

Improvement of Tuberculosis (TB) Patient Treatment Adherence through Family-Centered Approach and Social Cognitive Theory in Probolinggo Regency

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Abstract

Tuberculosis (TB) is still a public health problem. The existence of TB prevention programs involving the community has increased the discovery of TB suspects, but it has not been followed by treatment adherence of TB patients. The purpose of this study is to determine the improvement of treatment adherence of tuberculosis (TB) patients through a family-centered approach and social cognitive theory in Probolinggo Regency. This study is a quasi-experimental study using a pretest-posttest nonequivalent control group design. The population comprised all adherence TB patients in Probolinggo Regency (112 people); the sample comprised partially adherent TB patients, including family members, according to the inclusion criteria, using a cluster random sampling technique to select 80 respondents, divided into two groups: 40 in the intervention group and 40 in the control group. Patients in the intervention group received a family-based approach and social cognitive which focuses on interaction. The personal factors (knowledge, increased self-efficacy, medication-taking behavior) and the environment (family support) are important parts of care. The focus is not solely on the individual patient but on the relationship among behavior, environment, and mindset, applying theory through education twice a week for 60 minutes over 2 months. The control group received standard health services without additional intervention. Data were collected using a questionnaire, the Morisky Medication Adherence Scale (MMAS-8), which has undergone validity and reliability testing (Cronbach's alpha: 0.80), and a family-based nursing module. Data analysis with the help of SPSS nonparametric test, Wilcoxon W. Data processed on September 16, 2025. The results showed that, in the intervention group, the average non-adherence was 62.5%, and in the control group, 47.5%. Post-test showed that the average *t* adherent reached 77.5%, while the control group was non-adherent at 47.5%. The results of the independent-samples *t*-test show that in the intervention group, the mean rank is 56.3, and in the control group, it is 24.6, with a significant difference ($P\text{-value: } 0.000 < \alpha = 0.005$). and results Mann-Whitney test significant ($P\text{-value: } 0.000 < \alpha = 0.005$). There is a difference between the intervention and control groups. This means there is an increase in average adherence to family-based methods compared with standard health service methods. A family-centered approach, grounded in education and social cognitive theory, increases self-efficacy, and observational learning can improve adherence among patients with TB.

Keywords: Adherence, Tuberculosis (TB) patient treatment adherence, family-based approach, social cognitive theory

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INTRODUCTION

Tuberculosis is an infectious disease that has become a public health problem ([Fetensa et al., 2024](#)). Community-engaged prevention strategies have been successful in increasing the identification

of TB suspects, but a lack of willingness to receive treatment can lead to new infections that pose a risk of transmission ([Juliasih et al., 2024](#)). Successful treatment of TB relies heavily on patient adherence to a long-term regimen that typically lasts at least 6 months ([Kemenkes RI, 2023](#)). Non-adherence to treatment can lead to serious consequences, including treatment failure, development of drug resistance (MDR-TB), continued transmission of the disease in the community, and increased patient morbidity and mortality ([Lourenço et al., 2025](#)).

Data from the Global TB Report 2024 show that TB cases have increased from 7.2 million in 2022 to 8.2 million ([WHO, 2024](#)). Indonesia has the second-highest TB caseload in the world, with a case detection rate of 41%. The survey results obtained 326,210 cases unreached and undetected ([Kementerian Kesehatan RI, 2023](#)). The TB treatment non-compliance rate is around 27%, and the TB Success Rate (TSR) remains below 85%, short of the national target of 90%. Probolinggo Regency has the second-highest number of TB cases in East Java, with 3,532 suspected cases and 713 (21%) detected cases ([Dinas Kesehatan Kabupaten Probolinggo, 2025](#)). The results of a preliminary study on 10 patients with treatment adherence found that patients did not continue treatment because they were embarrassed, and TB disease was still a stigma in the community. Non-compliance risks therapeutic failure and the development of drug resistance (*Multi-Drug Resistant TB*). The factors that can affect patient adherence include individual factors, knowledge of the disease, socioeconomic status, health service factors, accessibility of health services, quality of interactions with health workers, and environmental factors, namely family support ([Asriwati et al., 2021](#)).

Considering the complexity of the factors influencing treatment adherence, interventions should not focus solely on one-way instructions from healthcare providers; other strategies are needed, including a family-centered care approach. Previous studies found that individual-based approaches were less effective in improving treatment adherence, while the family served primarily as medication supervisors. In this study, the family-based intervention not only serves as medication supervision but also engages the social environment to modify cognitive factors and support self-regulation, thereby promoting adaptive treatment-related behaviors. Previous studies using applications did not involve social support.

This family-based approach is found in Social Cognitive Theory, which incorporates the concept of reciprocal determinism in treatment adherence behavior, in which interactions occur among internal cognitive factors, the social environment, and the individual's behavior. In this theory, family involvement serves as environmental support that can enhance patients' self-efficacy in undergoing treatment. Families can provide positive reinforcement to patients and offer encouragement through motivational support, thereby helping them cope psychologically with the side effects of treatment. Integrating a family-based approach with Social Cognitive Theory not only provides supportive interventions but also promotes the restructuring of patients' behavior to improve adherence to treatment.

