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The Effect of Adherence on The Quality of Life in Pulmonary Tuberculosis Patients with or without Comorbidities

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ABSTRACT

Introduction: Pulmonary tuberculosis (TB) cases in East Jawa increased sharply by 73.3% in 2022, with Surabaya among the highest contributors. Nearly half of TB patients have comorbidities, which complicate therapy and may reduce medication adherence. Non-adherence to anti-tuberculosis drugs (OAT) can decrease treatment success and quality of life (QoL). This study aims to analyze the effect between OAT adherence and QoL in pulmonary TB patients with and without comorbidities.
Methods: This cross-sectional analytic study was conducted at Pegirian Surabaya Health Center and Husada Prima Surabaya Hospital from September to December 2024. Seventy-two respondents were recruited and evenly divided into two groups, with thirty-six patients in each group. Adherence was measure using 5-Tepat Questionnaire and QoL was assessed using AqoL-4D instrument. Data were analyzed with Chi-Square and Mann-Whitney tests.
Results: Among TB patients without comorbidities, 75% were adherent to OAT, compared to 61.1% in the group with comorbidities. There was no statistically significant difference in adherence rates between groups (p = 0.206). However, patients without comorbidities who were adherent had a significantly higher median quality of life score of 92.00 (p = 0.001), while adherent patients with comorbidities had a median score of 78.00 (p = 0.000).
Conclusion: Adherence OAT treatment significantly improves the quality of life of pulmonary TB patients, particularly among those with comorbidities. These findings underscore the importance of interventions to enhance adherence as part of comprehensive TB management strategies.

Keywords: tuberculosis; adherence; quality of life; comorbidities; antituberculosis drugs

INTRODUCTION

Tuberculosis (TB) cases in East Java increased by 73.3% in 2022. The number of cases increased from 43,247 cases in 2021, to 78,799 cases in 2022. The highest TB case finding was in Sumenep District, followed by Surabaya City with 10,382 cases[1]. Some of the causes for the increase in tuberculosis cases are high population density, limited access to health services and poverty[2–4]. Other causes of the increase in tuberculosis cases include patient characteristics, socio-economics, provider-patient relationships, treatment regimens and healthcare management[5].

Almost half of tuberculosis patients have at least one comorbidity[6]. Kohornen et al (2020) mentioned that comorbidities can reduce the body's immunity, thus facilitating infection by tuberculosis bacteria. This condition increases the risk of clinical worsening, especially due to the complexity of treatment and the burden of disease that the patient must bear[7]. Tuberculosis patients with co-

morbidities experience treatment difficulties due to the complexity of the regimen. Patients have to take Anti-Tuberculosis Drugs (OAT) along with other routine medications, and experience side effects, symptoms, and drug interactions[8].

All of these events can affect treatment adherence. This will have an impact on the success rate of treatment as seen from the final results during tuberculosis treatment[9]. The treatment success rate of tuberculosis has decreased since 2016, the highest increase in tuberculosis treatment success rate was in 2010 with 89.2%, while decreased to 82.7% in 2020 and 83% in 2021[10].

The unresolved problem of non-adherence to OAT utilization will have far-reaching impacts, including increasing the burden of financing[11], treatment failure and relapse[12], as well as decreased quality of life, mortality, morbidity and drug resistance[13,14].

Decreased quality of life in tuberculosis patients can also be caused by various other factors, such as drug side effects, duration of treatment, limited social relationships, depression, level of independence, and decreased physical function[15,16]. Healthcare should start considering quality of life measures as part of treatment plans to provide a more in-depth picture of the patient's health status. This is because clinical treatment alone is not enough to achieve effective treatment[17].

Yadav et al. (2021) stated that on average tuberculosis patients have a decreased quality of life, but there are 56.1% of patients who adhere to taking OAT have a better quality of life[18]. It can be interpreted that adherence to taking medication helps improve the quality of life of patients. Yusransyah et al. (2023) with their research in Drajat Prawiranegara Serang Hospital, 80% of tuberculosis patients who were compliant with taking medication had a good quality of life than patients who were not compliant with taking medication[19]. Based on this background, it is necessary to conduct research on analyzing the relationship between drug adherence and quality of life of pulmonary tuberculosis patients with or without comorbidities.

