Association Between Medication Adherence and Quality of Life Among Tuberculosis Patients: A Study at Permata Kuningan Hospital

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Abstract: Tuberculosis (TB) remains a major global health concern, particularly in high-burden countries such as Indonesia. Although TB is curable, prolonged therapy, potential adverse effects, and social stigma may affect medication adherence and patients' quality of life (QoL). Evaluating the association between adherence and QoL is important to support patient-centered TB management. This study aimed to examine the association between medication adherence and quality of life among tuberculosis patients at Permata Kuningan Hospital. A cross-sectional analytic study was conducted involving 62 TB patients selected through purposive sampling. Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8), and quality of life was measured using the EQ-5D-5L instrument. Data were analyzed using Spearman rank correlation. Most patients demonstrated high adherence (95.2%) and reported good quality of life (96.8%). Statistical analysis showed a significant positive correlation between medication adherence and quality of life (r = 0.384; p = 0.002), indicating that higher adherence was associated with better quality of life. These findings suggest a significant association between medication adherence and quality of life among TB patients. Strategies to support adherence, including education, counseling, and monitoring, may be considered as part of comprehensive TB care to optimize patient-centered outcomes.

Introduction

Tuberculosis (TB) remains a major global public health problem caused by *Mycobacterium tuberculosis*, primarily affecting the lungs and transmitted through airborne droplets. Despite the availability of effective treatment, TB continues to be one of the leading causes of death from infectious diseases worldwide. In 2022, an estimated 7.5 million new TB cases were reported globally, with Indonesia ranking second among high-burden countries, contributing approximately 1,060,000 cases and 134,000 deaths annually (1, 2). This high burden underscores the urgent need for strengthening TB control strategies, particularly in high-incidence regions such as West Java (3).

The WHO End TB Strategy targets an 80% reduction in TB incidence and a 90% reduction in TB mortality by 2030 (4). However, achieving these targets remains challenging, largely due to suboptimal medication adherence. TB treatment requires long-term multidrug regimens for at least six months, and poor adherence may result in treatment failure, prolonged transmission, relapse, and the development of multidrug-resistant TB (MDR-TB) (5). Therefore, improving adherence is central to both individual therapeutic success and broader public health outcomes.

From a pharmaceutical perspective, medication adherence represents a critical domain of pharmaceutical care. Pharmacists play an essential role in TB management through patient counseling, monitoring adverse drug reactions, ensuring appropriate drug use, and supporting adherence through education and follow-up interventions (6). Evidence suggests that pharmacist-led interventions, including structured counseling and medication therapy monitoring, significantly improve adherence and clinical outcomes in chronic infectious diseases (7). In TB management programs, the integration of pharmaceutical care services may enhance patients' understanding of therapy, reduce drug-related problems, and improve treatment persistence.

Several factors influence adherence among TB patients, including limited knowledge, low motivation, adverse drug reactions, socioeconomic constraints, and inadequate family or healthcare support (8). These factors not only affect treatment completion but also impact patients' quality of life (QoL) (9). TB patients often experience physical discomfort, psychological distress, social stigma, and financial hardship due to prolonged therapy (10). Quality of life, defined as an individual's perception of their physical, psychological, and social well-being, has therefore become an important

patient-centered outcome in TB management ([11]).

Previous studies in Indonesia have reported an association between medication adherence and quality of life among TB patients ([12]). However, most studies were conducted in primary health centers and primarily focused on epidemiological or behavioral aspects. Limited evidence is available from hospital-based settings, particularly regarding the use of standardized instruments such as the Morisky Medication Adherence Scale (MMAS-8) and EQ-5D-5L to quantitatively assess this relationship within a pharmaceutical care context. Furthermore, data from Kuningan Regency remain scarce, despite the high TB burden in West Java.

Permata Kuningan Hospital provides TB treatment services in Kuningan Regency, with 156 TB patients undergoing treatment between February and April 2024. Given the ongoing challenges in medication adherence and the limited hospital-based evidence integrating adherence and quality of life assessment, this study aims to examine the association between medication adherence and quality of life among TB patients using validated measurement tools. The findings are expected to support the development of pharmacist-led, evidence-based interventions to improve TB treatment outcomes.

Methods

Study Design
This study was a quantitative, observational, and analytical research employing a cross-sectional design. This approach was selected to analyze the relationship between medication adherence and quality of life at a single point in time.

Ethical Clearance
This research received ethical approval from the Health Research Ethics Commission, Faculty of Pharmacy, YPIB University, with ethical approval number 374/KEPK/EC/V/2025.

Population and Sample
The study population comprised 156 tuberculosis patients (both inpatients and outpatients) who received treatment at Permata Kuningan Hospital between February and April 2025.

