

# Knowledge Level and Treatment Adherence among Pulmonary Tuberculosis Patients: A Cross-Sectional Study

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## Abstract

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**Background:** Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* and remains a major cause of morbidity and mortality, particularly in developing countries. TB transmission occurs through airborne droplets, and successful treatment requires strict long-term adherence to medication to prevent treatment failure and drug resistance. Patient knowledge is considered an important factor influencing adherence behavior.

**Objective:** This study aimed to analyze the relationship between knowledge level and treatment adherence among tuberculosis (TB) patients.

**Methods:** This quantitative observational study employed a cross-sectional design and involved 120 TB patients who were undergoing treatment at primary health care facilities. Data were collected using a structured questionnaire to assess patients' knowledge of TB and its treatment, as well as a medication adherence measurement tool, such as the Morisky Medication Adherence Scale (MMAS). Data were analyzed using the Chi-square test with a significance level of  $p < 0.05$ .

**Results:** The results showed a statistically significant relationship between knowledge level and treatment adherence among TB patients ( $p < 0.05$ ), indicating that patients with higher knowledge levels were more likely to adhere to TB treatment.

**Conclusion:** A higher level of knowledge is significantly associated with better treatment adherence among TB patients. Strengthening patient education should be prioritized as part of TB control programs to improve treatment outcomes.

**Keywords:** Knowledge; medication adherence; tuberculosis

## Introduction

Tuberculosis (TB) is a chronic infectious disease that remains a major global public health problem. The World Health Organization (WHO) reports that TB continues to be among the top ten causes of death worldwide, particularly in developing countries where socioeconomic challenges and health system limitations persist (World Health Organization [WHO], 2023). TB not only affects physical health but also has profound social and economic consequences for patients, families, and communities. The long duration of treatment, combined with the risk of transmission and stigma, makes TB control a complex public health challenge requiring sustained behavioral and systemic interventions.

Indonesia is among the countries with the highest TB burden globally, placing TB control as a national health priority (Ministry of Health of the Republic of Indonesia, 2022). Despite the implementation of standardized treatment strategies and national TB programs, treatment outcomes remain suboptimal in some regions. One of the key determinants of successful TB control is patient adherence to treatment, which requires regular and complete medication intake over a prolonged period. Failure to adhere to treatment regimens can result in treatment

failure, relapse, prolonged infectiousness, and the emergence of drug-resistant TB strains, which pose serious threats to public health (Gough et al., 2020).

Treatment adherence in TB patients is influenced by a range of individual, social, and structural factors, among which patient knowledge plays a critical role. Knowledge related to TB includes understanding the cause of the disease, modes of transmission, treatment duration, medication schedules, potential side effects, and the consequences of incomplete treatment. Adequate knowledge enables patients to make informed decisions, recognize the importance of adherence, and actively participate in their own care. Previous studies have demonstrated that patients with higher levels of knowledge are more likely to adhere to TB treatment compared to those with limited understanding (Alipanah et al., 2018).

Empirical evidence further supports the role of knowledge as a modifiable factor in improving treatment adherence. Research has shown that TB patients who receive appropriate health education exhibit better comprehension of their condition and demonstrate higher levels of adherence to medication regimens (Suryanto et al., 2021). Educational interventions delivered through counseling, community outreach, or health facility-based programs have been shown to positively influence patients' attitudes and behaviors toward TB treatment (Hlongwa et al., 2020). These findings suggest that strengthening patient knowledge is a promising strategy for improving TB treatment outcomes.

However, knowledge alone does not always guarantee optimal treatment adherence. Several studies indicate that even patients with adequate knowledge may fail to adhere to treatment due to other influencing factors, such as limited family support, poor access to health services, economic hardship, medication side effects, and social stigma associated with TB (Munro et al., 2021). These findings highlight the complexity of adherence behavior and the need to examine knowledge within a broader contextual framework, particularly at the local level where cultural and social dynamics may differ.

