Correlation Between the Phases of Tuberculosis Treatment and Depression Levels

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Abstract: Tuberculosis (TB) is an infectious disease that remains a global health problem, including in Indonesia. In addition to the physical impact, pulmonary TB patients are also susceptible to psychological disorders such as depression, which may arise due to concerns about symptoms and treatment. Depression ranks first among mental health disorders in Indonesia. This study aims to determine the correlation between the phases of TB treatment and depression levels in pulmonary TB patients. This study employed an analytical observational design with a cross-sectional approach and used consecutive sampling. Data were collected from February 17 to June 8, 2024, using the Beck Depression Inventory-II (BDI-II) questionnaire. A total of 38 pulmonary TB patients participated in this study with 6 experiencing depression of varying severity. Spearman correlation test showed no statistically significant association between the phases of TB treatment and depression levels ($p = 0.093$). Based on these results, it can be concluded that there is no significant correlation between the phases of TB treatment and depression levels in pulmonary TB patients at Puskesmas Putat Jaya, Surabaya.

Keywords: Beck depression inventory-II; Depression; Tuberculosis; Treatment phases

Introduction

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis, which affects the lung parenchyma or extra pulmonary organs and can be transmitted through airborne droplet nuclei released when a patient with TB coughs, sneezes, or talks (Arsyad et al., 2024; Sihombing et al., 2025; Swalehe & Obeagu, 2024). Globally, TB ranks as the second leading cause of death from infectious diseases, following COVID-19. In 2022, an estimated 10 million people were affected by TB worldwide, including 5.6 million men, 3.3 million women, and 1.1 million children. In the same year, 1.5 million people died from TB, with Indonesia ranking third in the world for the highest TB cases after India and China (WHO, 2024). East Java ranked 8th in Indonesia in 2021 with 42,922 reported TB cases (Ningrum et al., 2022). TB patients commonly experience weight loss, fever, cough for more than two weeks with sputum and blood, chest pain, dyspneu, reduced apetite, fatigue, night sweats (Agyeman & Asenso, 2017; Luies & Preez, 2020). Individuals who have been diagnosed with TB often experience concerns about their symptoms and the daily medications they are required to take. This condition makes TB patients vulnerable to changes in psychological responses, such as depression (Chen et al., 2024; Meylisa, 2021).

Depression is a condition that occurs due to feelings of sadness and loss of interest in a long time continuosly for at least the last two weeks, individuals with depression typically present with the core triad of depressive symptoms such as depressed mood, loss of interest, fatigue (Rondón Bernard, 2018). In 2023, approximately 280 million people worldwide experienced depression and 700,000 died by suicide (WHO, 2023). There were 9 million people in Indonesia who experienced depression in 2017 (Fahmi et al.,

2019). Studies examining the correlation between TB treatment and depression were conducted by Meylisa (2021) at Meruaxa Hospital, Banda Aceh, which reported significant results (p = 0.000) and by Salodia et al. (2019) at RHTC Najafgarh, New Delhi, which reported no significant results (p = 0.241). Due to differing results from previous studies and the absence of studies on this topic in Surabaya, this study aims to examine the correlation between the phases of TB treatment and depression levels in pulmonary TB patients.

Method

This study employed an analytical observational design with a cross-sectional approach and used consecutive sampling. Data were collected from February 17, 2024 to June 8, 2024 in accordance to the ethical clearance granted by the University of Surabaya's institutional ethical committee. Samples were obtained through sosiodemographic questionnaires and the Beck Depression Inventory (BDI-II) on pulmonary TB patients at Puskesmas Putat Jaya, Surabaya. BDI-II is a screening tool used to measure the severity of depression, with a completion time of approximately 5-10 minutes. This questionnaire has 21 items with 4 statements on each item that describes the condition over the past 2 weeks, such as mood depressed, loss of interest, feeling dissatisfied, fatigue, feeling worthless, difficulty concentrating, loss of appetite, and loss of sexual desire (Ginting et al., 2013).

