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Relationship of Knowledge and Motivation with Compliance in Taking Anti-Tuberculosis Drugs in TB Patients at North Bontang Health Center 1

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ABSTRACT

Tuberculosis (TB) treatment requires six months of continuous Anti-Tuberculosis Drug (OAT) therapy; non-compliance leads to treatment failure and Multi-Drug Resistant TB. This study aimed to analyze the relationship between patient knowledge and motivation with medication compliance among TB patients at the North Bontang Health Center 1, Indonesia. This cross-sectional study involved tuberculosis patients at North Bontang 1 Health Center. From a total registered population of 325 patients, a strict purposive sampling technique was applied based on inclusion and exclusion criteria, resulting in 30 eligible patients who participated in this study during the period of December 2024 to January 2025. Data on knowledge and motivation were collected using structured questionnaires; compliance was determined via triangulation (interviews, TB Form 01, PMO). Bivariate analysis used the Fisher's Exact Test (n=30). Results showed the majority demonstrated good knowledge (83.3%) and high motivation (90.0%), resulting in a high overall compliance rate (93.3%). Statistical analysis revealed a significant relationship between knowledge and compliance (p=0.006). No statistically significant relationship was found between motivation and compliance (p=0.193), likely due to data homogeneity.

Keywords: Tuberculosis, Medication Adherence, Knowledge, Motivation

Introduction

Tuberculosis (TB) remains a major global health emergency and one of the leading causes of death from infectious diseases worldwide. Despite being a preventable and curable disease, the burden of TB is particularly high in developing nations. According to recent global reports, Indonesia consistently ranks among the countries with the highest TB burden in the world, alongside India and China (Chakaya et al., 2021). The success of TB eradication heavily relies on the effectiveness of the treatment regimen, which typically requires a minimum of six

months of continuous medication. However, strict adherence to this prolonged regimen poses a significant challenge for patients, leading to treatment failure, relapse, and the emergence of Multidrug-Resistant Tuberculosis (MDR-TB), which is far more difficult and expensive to treat (Pradipta et al., 2021).

Non-compliance with Anti-Tuberculosis Drug (OAT) therapy is a multifaceted issue influenced by various factors, including socio-economic status, healthcare system accessibility, and patient-related factors such as knowledge and motivation (Zegeye et al., 2019) The complexity of the treatment, coupled with the side effects of the drugs, often leads to patients discontinuing medication once physical symptoms subside, despite the bacteria not being fully eradicated. Research indicates that a lack of adequate knowledge regarding the disease process and the importance of completing the full course of therapy is a primary predictor of non-compliance (Mekonnen & Azagew, 2018). Patients with low health literacy often fail to understand the consequences of defaulting from treatment, which significantly hinders control efforts (Ruru et al., 2018).

Beyond knowledge, internal and external motivation plays a crucial role in behavioral compliance. Motivation, often driven by the desire to recover or social support from family, acts as a reinforcing factor that sustains a patient's commitment to the long-term treatment (Tola et al., 2015). Studies utilizing the Health Belief Model suggest that patients who perceive the severity of the illness and the benefits of the treatment - and are motivated by these perceptions - are significantly more likely to adhere to their medication schedule (Woimo et al., 2017). Conversely, psychological distress and lack of motivation are strongly correlated with poor medication adherence (Kastien-Hilka et al., 2016).

In the context of local primary healthcare, Community Health Centers (Puskesmas) serve as the frontline for TB control in Indonesia. North Bontang Health Center 1, as a primary healthcare provider, faces similar challenges where ensuring patient adherence remains a critical priority. While various studies have analyzed TB adherence broadly, there is a need to specifically examine how the interplay of specific domain knowledge and personal motivation correlates with adherence in this specific demographic to tailor more effective pharmacological and educational interventions (Khan et al., 2023) Understanding these variables is essential for pharmacists and healthcare providers to design counseling strategies that not only inform but also empower and motivate patients (Ulfah et al., 2018).

Therefore, this study aims to explain the relationship between knowledge and motivation with compliance in taking anti-tuberculosis drugs among TB patients at North Bontang Health Center 1. Based on the theoretical framework and previous empirical studies, the hypothesis proposed in this study is that there is a significant relationship between the level of knowledge and motivation with adherence to taking anti-tuberculosis drugs (OAT).

Methodology

This study employed an observational analytic design with a cross-sectional approach to determine the relationship between knowledge, motivation, and adherence to anti-tuberculosis medication among pulmonary TB patients at North Bontang 1 Community Health Center, Bontang City. The research was conducted from December 2024 to January 2025.