Given these considerations, further investigation is needed to better understand the relationship between patient knowledge and treatment adherence among TB patients in specific local contexts. This study aims to examine the influence of knowledge level on treatment adherence in TB patients, with the expectation that the findings will provide empirical evidence to support the development of more targeted and effective health education and adherence-enhancing interventions within TB control programs.

## Methods

### Study Design

This study employed a quantitative research design with a cross-sectional approach. This design was considered appropriate for examining the relationship between knowledge level and treatment adherence among tuberculosis (TB) patients at a single point in time.

### Samples

The study population consisted of all TB patients who were undergoing treatment at the selected health facility. Samples were selected using a purposive sampling technique to ensure that participants met the study objectives. The inclusion criteria were TB patients aged  $\geq 18$  years who had been undergoing TB treatment for at least one month. Patients who were unable to communicate effectively or declined to participate were excluded from the study.

### Instruments

Data were collected using structured questionnaires consisting of two main instruments. The first instrument was a knowledge questionnaire assessing patients' understanding of TB and its treatment, including disease transmission, treatment duration, medication schedules, and potential side effects. The questionnaire items were adapted from previous studies and reviewed by experts to ensure content validity. Reliability testing demonstrated acceptable internal consistency, with a Cronbach's alpha value above 0.70. The second instrument was a treatment adherence questionnaire, such as the Morisky Medication Adherence Scale (MMAS), which has been widely used and validated to assess medication adherence in TB patients.

Adherence scores were categorized according to standard cut-off values to classify respondents as adherent or non-adherent.

### Data Collection

Data collection was carried out using questionnaires completed directly by respondents. Researchers provided explanations regarding the study objectives and procedures before administering the questionnaires to ensure consistency and accuracy of responses.

### Data Analysis

Data were processed and analyzed using statistical software. Univariate analysis was conducted to describe the frequency distribution of respondents' characteristics, knowledge levels, and treatment adherence. Bivariate analysis was performed using the Chi-square test to examine the relationship between knowledge level and treatment adherence. Statistical significance was determined at a p-value of  $<0.05$ .

### Ethical Considerations

Ethical approval for this study was obtained from the Health Research Ethics Committee. All respondents were informed about the study objectives, procedures, and their rights as participants prior to data collection. Written informed consent was obtained from all participants, and confidentiality of the data was strictly maintained.

## Results

Table 1 showed that most of the respondents had a good level of knowledge about TB and its treatment, which was 75 people (62.5%).

Table 1. Distribution of TB Patient Knowledge Level

Knowledge Level	Frequency (n)	Percentage (%)
Good	75	62.5
Less	45	37.5
Total	120	100

Source: Primary Data, 2024

Table 2 depicted that most respondents were classified as compliant in undergoing TB treatment, which accounted for 80 people (66.7%).

Table 2. Distribution of TB Patient Treatment Adherence

Medication Adherence	Frequency (n)	Percentage (%)
Adherent	80	66.7
Non- Adherent	40	33.3
Total	120	100

Source: Primary Data, 2024

Table 3 elucidated that according to the Chi-square test, the p-value was 0.001 ( $p < 0.05$ ) which means that there is a significant relationship between the level of knowledge and the treatment adherence of TB patients. Respondents with a good level of knowledge had a higher level of adherence compared to respondents with less knowledge.

Table 3. The Relationship between Knowledge Level and TB Patients' Treatment Adherence

Knowledge Level	Adherence n (%)	Non-compliant n (%)	Total (n)
Good	65 (86.7)	10 (13.3)	75
Less	15 (33.3)	30 (66.7)	45
Total	80 (66.7)	40 (33.3)	120

Source: Primary Data, 2024

## Discussion

The results of this study demonstrate a significant relationship between knowledge level and treatment adherence among tuberculosis (TB) patients, indicating that patients with a good level of knowledge tend to be more compliant with treatment compared to those with lower knowledge levels. This finding confirms that patient knowledge remains a critical factor associated with adherence behavior in TB management, particularly in the context of long-term and demanding treatment regimens. From a theoretical perspective, these findings support the health behavior model proposed by Green and Kreuter, which identifies knowledge as a predisposing factor influencing the formation of health behaviors (Green & Kreuter, 2015). Adequate knowledge enables individuals to understand health risks, benefits of treatment, and consequences of non-adherence, thereby facilitating informed decision-making and behavioral change. In the context of TB, understanding disease transmission, treatment duration, and the risks of drug resistance appears to play a crucial role in shaping adherence behavior.