METHOD

This study was an observational analytic study with a cross sectional approach. The study was conducted at Pegirian Surabaya Health Center and Husada Prima Surabaya Hospital in September-December 2024.

The study population consisted of all patients diagnosed with TB at Puskesmas Pegirian Surabaya, and TB patients with comorbidities at Husada Prima Surabaya Hospital. The sample size obtained was 72 respondents, with the number of respondents in each group being 36 respondents.

Inclusion criteria in this study include: (1) Registered as an outpatient without comorbidities at the Pegirian Surabaya Health Center; (2) Registered as an outpatient with comorbidities with comorbidities who are registered as patients at Husada Prima Surabaya Hospital; (3) At least 18 years old; (4) In intensive phase treatment who have taken OAT for ≥ 2 weeks; (5) Able to read, write and be able to communicate verbally and in writing, if the patient is unable to fill out the questionnaire himself, the questionnaire is read by the researcher; (6) Patients with stable mental conditions and able to provide the information needed in the study; (7) Willing to become research subjects and sign informed consent. The exclusion criteria in this study were patients who canceled their participation after agreeing to the informed consent, and did not fill out the questionnaire completely until the data collection time was completed. The independent variable in this study is medication compliance. The dependent variable in this study was the quality of life of TB patients with or without comorbidities. The quality of life of TB patients was measured using the Assessment Quality of Life 4 Dimension (AQoL-4D) questionnaire. Adherence to medication was measured using the 5 Tepat Questionnaire. Respondents will be explained about the purpose of the study and sign an informed consent if they are willing to participate in the study.

Normality test was performed before statistical tests. Comparison of medication adherence of TB patients with or without comorbidities was analyzed using the Chi-Square Test. The effect of medication adherence on the quality of life of TB patients with or without comorbidities was analyzed using the Mann-Whitney Test.

This study has received Ethical Clearance from the Ethics Committee of Husada Prima Surabaya Hospital with number 045/012.09/EC/KEPK/2024 on September 25, 2024.

RESULT

Table 1. Demographic Data of Respondents

Parameter	Category	Pulmonary TB		Pulmonary TB with Comorbidities	
		n	%	n	%
Gender	Male	16	44.4	19	52.8
	Female	20	55.6	17	47.2
	Total	36	100	36	100
Educational Level	No School	3	8.3	6	16.7
	Elementary School Graduates	11	30.6	18	50.0
	Middle School Graduates	9	25.0	4	11.1
	High School Graduates	13	36.1	8	22.2
	Total	36	100	36	100
Occupation	No Work	25	69.4	24	66.7
	Working	11	30.6	12	33.3
	Total	36	100	36	100
Income	IDR <2 million	31	86.1	26	72.2
	IDR 2 – 4 million	5	13.9	10	27.8
	Total	36	100	36	100
Age	19 – 29	12	33.3	1	2.7
	30 - 39	9	25	2	5.5
	40 - 49	9	25	7	19.4
	50 - 59	2	5.5	13	36.1
	60 - 69	3	8.3	9	25
	>70	1	2.7	4	11.1
	Total	36	100	36	100
Treatment Duration	2 – 4 weeks	10	27.8	21	58.3
	5 – 8 weeks	26	72.2	15	41.7
	Total	36	100	36	100
Number of Drug Consumed	4	N/A	N/A	4	11.1
	5	N/A	N/A	8	22.2
	6	N/A	N/A	8	22.2
	7	N/A	N/A	7	19.4
	8	N/A	N/A	7	19.4
	9	N/A	N/A	1	2.8
	10	N/A	N/A	1	2.8
	Total			36	100
Number of Comorbidities	1	N/A	N/A	24	66.7
	2	N/A	N/A	11	30.6
	3	N/A	N/A	1	2.8
	Total			36	100

