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Effect of the Assistance Model on Adherence to Treatment of Drug-Resistant Tuberculosis (RO TB) Patients

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HIGHLIGHTS

- There is a significant relationship between knowledge and adherence to RO TB treatment (p = 0.000).
- The mentoring model significantly improves treatment adherence in RO TB patients (p = 0.037)

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Drug Resistant Tuberculosis (RO TB) patients require external support in the form of patient mentoring to ensure the delivery of quality, patient-centered TB services. This study aimed to determine the effect of a mentoring model on RO TB patients in the Special Region of Yogyakarta (DIY). The research employed a quasi-experimental design involving 30 RO TB patients, focusing on assessing their level of knowledge and demographic characteristics. Ethical approval was granted based on KEPK Number e-KEPK/POLKESYO/0619/VIII/2022. The results showed that most RO TB patients were male and aged ≥ 45 years. There was a significant relationship between patients' knowledge and adherence to RO TB treatment, as evidenced by the Pearson test with a p-value of 0.000 (<0.01). Furthermore, the mentoring model significantly influenced treatment adherence, supported by the Mann-Whitney test which yielded a p-value of 0.037 (<0.05). In conclusion, increased knowledge has a significant impact on improving adherence to RO TB treatment.

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1. INTRODUCTION

Tuberculosis is still ranked among the top 10 causes of death and remains the leading cause of death from infectious agents globally (Dirjen Pencegahan dan Pengendalian Penyakit, 2017). According to the World Health Organization (2022), an

estimated 10.6 million people fell ill with TB in 2022, and 410,000 of them had drug-resistant TB (DR-TB), including multidrug-resistant and rifampicin-resistant TB. In Indonesia, TB continues to pose a major public health challenge, with Kementerian Kesehatan RI (2022) reporting more than 724,000 estimated new TB cases in 2022, making Indonesia one of the top three countries with the highest TB burden globally. Despite the availability of treatment, the management of Drug-Resistant Tuberculosis (RO TB) remains unsatisfactory. This indicates the need for breakthroughs to enhance the quality and intensity of treatment programs, especially for RO TB patients. Clinical mentoring or mentorship is an educational strategy aimed at improving knowledge, skills, and adherence to therapy among patients, and has potential to support better treatment outcomes. However, there is still a lack of studies that evaluate structured assistance models for TB RO patients, and few researchers have developed specific mentoring frameworks tailored for them. Based on this background, this study aims to implement and evaluate a mentoring model to improve medication adherence among RO TB patients in the Special Region of Yogyakarta.

2. RESEARCH METHODS

This study employed a quasi-experimental design to examine the effect of a mentoring model on medication adherence among drug-resistant tuberculosis (RO TB) patients in the Special Region of Yogyakarta (DIY). A total of 30 patients from Dr. Sardjito Hospital were recruited as research participants beginning in 2020. The intervention consisted of structured patient assistance based on educational materials derived from the Integrated Management of Drug-Resistant Tuberculosis Treatment (MTPTPRO) guidelines. These materials were delivered through printed leaflets and posters. The mentoring sessions were conducted in groups and organized into four phases based on a predetermined timeline. Participants were enrolled following informed consent, indicating their voluntary agreement to take part in the study. To evaluate the effectiveness of the intervention, pre-test and post-test assessments were conducted to measure participants' knowledge and adherence to TB RO treatment. This study received ethical approval from the Health Research Ethics Committee (KEPK), as stated in approval number e-KEPK/POLKESYO/0619/VIII/2022.

3. RESEARCH RESULT

As many as 30 patient data were collected by the enumerator researchers and DIY SIKLUS in accordance with the intervention, namely providing assistance to patients and former TB RO patients.

a. Patient Characteristics

Table 1. Patient Demographic Characteristics (n=30)

No	Characteristic	n	f
1	Age		
	a. < 45 years	12	40,00%
	b. ≥ 45 years	18	60,00%
2	Jenis Kelamin		
	a. Man	19	63,20%
	b. Woman	11	36,70%
3	Pendidikan		
	a. No school, elementary, middle school/equivalent	13	43,30%
	b. SMA/equivalent-college	17	56,70%
4	Work		
	a. Doesn't work	10	33,33%
	b. Working	20	66,77%