Participants were selected using a purposive sampling technique based on predefined eligibility criteria. The inclusion criteria were: (1) confirmed diagnosis of tuberculosis; (2) age between 18 and 65 years; (3) currently undergoing outpatient treatment; and (4) willingness to participate in the study. The exclusion criteria were: (1) presence of comorbidities or other significant concomitant diseases; and (2) duration of anti-tuberculosis treatment of less than one month.

The required sample size was calculated using the Slovin formula, given the finite and known population size (N = 156) and the absence of prior local data to estimate population variance. A 95% confidence level and a 10% margin of error (e = 0.10) were applied in the calculation.

The resulting minimum sample size was rounded up to 62 respondents to ensure adequate representation and to account for potential incomplete responses.

Prior to data collection, all participants provided written informed consent after receiving a comprehensive explanation of the study objectives, procedures, confidentiality, and the voluntary nature of participation.

Measurement Instruments
Medication Adherence
Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8), which consists of eight questions evaluating patients' behavior in following their prescribed medication regimen. Total scores were categorized as high adherence (score = 8), moderate adherence (score 6-7), and low adherence (score < 6).

The use of the MMAS-8 instrument in this study was permitted based on its prior validated use in Martini's research ([13]). The instrument has been widely recognized for its validity and practicality in identifying patients at risk of treatment failure due to non-adherence.

Quality of Life
Quality of life was measured using the EQ-5D-5L questionnaire, which assesses five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Responses were converted into utility values using the Indonesian EQ-5D-5L value set to enable standardized health outcome comparisons. The EQ-5D-5L is considered a reliable instrument for evaluating both clinical and psychosocial impacts among tuberculosis patients.

Data Analysis
Descriptive statistics were used to summarize respondents' demographic characteristics, adherence scores, and quality-of-life values. The relationship between medication adherence and quality of life was analyzed using the Spearman rank correlation test due to the non-parametric distribution of the data. Statistical significance was set at $p < 0.05$.

No multivariate analysis or adjustment for potential confounding variables (such as age, sex, education level, or occupation) was performed. This study focused solely on bivariate correlation analysis. Data processing and statistical analysis were conducted using appropriate statistical software to ensure accuracy and validity.

Results and Discussion

Characteriztics of Tuberkulosis Patients
A total of 62 tuberculosis (TB) patients met the inclusion criteria and were included in the analysis. **Table 1** presents the demographic characteristics of tuberculosis patients at Permata Kuningan Hospital, including age, gender, education level, and occupation. Most respondents were aged 18-30 years (41.9%), followed by 51-65 years (35.5%). This finding is consistent with previous reports indicating that TB frequently affects economically productive age groups with high social mobility and exposure risk ([1], [2]).

Male patients accounted for 51.6% of respondents. Globally, TB incidence tends to be higher among men, which has been associated with behavioral and occupational risk factors, including smoking and delayed healthcare utilization ([14], [15]).

Regarding education, 38.7% of respondents had completed high school. Previous studies suggest that individuals with secondary education may possess general health knowledge but may lack specific understanding regarding TB treatment completion ([16]).

In terms of occupation, 30.6% were housewives. Household crowding and ventilation conditions have been reported as environmental factors associated with TB transmission in domestic settings ([17]).

Table 1. Characteristics of Tuberculosis Patients at Permata Hospital (n = 62).

Characteristics	Category	Frequency (f)	Percentage (%)
Age (years)	18-30	26	41.9
	31-40	7	11.3
	41-50	7	11.3
	51-65	22	35.5
Gender	Man	32	51.6
	Woman	30	48.4
Education level	Primary school	16	25.8
	Junior high school	18	29.0
	Senior high school	24	38.7
	College/University	4	6.5
Occupation	Farmers	13	21.0
	Entrepreneurs	3	4.8
	Housewives	19	30.6
	Civil Servants	2	3.2
	Others	25	20.3

Note: Values are presented as frequency (f) and percentage (%).

Table 2. Frequency Distribution Based on Medication Adherence of Tuberculosis Patients at Permata Kuningan Hospital (n = 62).

Level of Compliance	MMAS-8 Score	Frequency (f)	Percentage (%)
High compliance	8	59	95.2
Moderate compliance	7-6	2	3.2
Low compliance	<6	1	1.6
Total		**62**	**100**

Note: MMAS-8 = Morisky Medication Adherence Scale-8.

Medication Adherence

Table 2 presents the distribution of medication adherence levels among tuberculosis patients assessed using the MMAS-8 instrument. Most patients (95.2%) were categorized as having high adherence, while 3.2% had moderate adherence and 1.6% had low adherence.

Similar high adherence proportions have been reported in other Indonesian studies (18, 19). Adherence levels may be associated with patient awareness, structured treatment programs, and healthcare support systems (20). However, given that adherence was measured using a self-reported questionnaire, the possibility of overestimation cannot be excluded.