The target population in this study was all registered TB patients at the North Bontang 1 Community Health Center, totaling 325 patients. However, to ensure data homogeneity and reduce confounding bias, strict inclusion and exclusion criteria were applied. The inclusion criteria were: (1) Patients currently in the intensive phase treatment program (>1 month); (2) Adult and elderly patients (18-65 years); and (3) Patients actively visiting the center during the study period (Dec 2024 - Jan 2025). The exclusion criteria eliminated patients with Multi-Drug Resistant (MDR) TB and those with severe comorbidities (heart/kidney failure).

Based on these criteria, only 30 patients were identified as eligible respondents. Therefore, this study utilized a Total Sampling technique of the eligible population (saturated sampling) during the observation period, ensuring that all qualified subjects were included to minimize selection bias.

Data collection utilized primary and secondary sources. Independent Variables (Knowledge & Motivation) measured using a structured questionnaire administered directly to respondents. Dependent Variable (Medication Compliance) measured using a triangulation method combining: Secondary data from TB Form 01 (patient treatment card) available at the health center. Interviews with the patient's family (drug-taking supervisor/PMO) using a structured interview guide to cross-verify adherence.

The collected data were analyzed using statistical software (SPSS). The analysis consisted of: 1) Univariate analysis conducted to describe the frequency distribution

of respondent characteristics, knowledge, motivation, and compliance; 2) Bivariate analysis conducted to determine the relationship between the independent variables (knowledge, motivation) and the dependent variable (compliance). Due to the small sample size (n=30) and the presence of expected cell counts of less than 5, the Fisher's Exact Test was employed as a more robust alternative to the Chi-Square test. The significance level was set at $\alpha = 0.05$

Result and Discussion

1. Characteristics of Respondents

Table 1 presents the demographic characteristics of the respondents involved in this study. In terms of gender distribution, the majority of respondents were male (n = 22, 73%), while female respondents accounted for 27% (n = 8). Regarding age classification, most respondents were categorized as adults (n = 26, 87%), with the remaining 13% (n = 4) classified as elderly.

Table 1. Characteristics respondents

Characteristics	Frequency	Percentage(%)
Gender		
1. Male	22	73
2. Women	8	27
Age Group		
1. Adult	26	87
2. Elderly	4	13
Education Level		
1. Elementary School	4	13
2. Junior High School	1	3
3. Senior High School	23	77
4. Higher Education (College)	2	7
Occupation		
1. Unemployed	2	7
2. Farmer	3	10
3. Self-employed	22	73
4. Housewife	3	10
Marital status		
1. Single	0	0
2. Married	29	97
3. Widowed (Divorced/Deceased)	1	3

The educational background of the respondents varied, with the highest proportion having completed High School (n = 23, 77%). Only a small fraction (n = 2, 7%) had completed higher education (college/university). In terms of occupation, the majority were self-employed (n = 22, 73%). Furthermore, almost all respondents were married (n = 29, 97%).

2. Distribution of Respondents Based on Knowledge, Motivation, and Compliance Levels (n=30)

The findings of this study, as presented in the demographic and variable distribution table, indicate a highly positive trend among Tuberculosis (TB) patients at North Bontang Health Center 1. The data reveals that the majority of respondents possess a "Good" level of knowledge (83.3%) and a "High" level of motivation (90.0%). Consequently, the rate of medication compliance is exceptionally high at 93.3%. These descriptive statistics suggest a strong synergy where cognitive understanding and psychological drive collectively foster adherence to the rigorous TB treatment regimen.

The high level of compliance observed in this study can be attributed to the patients' fundamental understanding of the disease. Knowledge serves as the cognitive foundation for health behavior. In the context of TB, "good knowledge" implies that patients understand the etiology of the disease, the necessity of the six-month treatment duration, and the dangers of drug resistance if medication is interrupted.

Table 2. Distribution of Respondents Based on Knowledge, Motivation, and Compliance Levels in TB patients (n=30)

Variables	Category	Frequency (n)	Percentage (%)
Knowledge Level	Good	25	83
	Sufficient	4	13
	Insufficient	1	4
Motivation Level	High	27	90
	Moderate	3	10
	Low	0	0
Medication Compliance	Compliant	28	93
	Non-compliant	2	7

Mechanistically, adequate health literacy transforms into adherence by altering the patient's risk perception. A study by Sukartini et al. (2020) confirms that patients with high knowledge are significantly more capable of self-management. They understand that the disappearance of symptoms does not mean the bacteria are eradicated, which prevents them from unilaterally stopping treatment. Furthermore, a systematic review by Adhanty & Syarif (2023) highlights that knowledge is a predisposing factor that directly influences a patient's attitude towards the side effects of drugs; knowledgeable patients are more resilient when facing mild side effects because they understand the long-term benefit of the cure.