Table 1 shows the demographic data of respondents. The gender of the pulmonary TB group was predominantly female (55.6%), while in the pulmonary TB with comorbidities group the majority were male (52.8%). The education level of respondents in the pulmonary TB group was mostly high school graduates (36.1%), while in the pulmonary TB with comorbidities group the majority of respondents were elementary school graduates (50.0%). In terms of occupation, the majority of respondents in both groups were unemployed, with a monthly income of less than IDR 2 million. Most respondents in the pulmonary TB group were aged 19-29 years (33.3%), while the majority of respondents in the pulmonary TB with comorbidities group were aged 50-59 years (36.1%). Based on the duration of treatment, the pulmonary TB group mostly underwent treatment for 5-8 weeks (72.2%), then the pulmonary TB group with comorbidities mostly underwent treatment for 2-4 weeks (58.3%). In the pulmonary TB group with comorbidities, most of them took 5 (22.2%) and 6 (22.2%) types of drugs, and the majority had 1 (66.7%) comorbidity.

Tabel 2. Adherence Profile of OAT Use

Total Score of Adherence				
	Pulmonary TB (%)	Pulmonary TB with Comorbidities (%)	Total	p-*value*
Non-adherent	9 (25)	14 (38.9)	23	0.206*
Adherent	27 (75)	22 (61.1)	49	
Total	36	36	72	

**Significant if p-value ≤0.05*

Table 2 shows the adherence profile of treatment use among respondents in this study. In the pulmonary TB group, the majority of respondents (27 respondents, 75%) were classified as adherent, while 9 people (25%) were classified as non-adherent. Meanwhile, in the pulmonary TB group with comorbidities, most of the respondents (22 respondents, 61.1%) were also classified as adherent, but there were 14 people (38.9%) who were non-adherent. Overall, from a total of 72 respondents in this study, 49 people (68.1%) showed adherence in the use of drugs, while 23 people (31.9%) were classified as non-adherent. Based on the results of the comparative analysis of drug use adherence between the pulmonary TB group and the pulmonary TB group with comorbidities, a significance value of 0.206 was obtained, indicating that there was no difference in adherence between patients with pulmonary TB and pulmonary TB with comorbidities.

Table 3. The Effect of Adherence on the Quality of Life of Pulmonary Tuberculosis Patients

Variabel	Quality of Life		P-value
	Adherent (27)	Non-adherent (9)	
Quality of life score, median	92.00	86.00	*0.001

**Signficant if p-value ≤ 0.05*

Table 3 shows that there is a significant difference in the quality of life scores of pulmonary TB patients based on the level of adherence to OAT use. The median quality of life of adherent patients of 92.00 was higher than that of non-adherent patients of 86.00, and adherence had the potential to affect quality of life (p-value = 0.001).

Table 4. The Effect of Adherence on the Quality of Life of Pulmonary Tuberculosis Patients with Comorbidities

Variabel	Quality of Life		P-value
	Adherent (n= 22)	Non-adherent (n=14)	
Quality of life score, median	78.00	62.50	*0.000

**Significant if p-value ≤ 0.05*

Table 4 shows that adherence to OAT use is associated with differences in quality of life in the group of pulmonary tuberculosis patients with comorbidities. Patients who were adherent to treatment had a median quality of life of 78.00, while those who were not adherent had a median of 62.50. Adherence to treatment significantly improved quality of life in patients with co-morbidities (p-value = 0.000).

DISCUSSION

Adherence Profile

In this study, the compliance rate of pulmonary tuberculosis patients without comorbidities was higher (75%) than that of pulmonary tuberculosis patients with comorbidities (61%). Kunoor et al. (2023) stated that tuberculosis patients with comorbidities have lower treatment adherence due to several conditions. These conditions cause tuberculosis treatment to be difficult, such as adjustments to the treatment regimen of both OAT and therapy for comorbidities[20].

