in contact with TB patients. Thus, nurses also have a role in completing TB treatment. This study aimed to develop a simple model to describe the non-adherence to medication among Indonesian TB patients.

METHOD

Study design

This study used an analytical design with a cross-sectional approach.

Sample/ Participants/ Informant

This research was conducted at the Perak Timur Public Health Center, Surabaya. The population of this study was 119 pulmonary tuberculosis patients referred to the Perak Timur Health Center for treatment. The inclusion criteria in this study were adolescents who could read and write and were willing to be respondents. Their willingness was evidenced by their signed informed consent forms. The sample sizes were calculated from known population formulas. The sample size was 93 respondents, who were selected using simple methods for random probability sampling. This study considered predisposing factors (knowledge, attitudes, beliefs, and values); enabling factors (health facilities, environment); and independent variables (knowledge, attitudes, beliefs, and values); factors that reinforce (family support and healthcare personnel support), and the dependent variable of non-adherence to medication.

Data collection

Data collection was conducted using questionnaires with checklists.

Instrument

The TB medication adherence instrument was based on Lowren Green's behavioral theory, which consists of three parts: predisposing factors (knowledge, attitudes, and beliefs); enabling factors (health facilities, environment); and reinforced factors (family support and healthcare personnel support). The type of questions asked was closed questions with a Likert scale. The t-scoring system for the research data consisted of good and bad criteria with a good indicator with t-count > mean t. The validity test was predicated on a 0.361 difference between the r-count and the r-table. The assertion was accepted as true if the r-count exceeded the r-table. The instrument validity test results were deemed legitimate based on the instrument reliability test's findings and Cronbach's alpha result of 0.678.

Data analysis

Data were analyzed using logistic regression. The requirements for the logistic regression test were fulfilled, including data categorized as dichotomous and did not require the assumption of normality.

Ethical consideration

This research has received ethical approval from the Ethics Committee for Health Research at Nahdlatul Ulama University Surabaya with 048/EC/KEPK/UNUSA/2019.

RESULTS

The respondents' characteristics indicate that 52% were adults, 58% were male, and 50% had secondary education. Based on the respondents' treatment phase, 48% were in category 1.

Table 1. The participant's socio-demographic characteristics (n = 93)

Socio-demographic variables	Category	n (%)
Age	Adult	64 (68.8)
	Early elderly	29 (31.2)
Gender	Male	54 (58)
	Female	39 (42)
Education level	Basic	17 (18)
	Intermediate	47 (50)
	Advance	27 (42)
Suffering from TB	Category 1	45 (48)
	Category 2	26 (28)
	Category 3	22 (24)

Table 2. Regression analysis

Omnibus test	Hosmer & Lemeshow test	Prediction percentage	Regression analysis		
			Variables	p	OR
0.000	0.990	91.4	Knowledge	0.000	56.4
			Attitude	0,123	20.02
			Believe	0.000	22.56
			Family support	0.034	2.940
			Healthcare personal support	0.022	0.577
			Healthcare facility	0.007	0.061
			Environment	0.221	2.254

Table 2 shows that knowledge, belief, family support, support for health workers, and health facilities have a significant effect. Meanwhile, the variables that are not significant are attitude and environment.

The model fits (omnibus test = 0.000) and is correct (Hosmer and Lemeshow test = 0.990).

Logit (Pi) = 22.363 + 56.4 knowledge (1) + 22.56 believe (1) + 2.9 family support (1) + 0.577 healthcare support (1) + 0.061 healthcare facility (1).

This study's data were analyzed by logistic regression, where the requirements of the logistic regression test have been fulfilled. The following are the requirements for logistic regression: (1) does not require an assumption of normality, (2) a linear relationship between independent and dependent variables is not required, (3) independent variables do not require the assumption of multivariate normality, 6) dependent variables should be dichotomous, (9) at least 50 data samples are required for (independent) prediction if the required samples are relatively large.

Based on the above equation, the following information was obtained:

1. TB patients with low knowledge have a 56.4 times higher risk of non-adherence to TB mediation than those with good knowledge.
2. TB patients with low family support have a risk of not complying with TB medication 2.94 compared to those with good family support.
3. TB patients with low support from health workers risk not complying with TB medication by 0.577 times compared to those with good support from health workers.
4. TB patients with lower support from health facilities risk not complying with TB medication by 0.061 times compared to those with good support facilities.

Insignificant variables were attitude (p = 0.123) and environment (p = 0.221).

1. TB patients with low attitudes have a 20.02 times risk of non-adherence to TB medication than those with good attitudes.
2. TB patients with low environmental support have a 2.254 times higher risk of non-adherence to TB medication than those with good environmental support.

DISCUSSION

TB is a disease that can be cured. However, a lack of knowledge causes TB patients to not complete the necessary treatment (Adisa et al., 2021; Zhang et al., 2020). Low knowledge of tuberculosis and anti-TB therapy has a significant relationship with non-adherence (Mekonnen & Azagew, 2018). Lack of health education also makes TB patients lack information about TB medication (Ali & Prins, 2020). Thus, the patient's knowledge of the disease influences their treatment adherence and outcome (Dogah et al., 2021).