The mechanism of motivation affects compliance by buffering against treatment fatigue. A recent study by (Nugroho et al., 2025) found that motivation is strongly linked to support from health workers and family. High motivation acts as a psychological buffer that helps patients persist through the maintenance phase of treatment. Similarly, international research by Mekonnen et al. (2024) indicates that patients with low motivation often fail to disclose their status or feel stigmatized, leading to higher non-adherence rates. In your setting, the high motivation likely reflects a supportive environment that minimizes stigma and encourages patients to complete their regimen.

The high rates of compliance (93.3%) at North Bontang Health Center 1 likely reflect the effective implementation of the DOTS (Directly Observed Treatment, Short-course) strategy combined with active health promotion. As noted by Tinambunan et al. (2025) in their analysis of TB patients in North Sumatra, the "human factor" in primary care is crucial. The high knowledge levels observed in this study suggest effective counseling strategies by the pharmacy and medical staff at the Health Center. When healthcare professionals at the Puskesmas level actively educate patients (increasing knowledge) and show empathy (increasing motivation), patient trust increases. This creates a therapeutic alliance where compliance becomes a shared goal rather than an imposed rule. The result is a patient population that is not only informed but also empowered to adhere to their medication schedule.

3. The Relationship between Knowledge and Medication Compliance in TB Patients

The analysis yielded a p-value of 0.006. Since $p < 0.05$, it can be concluded that there is a statistically significant relationship between the level of knowledge and medication compliance. Furthermore, the high motivation levels (90.0%) observed in the demographic data align with the high overall compliance rate (93.3%).

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understanding the etiology, the exact duration of therapy, and the severe consequences of Multi-Drug Resistant TB (MDR-TB).

Table 3. Relationship between Knowledge and Medication Compliance in TB Patients

Knowledge Level	Medication Compliance		Total	p-value
	Non-Compliant (%)	Compliant (%)		
Insufficient	1 (100%)	0 (0%)	1 (100%)	**0,006**
Sufficient	1 (25%)	3 (75%)	4 (100%)	
Good	0 (9%)	25 (100%)	25 (100%)	
Total	**2 (6,7%)**	**28 (93,3%)**	**30 (100%)**	

This finding is consistent with Hasina et al. (2023) who argued that knowledge transforms into adherence by elevating the patient's risk perception. When patients fully understand that "feeling better" does not mean "cured," they are less likely to stop medication prematurely. Furthermore, Halim et al. (2023)emphasize that pharmacological literacy - understanding *why* specific drugs must be taken - empowers patients to manage minor side effects without panic, thereby maintaining the regimen continuity. At North Bontang Health Center 1, this suggests that the educational interventions provided by pharmacists and doctors have successfully instilled this critical understanding.

A critical analysis of the results reveals an inconsistency in the "Sufficient" knowledge category, where 25% (n=1) of patients remained non-compliant. This indicates that while knowledge is necessary, it is not always sufficient to guarantee adherence—a phenomenon known as the Knowledge-Behavior Gap. This "gap" often occurs when external barriers override cognitive understanding. Lemma Tirore et al. (2024), in a study of TB patients in Ethiopia, found that even knowledgeable patients often default due to "medication intolerance" (side effects like nausea) and logistical barriers, rather than a lack of information. Similarly, Ziliwu & Girsang (2022) note that knowledge must be accompanied by a positive attitude. The non-compliant patient in the "Sufficient" category may theoretically know the rules but lacks the psychological resilience to endure the physical discomfort of the drugs. This highlights the need for interventions that go beyond education, focusing on side-effect management strategies.

While knowledge provides the rationale, motivation provides the endurance. The high motivation observed in this study is likely a reflection of high Self-Efficacy.

(Pakpahan, 2024) demonstrates that motivation is the fuel for long-term adherence. Patients with high intrinsic motivation view recovery as a personal goal, making them more resilient to the boredom of a 6-month regimen. Mechanistically, Marselina et al. (2024) explain that self-efficacy (the belief in one's ability to succeed) significantly reduces the probability of dropout. In the Puskesmas setting, this motivation is rarely solitary; it is constructed socially.