The results of this study are consistent with previous research demonstrating the positive role of knowledge in improving TB treatment adherence. Alipanah et al. (2018) reported that improved patient understanding of TB and its treatment significantly contributed to better adherence outcomes. Similarly, Hlongwa et al. (2020) found that community-based education interventions were effective in increasing patient knowledge and had a direct impact on TB treatment success. These findings suggest that educational strategies remain a cornerstone of TB control efforts.

Evidence from national studies also supports the findings of this research. Nugroho and Kurniawan (2021) showed that TB patients in Indonesia who had a good understanding of treatment duration and adherence importance were twice as likely to comply with therapy compared to patients with lower knowledge levels. This reinforces the relevance of patient education within the Indonesian context and highlights knowledge as a key component in achieving successful TB treatment outcomes. Despite the strong association observed, this study also found that not all patients with good knowledge demonstrated optimal treatment adherence. This indicates that adherence is a complex behavior influenced by multiple interacting factors beyond knowledge alone. Several respondents reported challenges in maintaining adherence due to medication side effects such as nausea, dizziness, and fatigue, even though they were aware of the importance of completing treatment.

These findings align with previous studies highlighting the influence of psychosocial factors on TB treatment adherence. Duko et al. (2019) emphasized that anxiety, low motivation, and social stigma can hinder adherence even among knowledgeable patients. TB-related stigma remains a significant barrier, as patients may feel ashamed or fear discrimination, leading them to hide their condition and avoid taking medication in public settings. In addition to psychosocial factors, healthcare system-related barriers also contribute to non-adherence. Limited access to health facilities, long waiting times, and shortages of healthcare personnel can reduce patients' motivation to attend routine follow-up visits and adhere to treatment schedules (WHO, 2023). These structural challenges highlight the need for supportive health system environments to complement individual-level knowledge. The findings of this study have important implications for nursing practice and public health services. Nurses and community health workers play a strategic role in delivering continuous and comprehensive education to TB patients. Educational interventions should not only aim to increase knowledge but also address motivation, emotional support, and coping strategies for managing side effects. Involving family members as part of the educational process may further strengthen adherence by providing additional psychosocial and practical support.

Although this study provides valuable insights, several limitations should be considered. The cross-sectional design limits the ability to establish causal relationships between knowledge and adherence. Additionally, the use of self-reported questionnaires may introduce information bias, including social desirability bias. Future studies are recommended to use longitudinal or mixed methods designs to better capture changes in knowledge and adherence over time and to explore underlying behavioral mechanisms in greater depth. Overall, the findings of this study reinforce existing evidence that improving patient knowledge is an essential strategy for enhancing TB treatment adherence. However, knowledge-based interventions alone are insufficient. Multidimensional approaches that integrate educational, psychosocial, family-based, and health system interventions are necessary to achieve optimal TB treatment outcomes and support sustainable TB control efforts.

## Conclusion

There is a significant relationship between knowledge level and treatment adherence among tuberculosis patients, indicating that patients with better knowledge tend to demonstrate higher compliance with TB therapy. These findings highlight the critical role of effective health education in improving treatment outcomes and underscore the importance of nurses and community health workers in delivering continuous, patient-centered education. TB control programs should strengthen structured educational interventions tailored to patients' needs, while future research is recommended to employ longitudinal or mixed methods designs to further explore causal pathways and develop more comprehensive strategies to enhance treatment adherence.

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