The questionnaire's total score is categorized into 4 levels of depression: minimal depression (0-13), mild depression (14-19), moderate depression (20-28), and severe depression (29-63) (Jackson-Koku, 2016; Wang et al., 2020). Based on figure 1, 38 out 45 respondents met the inclusion criteria, while the remaining 7 were excluded based on the exclusion criteria.
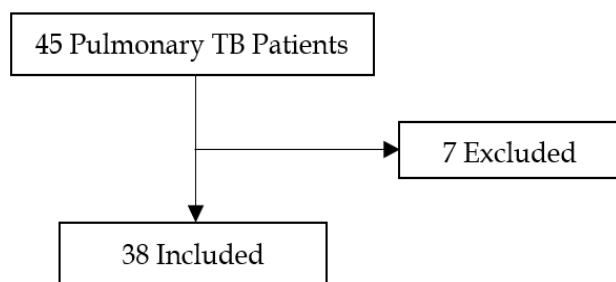

Figure 1. Participant flow diagram

Data were entered into Microsoft Excel for coding and then transferred to Jamovi version 2.6.23 for analysis. Spearman correlation was used to analyze the correlation between the phases of TB treatment and depression levels, while Fisher's exact test was used to explore the correlation between depression levels and sosiodemographic factors, including gender, age, smoking status, comorbid medical history, and occupation. A p-value of less than 0.05 was considered statistically significant.

Result and Discussion

Depression Levels in Pulmonary TB Patients

Table 1 shows that most respondents did not experienced depression (84.2%). However, 6 respondents (15.8%) experienced depression, consisting of 2 respondents (5.3%) with mild depression, 1 respondents (2.6%) with moderate depression, and 3 respondents (7.9%) with severe depression.

Table 1. Depression Levels in Pulmonary TB Patients

Depression Levels	N	Percentage (%)
None/minimal	32	84.21
Mild	2	5.26
Moderate	1	2.63
Severe	3	7.89

Depression Levels in Pulmonary TB Patients Based on Gender

Table 2 presents the proportion of depression levels based on gender. The largest proportion of respondents were male, totaling 22 individuals (57.89%) and four of them experienced depression, with one (2.63%) having mild depression, one (2.63%) moderate depression, and two (5.26%) severe depression. The results of Fisher's exact test revealed no significant correlation between gender and depression levels (p = 1.000). The results of this study are in accordance with those reported by Salodia et al. (2019), which found that gender was not significantly correlated with depression levels. Kielan et al. (2021) stated that the factors contributing to depression in men include a family history of depression, unemployment, and economic issues.

Table 2. Depression Levels in Pulmonary TB Patients Based on Gender

Gender	Depression levels (%)			
	None/minimal	Mild	Moderate	Severe
Male	18 (47.37)	1 (2.63)	1 (2.63)	2 (5.26)
Female	14 (36.84)	1 (2.63)	0 (0)	1 (2.63)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)

Fisher's exact test: p = 1.000

Depression Levels in Pulmonary TB Patients Based on Age

Table 3 shows that the majority of respondents were adults, totaling 17 individuals (44.74%). There

were 4 respondents who experienced depression, consisting of two (5.26%) with mild depression and two (5.26%) with severe depression. Fisher's exact test revealed no significant correlation between age and depression levels (p = 0.577). This can occur due to other factors such as marital status, family history of depression, insomnia, lack of social support, and economic issues, which can also contribute to depression in individuals aged 20-40 years (Balawi et al., 2019; Cui & Fiske, 2022).

Table 3. Depression Levels in Pulmonary TB Patients Based on Age

Age	Depression Levels (%)			
	None/minimal	Mild	Moderate	Severe
Adults	13 (34.21)	2 (5.26)	0 (0)	2 (5.26)
Pre-elderly	10 (26.32)	0 (0)	0 (0)	1 (2.63)
Elderly	9 (23.68)	0 (0)	1 (2.63)	0 (0)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)

Fisher's exact test: p = 0.577

Depression Levels in Pulmmonary TB Patients Based on Smoking Status

Table 4 shows that most of the respondents in this study were non-smokers with a total of 32 individuals (84.21%) and the results of Fisher's exact test analysis revealed no significant correlation between smoking status and depression levels (p = 0.672). The results of this study differ from those of Wu et al. (2023), who reported a correlation between smoking and depression, with the risk of depression increasing in line smoking frequency.