The high compliance rate (93.3%) at North Bontang Health Center 1 cannot be separated from the institutional support system. Unlike anonymous large hospitals, the Puskesmas setting allows for closer interpersonal relationships between health workers and patients. Afifa et al. (2024) found that in the Puskesmas environment, the role of the Medication Supervisor (PMO) and family support is the strongest predictor of compliance. The active involvement of family members acts as an external motivation source when the patient's internal motivation fluctuates. Additionally, Siallagan et al. (2023) highlight that emotional support from family reduces the stigma often felt by TB patients, preventing isolation-induced non-compliance. Thus, the success at North Bontang Health Center 1 is a result of a synergistic triad: Adequate Knowledge (Cognitive), High Motivation (Psychological), and Strong PMO Support (Social).

4. The Relationship between Motivation and Medication Compliance in TB Patients

The results of this study at North Bontang Health Center 1 indicate a high overall rate of medication compliance among Tuberculosis (TB) patients, with 93.3% (n=28) of the respondents adhering to the treatment regimen. Regarding motivation, the majority of patients demonstrated high motivation (90% of the sample). Although the descriptive data suggests that patients with high motivation have a higher compliance rate (96.3%) compared to those with moderate motivation (66.7%), the statistical analysis yielded a p-value of 0.193 ($p > 0.05$). Consequently, statistically, there is no significant relationship between motivation and medication compliance in this specific population. This lack of statistical significance may be attributed to the limited sample size (n=30) and the homogeneity of the data, where the vast majority of respondents fell into the "High Motivation/Compliant" category.

However, from a clinical and qualitative perspective, the trend aligns with the Health Belief Model, which posits that an individual's perceived susceptibility and

severity of the disease drive their motivation to take action (Rosenstock's theory). In the context of the Community Health Center), the high motivation observed is likely influenced by the active role of healthcare providers in providing counseling and the effective implementation of the Direct Observed Treatment Short-course (DOTS) strategy. As noted by (Ramadhani et al., 2025) effective communication by health workers in Indonesian primary care settings significantly boosts patients' internal drive to recover.

Table 4. Relationship between Motivation and Medication Compliance in TB Patients

Motivation Level	Medication Compliance		Total	p-value
	Non - Compliant (%)	Compliant (%)		
Moderate	1 (33,3%)	2 (66,7%)	3 (100%)	
High	1 (3,7%)	26 (96,3%)	27 (100%)	**0,193**
Total	**2 (6,7%)**	**28 (93,3%)**	**30 (100%)**	

A critical aspect of this study involves analyzing the "outliers"—cases that contradict the general trend. Specifically, the study identified one patient (3.7%) who possessed high motivation yet remained non-compliant. This phenomenon, often termed the "intent-behavior gap," suggests that high motivation alone is insufficient when external barriers are overwhelming.

To contextualize this, an in-depth interview with a respondent in this category revealed that adverse drug reactions (ADRs) played a pivotal role.

"I really want to get well; I know this disease is dangerous. But every time I take the red pill, I feel severe nausea and dizziness for hours. Sometimes I skip it just to be able to work that day." (Respondent A, High Motivation, Non-Compliant).

This finding contrasts with the notion that motivation is the sole predictor of adherence. It supports the findings of (Mekonnen & Azagew, 2018) who reported that medication side effects are a primary determinant of non-compliance, even among patients who understand the importance of treatment. This suggests that at North Bontang Health Center 1, clinical management of side effects must be prioritized alongside motivational counseling.

Conversely, the study also observed patients with moderate motivation who were compliant (66.7% of the moderate group). This finding highlights the crucial role of

the Medication Supervisor (PMO). Even when a patient's internal drive fluctuates, strong social support acts as a safety net.

"Honestly, sometimes I feel lazy and tired of the routine. But my wife prepares the water and medicine every morning and watches me swallow it. I drink it because I don't want to disappoint her." (Respondent B, Moderate Motivation, Compliant).

This aligns with recent research by Sari et al. (2025), which found that family support is a stronger predictor of compliance than personal knowledge or motivation in Indonesian communal settings. The Puskesmas system, which formally integrates family members as PMOs, successfully bridges the gap where personal motivation falls short.

Conclusion

This study concludes that knowledge has a significant relationship with medication adherence in TB patients (p=0.006), whereas motivation shows no statistically significant correlation (p=0.193) due to data homogeneity. However, descriptive trends indicate that high motivation remains clinically relevant.

Declaration of Competing Interest

The authors declare that they have no competing interests

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