The factor that positively affects adherence to TB treatment is the belief in TB recovery (Sukartini et al., 2019). A good attitude is also related to adherence to drug adherence in patients with pulmonary disease TB at East Perak Surabaya (Nimah et al., 2019)·(Afryandes & Afryandes, 2020; Zahroh et al., 2021).

Family support is essential for TB patients to adhere to medication (Gugssa Boru et al., 2017; Zahroh et al., 2019). Families are involved as the patient's supervisors, provide food and transportation, and motivate the patient during treatment (Gugssa Boru et al., 2017). Knowledge of tuberculosis as well as family and social support are considered as important components of efficacy decisions..Knowledgeable families would encourage their family members to adhere to their treatment plan since they know of the repercussions of doing otherwise. Therefore, family support and information are crucial for a patient's healing and rehabilitation (Nimah et al., 2019). Effective family functioning can be interpreted as family members having a sense of belonging in the family, and maintaining their personality in a way that meets the psychological needs of family members. Family support allows families to function properly, improves adaptation skills and can improve the health of family members. Individuals who have good family support will become more optimistic and confident that they can improve their self-efficacy.

Lack of family support can contribute to non-adherence to medication by TB sufferers (Zhang et al., 2020). Social support systems including family support, peer support, and health support play an important role in maintaining TB treatment regimens (Barik et al., 2020). Moreover, families of TB sufferers play a role in preventing TB transmission by increasing knowledge and awareness (Gunawan, 2019; Sukartini et al., 2019, 2020).

Next, healthcare personnel helps TB patients overcome non-adherence to medications by being educators, reliable sources of information, trainers, and caregivers (Kurniawati, 2013). The role must be continuously and consistently performed at every TB patient meeting (Adisa et al., 2021). A strong correlation was also found between poor patient-provider relationships (Gugssa Boru et al., 2017; Mekonnen & Azagew, 2018; Sukartini et al., 2020). Lack of adequate communication between health professionals and TB patients also reduces the health worker support they receive (Gebremariam et al., 2010; Nezenega et al., 2020).

Furthermore, healthcare facilities also play a role and should ensure the timely collection of medication. However, access to healthcare facilities is frequently hampered by the difficulty of transporting TB patients to those facilities due to how they prepare their medications. (Sukartini et al., 2020). Moreover, transportation costs were the biggest obstacles to adhesion (Woimo et al., 2017). The patient's belief that they are far from health institutions is a major risk factor for non-adherence to tuberculosis treatment (Zegeye et al., 2019).

Another aspect to consider is the patient's living environment. It should also be modified into a place of therapy for the patient's recovery (Sukartini et al., 2020). The ability to modify a good environment will minimize the transmission of TB to other family members. Moreover, maintaining a healthy and conducive home environment will help TB patients to maintain their immune systems and avoid other diseases during their treatment program.

Non-adherence to anti-tuberculosis treatment was high (Adane et al., 2013). Pulmonary TB patients are considered obedient if they regularly undergo treatment for six months. After finishing the treatment, patients with pulmonary tuberculosis can be declared as recovered if they have met the predetermined criteria (Yusmaniar & Kurniawan, 2020).

Knowledge is the dominant factor that affects the TB patient's non-compliance in taking medication. Therefore, health workers, especially nurses, must increase health education efforts for TB patients. Knowledge is closely related to behavior (Gunawan, 2019; Sukartini et al., 2019). It is included in the cognitive domain and has six levels: knowing, understanding, application, analysis, synthesis, and evaluation.

In this study, attitude and environment were insignificant variables. The attitude factor referred to adherence to taking TB medication. The environmental factors reviewed in this

study included ventilation (air circulation), lighting, and humidity. Nevertheless, environmental factors must still be considered because they can affect the growth of TB. Feedback from the environment may be the most important factor that can influence the level of social support. In this study there were still many individuals who received less social support from the community because there is still a bad social stigma around people with pulmonary tuberculosis. Patients feel embarrassed and afraid to be excluded when they gather with the community because they suffer from pulmonary tuberculosis disease (Sukartini et al., 2019). This can cause an individual to withdraw or avoid others. This experience is a factor that can reduce their self-confidence because individuals are not able to control changes in their environment. Social support is not related to self-efficacy which is allegedly due to various social circumstances and conditions with different self-beliefs.

The limitation of this study was that only adult TB patients were sampled because almost all TB sufferers at the East Perak Health Center in Surabaya were adults.

CONCLUSION AND RECOMMENDATION

TB is a curable disease. The factors affecting non-compliance to medication should be minimized. This requires families and health workers to support (knowledge, attitudes) and motivate TB patients. In conclusion, overcoming the issue of non-adherence to TB medication requires collaboration between the private sector, family sector, society/healthcare sector, and government sector.

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