Table 1 presents the demographic profile of the respondents. The majority of participants were aged ≥45 years (60.0%), male (63.2%), had senior high school or higher education (56.7%), and were employed (66.7%).

b. Knowledge Level of Respondents

Table 2. Knowledge Level of RO TB Patients

No	Knowledge	n	f
1	Good	21	70%
2	Not good	9	30%

Table 2 shows the distribution of knowledge levels among participants. Most respondents (70.0%) demonstrated good knowledge regarding RO TB and its treatment.

c. Treatment Adherence

Tabel 3. Treatment Adherence of Respondents

No	Adherence and Treatment	n	f
1	Obey	24	80%
2	Not obey	6	20%

Table 3 shows that 24 patients (80.0%) adhered to their treatment regimen, while 6 patients (20.0%) were not adherent

d. Correlation Between Knowledge and Treatment Adherence

A cross-tabulation analysis between knowledge and adherence is shown in Table 4, followed by Pearson correlation analysis in Table 5

Table 4. Cross-tabulation of Knowledge and Adherence

Knowledge Level	Adherent (n)	Not Adherent (n)	Total
Good	16	5	21
Not good	3	6	9
Total	19	11	30

Table 4 presents a cross-tabulation between the level of knowledge and patient adherence to drug-resistant tuberculosis (RO TB) treatment. Out of 30 respondents, most patients with good knowledge showed adherence to treatment (16 patients), while only 5 patients with good knowledge were non-adherent. Conversely, among patients with poor knowledge, only 3 were adherent, and 6 were non-adherent. Descriptively, 63.4% of patients in the adherent group had good knowledge.

Table 5. Pearson Correlation between Knowledge and Adherence

Variables	Pearson r	p-value
Knowledge vs Adherence	0.649	0.000**

To examine the relationship between knowledge and adherence to RO TB treatment, a bivariate analysis was performed using the Pearson correlation test. As shown in Table 5, the analysis revealed a significant relationship between knowledge and adherence ($r = 0.649$; $p = 0.000$). The Pearson correlation coefficient (r) indicates a strong and positive association, suggesting that higher levels of knowledge are related to higher adherence to RO TB treatment. Since the p-value is less than 0.01, the result is considered statistically significant at the 99% confidence level.

e. Effect of the Mentoring Model on Adherence

A comparison of adherence levels before and after the mentoring intervention was tested using the Mann-Whitney U test.

Table 6. Effect of Mentoring Model on Treatment Adherence

Group	N	Mean Rank	Sum of Ranks
Pre-test	30	25.80	774.00
Post-test	30	35.20	1056.00

Table 6 presents the results of the mentoring model intervention on treatment adherence among patients with drug-resistant tuberculosis. The average rank in the post-test group (Mean Rank = 35.20) was higher than in the pre-test group (Mean Rank = 25.80), indicating an increase in treatment adherence after the implementation of the mentoring model.

Table 7. Mann-Whitney U Test Results

Test Statistic	Value
Mann-Whitney U	309.000
Z	-2.091
p-value (2-tailed)	0.037*

To statistically evaluate the effect of the intervention, a non-parametric analysis using the Mann–Whitney U test was conducted. As shown in Table 7, the test yielded a Mann–Whitney U value of 309.000 with a Z-score of -2.091 and a p-value of 0.037 ($p < 0.05$). These results indicate that there is a statistically significant difference in treatment adherence between the pre-test and post-test groups. Therefore, the mentoring model had a significant positive effect on improving patient adherence to RO TB treatment.

4. DISCUSSION

Most of the patients in this study were aged ≥45 years (60.0%) and the majority were male (63.2%). This finding aligns with the study by Montoya et al. (2022), which suggested that aging is associated with physiological decline, including reduced organ function, which can impact drug tolerance and treatment outcomes in DR-TB patients. The gender disparity in adherence may also be influenced by sociocultural roles, where males—often positioned as primary breadwinners—may face greater challenges in accessing and maintaining consistent treatment schedules (Masyarakat et al., n.d.). This is consistent with previous studies that report gender as a key social determinant influencing healthcare-seeking behavior and adherence in TB management (WHO, 2023).