However, both pulmonary tuberculosis patients and pulmonary tuberculosis patients with comorbidities had similar adherence rates. One of the factors contributing to the adherence rate in both groups was the role of the medication swallowing supervisor (PMO), who actively assisted patients in taking their daily medication, assisted in the routine control process and acted quickly when patients complained of serious or unusual symptoms. According to Huda et al. (2024) the presence of PMOs from both family and community cadres has been shown to help patients to be more consistent in undergoing therapy through direct monitoring, regular reminders, and moral support[21]. Indirectly, the presence of PMOs acts as social support, both from family and friends who provide motivation and strengthen the patient's commitment to following treatment[22]. This social support helps to reduce the stress and anxiety that patients often experience during TB treatment, so the PMO also plays an important role in supporting patients' mental health[23].

In addition, pulmonary tuberculosis patients with comorbidities understand that adherence to tuberculosis medication use will affect the success of tuberculosis treatment therapy. This success also affects the management of their comorbid conditions, in other words, patients feel more encouraged to follow the therapy to optimize the treatment of both conditions. The more serious the disease condition, the more patients will be encouraged to treat the disease because they realize the serious impact of the disease[24]. In line with the findings of Iweama et al. (2021), tuberculosis patients with HIV have a higher level of treatment adherence than patients without HIV with an OR value of 0.01 (95% CI: 0.12 - 0.35)[11]. Kittikraisak et al. (2012) in their study also found evidence to support that tuberculosis patients with HIV adhered to tuberculosis treatment correctly, thus improving their health [25].

The Effects of Adherence on The Quality of Life of Pulmonary Tuberculosis Patients

Adherence to tuberculosis treatment is positively associated with improved quality of life[18]. This is in line with this study, especially in pulmonary tuberculosis patients with comorbidities, tuberculosis treatment adherence has a greater influence on their quality of life. Non-adherence to tuberculosis treatment can lead to faster worsening of comorbidities and thus negatively affect quality of life. Kakisingi et al. (2024) confirmed that uncontrolled tuberculosis infection can lead to impaired glucose tolerance which contributes to elevated blood glucose levels, especially in patients with diabetes mellitus[26]. This suggests an association between tuberculosis and diabetes mellitus. Diabetes mellitus

not only increases the risk of tuberculosis, but active tuberculosis infection can also worsen glycemic control. This condition certainly has an impact on the clinical condition and can worsen the patient's quality of life.

Adefuye et al. (2022) also mentioned that uncontrolled tuberculosis treatment can worsen heart disease through several mechanisms that contribute to the development of atherosclerotic plaques. Continued plaque formation will increase the risk of arrhythmia and accelerate the occurrence of coronary artery disease. In addition, uncontrolled tuberculosis treatment in patients with heart failure has the potential to cause complications such as tuberculous pericarditis, which can develop into constrictive pericarditis that can worsen the condition of heart failure[27]. Adherence to tuberculosis treatment is not only important for controlling infection, but also plays a significant role in stabilizing comorbidities and improving quality of life.

In this study, it was found that not all non-adherence to tuberculosis treatment had a direct negative impact on quality of life. There were pulmonary tuberculosis patients who were not adherent to treatment but reported a relatively good quality of life. This may be due to the patients' focus on TB treatment as the only health problem they face, without any comorbidities that aggravate the clinical condition. In addition, some patients who have undergone treatment and feel that their symptoms have improved, generally no longer have complaints that cause patients to feel that they do not need to continue treatment[18]. Patients may not feel the impact immediately, but non-compliance still carries long-term risk factors that lead to relapse and emergence of resistance. This can lead to a longer course of treatment, which in turn can significantly worsen quality of life[28]. This study has several limitations, including a limited sample size and data collection conducted at only two healthcare facilities. Therefore, future studies are recommended to involve a larger sample size and include more diverse study sites for collecting data from pulmonary tuberculosis patients, both with and without comorbidities.

CONCLUSION

Treatment adherence in pulmonary tuberculosis patients without comorbidities was higher than that in tuberculosis patients with comorbidities. However, the role of the PMO helped maintain the level of adherence in both groups. Adherence had a positive effect on quality of life, especially in patients with comorbidities.

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CONFLICT OF INTEREST

All the author declare that there is no conflict of interest in this research.

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