Table 4. Depression Levels in Pulmonary TB Patients Based on Smoking Status

Smoking Status	Depression Levels (%)			
	None/minimal	Mild	Moderate	Severe
Yes	5 (13.16)	0 (0)	0 (0)	1 (2.63)
No	27 (71.05)	2 (5.26)	1 (2.63)	2 (5.26)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)

Fisher's exact test: p = 0.672

Depression Levels in Pulmonary TB Patients Based on Comorbid Medical History

Based on Table 5, a total of 16 respondents (42.11%) had comorbidities, including diabetes mellitus in 11 respondents, hypertension in 3 respondents, prostate disease in 2 respondents aged over 70 years, kidney disease in 1 respondent, COPD in 1 respondent, and asthma in 1 respondent. Individuals with a history of comorbid diseases such as diabetes mellitus and hypertension often experience sadness, hopelessness, and stress related to their ilness, which may increase their susceptibility to depression (Herrera et al., 2021). However, the results of Fisher exact test analysis in this study revealed that comorbid medical history were not

significantly correlated with depression levels (p = 0.873).

Table 5. Depression Levels by Comorbid Medical History

Comorbid Medical History	Depression Levels (%)			
	None/minimal	Mild	Moderate	Severe
Yes	13 (34.21)	1 (2.63)	1 (2.63)	1 (2.63)
No	19 (50)	1 (2.63)	0 (0)	2 (5.26)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)

Fisher's exact test: p = 0.873

Depression Levels in Pulmonary TB Patients Based on Occupation Type

The number of unemployed respondents in this study was the highest compared to other occupational categories, with 3 respondents experiencing depression. However, the results of Fisher's exact test analysis revealed no significant correlation between occupation and depression (p = 0.969). The results are inconsistent with the results reported by Evanytha et al. (2022) and Yang et al. (2024), who stated that individuals with unemployed status are more likely to experience depression due to economic pressure and social stigma. These individuals frequently experience low self-esteem, feelings of inferiority compared to employed individuals, and concern about their future.

Table 6. Depression Levels in Pulmonary TB Patients Based on Occupation Type

Type of Occupation	Depression Levels (%)			
	None/minimal	Mild	Moderate	Severe
Unemployed	14 (36,84)	1 (2.63)	1 (2.63)	1 (2.63)
Civil Servant	1 (2.63)	0 (0)	0 (0)	0 (0)
Private Employee	3 (7.89)	0 (0)	0 (0)	0 (0)
Self-employed	11 (28.94)	1 (2.63)	0 (0)	2 (5.26)
Student	3 (7.89)	0 (0)	0 (0)	0 (0)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)

Fisher's exact test: p = 0.969

Correlation Between the Phases of TB Treatment and Depression Levels

Based on the results in table 7, the majority of respondents who experienced depression were undergoing tuberculosis treatment in the intensive phase, with a total of 5 respondents, and only 1 respondent experienced depression during the continuation phase of tuberculosis treatment. This can occur because individuals who have recently been diagnosed with TB generally experience insomnia, loss of appetite, loss of interest, and concerns about complications or the prognosis of their illness (Agarwal & Sarthi, 2020; Kumar et al., 2016).

The spearman correlation analysis shown in table 7 revealed no significant correlation between the phases

of TB treatment and depression levels, with a p-value 0.093. The results of this study differ from those of Meylisa (2021), who conducted a study at Meruaxa Hospital, Banda Aceh, and reported a significant correlation between TB treatment duration and depression levels. However, the results of this study are consistent with those of Salodia et al. (2019), who conducted a study at RHTC Najafgarh, New Delhi, and found no significant correlation between the phases of TB treatment and depression levels (p = 0.241). Salodia et al. (2019) stated that depression may be caused by factors such as unemployment and low socioeconomic status. Kamble et al. (2022) also reported that depression can be caused by other contributing factors aside from the phases of TB treatment, including comorbid diseases, negative stigma, gender, unemployment, and low economic status.

Table 7. Correlation Between the Phases of TB Treatment and Depression Levels

TB Treatment Phases	Depression Levels (%)			
	None/minimal	Mild	Moderate	Severe
Intensive	14 (32.84)	2 (5.26)	1 (2.63)	2 (5.26)
Continuation	18 (47.37)	0 (0)	0 (0)	1 (2.63)
Total	32 (84.21)	2 (5.26)	1 (2.63)	3 (7.89)
Spearman: r = -0.276, p = 0.093				

Conclusion

Based on the data analysis results in this study, most TB patients did not experience depression and there was no significant correlation between the phases of TB treatment and depression levels in pulmonary TB patients at Puskesmas Putat Jaya, Surabaya.

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