Educational attainment was also found to be a significant factor, with 56.7% of respondents having completed at least senior high school. This corresponds with Indonesia's 12-year compulsory education policy (Ministry of Education and Culture Regulation No. 13 of 2022). A higher level of education has been shown to facilitate better health literacy, enabling patients to process and respond to health information more effectively (Izhar et al., 2021). Additionally, 66.7% of patients were employed, potentially increasing their exposure to TB transmission in occupational environments, particularly in sectors with poor ventilation or close contact, as observed by Mehra et al. (2017)

a. Knowledge

The study found that 63.4% of participants had good knowledge regarding RO TB, suggesting a foundational awareness of the disease and its treatment (Izhar et al., 2021). This finding is in line with Budi and Tuntun (2013), who emphasized knowledge as a principal determinant of health-related behavior. However, while knowledge levels in this study were generally high, it is important to critically note that other studies, such as that of Sripad et al. (2014), have highlighted that knowledge

alone does not always guarantee behavioral change unless paired with psychosocial support and systemic facilitation. Therefore, while this study confirms that good knowledge contributes to treatment adherence, the role of other reinforcing factors, such as motivation and community support, should also be considered in future research.

b. Treatment Adherence

Most respondents (80.0%) exhibited good adherence to treatment, which supports findings from Kaufmann and Van Helden (2008) and Park et al. (2012), who reported that adherence plays a crucial role in treatment success, particularly for RO TB. Good adherence ensures that medications are taken correctly in terms of dosage, timing, and duration. However, consistent with the Ministry of Health's TB guidelines (Kemenkes RI, 2017), several factors can still interfere with adherence, including polypharmacy, adverse drug reactions, and patient fatigue. Chambers (2010) further distinguished between unintentional and intentional non-adherence: the former may involve forgetfulness or logistical issues, while the latter often stems from beliefs, stigma, or perceived inefficacy of treatment.

Comparative studies such as those by Lange et al. (2014) and Shrestha et al. (2018) support this finding but also emphasize that patient-centered care and structural support (e.g., community-based directly observed therapy or incentives) can enhance adherence levels. Thus, while the findings of this study are consistent with existing literature, they also indicate the importance of integrated strategies beyond education alone.

c. The Relationship between Knowledge and Adherence to Treatment

The analysis revealed a statistically significant correlation between knowledge and treatment adherence ($p = 0.000$). Patients with better knowledge were more likely to follow treatment protocols, which supports findings from Shrestha et al. (2018) and Lange et al. (2014). This relationship can be explained by the increased comprehension of treatment benefits and consequences of non-adherence when patients are well-informed. However, the consistency of this result with prior studies also raises the need to investigate knowledge quality—beyond factual recall—such as its relevance, accuracy, and patient trust in the information source. Future research could explore how different forms of knowledge delivery (digital, interpersonal, peer support) influence adherence behaviors more effectively.

d. The Effect of the Mentoring Model on Treatment Adherence

The mentoring intervention, structured into four sessions and delivered using posters and leaflets, showed a significant impact on treatment adherence ($p = 0.037$). This is consistent with findings by Pasek (2013) and Sripad et al. (2014), both of which affirmed the role of structured educational and psychosocial interventions in improving adherence. Notably, the mentoring model in this study integrated not only knowledge delivery but also addressed social stigma—an often overlooked factor in TB management.

Critically, while the improvement in adherence post-intervention is encouraging, the study did not include a control group for comparison. Therefore, while the results are promising, the effect of the mentoring model should be interpreted cautiously. Studies such as that by Diel et al. (2020) have shown that mentoring models are most effective when combined with digital follow-ups or community health worker involvement. Thus, future studies should consider larger, randomized trials to strengthen the evidence for scalability.

5. CONCLUSION

This study concludes that the majority of drug-resistant tuberculosis (DR-TB) patients are aged ≥45 years, predominantly male, possess a senior high school level of education, and are employed. Patient knowledge was found to have a significant influence on medication adherence (p = 0.000), and the implementation of a structured mentoring model also showed a significant effect on improving treatment adherence (p = 0.037). These findings highlight that patient knowledge and systematic mentoring are key components in enhancing compliance with DR-TB treatment regimens. The mentoring model used in this study, which combines educational support with patient-centered guidance, demonstrates practical value in improving patient outcomes and adherence behavior. Therefore, this model is recommended to be adopted and integrated into the national tuberculosis control program as an innovative strategy to strengthen adherence, reduce default rates, and support the overall success of DR-TB management. Further research involving larger populations and diverse settings is recommended to validate and expand the applicability of this mentoring approach.

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