Although the proportion of moderate and low adherence was small, these patients may experience barriers such as adverse drug reactions, stigma, or limited understanding of therapy (21). Identifying individuals at risk of non-adherence remains important in TB management.

Quality of Life of Tuberculosis Patients

Quality of life (QoL) was assessed using the EQ-5D-5L

Table 3. Health State Results of Tuberculosis Patients (n = 62).

Health states	Frequency (f)	Percentage (%)	Utility
11111	37	59.7	1,000
11112	3	4.8	0,921
11114	1	1.6	0,773
11121	4	6.5	0,859
11122	3	4.8	0,835
11123	1	1.6	0,780
11224	1	1.6	0,597
22121	1	1.6	0,694
22221	1	1.6	0,604
22222	6	9.7	0,525
22223	1	1.6	0,349
33222	1	1.6	0,347
33322	1	1.6	0,347
44232	1	1.6	0,078

Note: Utility values are presented as decimals.

instrument, and the results are presented in **Table 3.** The majority of respondents (59.7%) reported a health state of 11111, corresponding to a utility score of 1.000, indicating no reported problems across the five EQ-5D dimensions. Overall, 96.8% of patients were categorized as having good QoL.

High EQ-5D utility values among TB patients have been observed in settings where treatment is accessible and patients are clinically stable (22, 23) yasoban (10, 24).

Association Between Medication Adherence and Quality of Life

Table 4 presents the results of the Spearman rank correlation analysis, which showed a statistically significant positive association between medication adherence and quality of life (r = 0.384; p = 0.002). The correlation coefficient indicates a moderate association.

These findings are consistent with previous studies reporting significant associations between adherence and QoL among TB patients (24, 25). However, given the cross-sectional design, the results indicate association rather than causation. The directionality of the relationship cannot be determined.

The magnitude of the correlation may vary across studies due to differences in population characteristics, measurement tools, and healthcare settings. Additionally, potential confounding variables such as age, gender, education, occupation, and duration of treatment were not controlled for in this study, which may influence the observed association (26, 27).

Therefore, while higher adherence levels were statistically associated with better reported quality of life in this sample, longitudinal studies are required to further explore temporal relationships and potential causal pathways (28).

This study has several limitations that should be considered when interpreting the findings. First, the high proportion of respondents reporting a "perfect health" state (EQ-5D-5L score 11111) suggests the possibility of a ceiling effect, which may limit the instrument's sensitivity in

Table 4. Spearman Rank Test Results on the Relationship between Adherence and Quality of Life of Tuberculosis Patients at Permata Kuningan Hospital (n = 62).

Medication Adherence		
Quality of Life	R Correaltion coefficient	0.384**
	p-value	0.002
	N	62
Note:p < 0.01 (significant at the 0.01 level).		

detecting subtle variations in health status among tuberculosis patients.

Second, quality-of-life data were collected using a self-reported questionnaire in a hospital setting. This may have introduced social desirability bias, as respondents could have provided more favorable answers due to perceived expectations from healthcare providers.

These methodological limitations may have influenced the distribution of QoL scores and should be taken into account when interpreting the observed association between medication adherence and quality of life. Future studies using longitudinal designs and complementary objective measures are recommended to strengthen the evidence.

Conclusion

This study describes the characteristics, medication adherence, and quality of life of tuberculosis patients at Permata Kuningan Hospital and examines the association between adherence and health-related quality of life. Most respondents were of productive age, slightly more were male, and a substantial proportion had secondary-level education.

The majority of patients demonstrated high medication adherence and reported good quality of life based on EQ-5D-5L assessment. Statistical analysis revealed a moderate and significant positive association between medication adherence and quality of life (r = 0.384; p = 0.002).

These findings indicate that higher levels of adherence were associated with better reported quality of life in this population. However, due to the cross-sectional design and the absence of adjustment for potential confounders, the results should be interpreted as associative rather than causal. Further longitudinal studies are recommended to better understand the temporal relationship between adherence and quality of life in tuberculosis care.

Abbreviations

Tuberculosis (TB), Quality of Life (QoL), Health-Related Quality of Life (HRQoL), Morisky Medication Adherence Scale-8 (MMAS-8), EuroQol Five-Dimensional Five-Level Questionnaire (EQ-5D-5L), Directly Observed Treatment, Short-course (DOTS), World Health Organization (WHO).

Declarations

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Conflict of Interest
The authors declare no conflicting interest.

Data Availability
All data generated or analyzed during this study are included in this published article.

Ethics Statement
This observational study was approved by the Health Research Ethics Commission of the Faculty of Pharmacy, YPIB University. Written informed consent was obtained from all participants.

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Additional Information

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