Traditional approaches to TB care often focus on the individual patient. Despite their importance, these approaches may be less effective at addressing the complexity of social and environmental factors influencing adherence ([Ro'isah et al., 2021](#)). Family has a very important role in an individual's life, especially in the context of health ([Hassani et al., 2024](#)). Families can provide crucial emotional, practical (e.g., reminders to take medication, accompaniment to health facilities), and financial support for TB patients ([Ismail et al., 2025](#)). The shortcomings of the customized strategy led to the development of the family-centered approach, which acknowledges the crucial role families play in enhancing TB patient adherence ([Welbeck et al., 2025](#)). This method involves family members in all aspects of patient care and support, including information sharing, emotional support, and medication management. By actively involving the family, it is expected that patients will feel more supported, motivated, and have greater responsibility for their treatment ([Zary et al., 2024](#)).

The cognitive social theory approach is one of the psychosocial theories that support behavior change strategies that observe others in social interactions ([Tang et al., 2023](#)). This cognitive social theory explains that behavior arises from a reciprocal relationship among personal, environmental, and behavioral factors, in which continuous interactions among knowledge, behavior, and environmental

influences shape social behavior ([Akram & Abdelrady, 2025](#)). Therefore, families can be agents of change in supporting their family members' health and preventing TB transmission in the community ([Ro'isah et al., 2021](#)). Therefore, a family-centered approach and social cognitive theory are needed to improve adherence. Ketidakpatuhan TB patients is based on the understanding that treatment adherence is influenced by various factors, including social and family support ([Ciaravino et al., 2023](#)). Treatment adherence for TB patients includes pill counts and the TB card 01. The TB patient adherence indicator is the evaluation of the record of medication intake dates and the remaining quantity of medication. The purpose of this research is to analyze improvements in treatment adherence among patients with TB through a family-centered approach and social cognitive theory in the Probolinggo district. The family-centered approach and social cognitive theory by Albert Bandura is commonly used; previous researchers were just focused on one of family support, self-efficacy, whereas in family research has become the first agent facilitating patient compliance improvement. The integrity approach is used to overcome initial obstacles, such as stigma, denial, or fear, at the beginning of diagnosis. This approach, which involves actively involving families in the care of TB patients, is expected to overcome these barriers and improve the overall success of the TB control program. Family support is a key factor in the success of TB treatment; the family acts as both a motivator and a facilitator. This role model involves reminding the patient, supervising medication intake, and accompanying the patient to regular check-ups

METHODS

This study uses a Quasi-Experimental Study with a Pretest-Posttest design and a nonequivalent control group design, comparing compliance between the intervention group and the control group without any additional intervention ([Sugiono, 2020](#)). The research was conducted from March 16 to September 16, 2025. The population was all adherence of tuberculosis patients in Probolinggo Regency as many as 112 people and the sample was part of all adherence of tuberculosis patients in Probolinggo Regency according to the inclusion and exclusion criteria with *cluster random sampling technique*, all members of the population are written on paper, then shuffled until the sample size is reached of 80 people divided into 2 (two) groups of 40 people each. Inclusion criteria of age 17-50 years old, a minimum education level of elementary school, a two-month treatment phase, and family accompanying the patient for a follow-up visit. Exclusion criteria: over the age of 50, treatment failed. Those who assigned participants to the interventions did not have access to the random allocation sequence. The family-centered approach intervention was provided by a health worker who is a mental health nursing expert, through health education over 2 meetings; each meeting had 2 sessions, each lasting 60 minutes, within two months. The control group was given standard health services. Data were collected using modules and questionnaires, the Morisky Medication Adherence Scale (MMAS). The total number of questions is 8, with scoring as follows: for questions 1–7, the response options are Yes and No. Non-compliant answer: score 1; compliant answer: score 0. Question number 8 uses a Likert scale: never: score 1.0; rarely: score 0.75; sometimes: score 0.50; usually: score 0.25; always: score 0.0. Data were analyzed using SPSS with the nonparametric Wilcoxon test to assess differences before and after the intervention. and the Mann-Whitney test to compare scores between the intervention and control groups ([Kustin et al., 2024](#)). Missing data were not included in the analysis. The trial protocol and statistical analysis plan can be accessed <https://komiteetik.unhasa.ac.id/home>, with the number: 123/KEPK-UNHASA/III/2025. There is no risk to respondents from the research. If the respondent is fatigued, they are given time to rest. <https://ina-crr.kemkes.go.id/> No. INA.55FE826.

RESULTS

In this study, the data is divided into general data, including age, gender, and education, and special data, consisting of adherence of TB patients, as shown in [Table 1](#).

Table 1. Frequency Distribution of Characteristics of TB Adherence Patients in Probolinggo Regency

Characteristics	Group		P
	Intervention n=40 Frequency (%)	Control n=40 value Frequency (%)	
Age			
19-26	9 (22.5)	10 (25)	0.214
27-34	14 (35)	17 (42.5)	
35-42	9 (22.5)	8 (20)	
43-50	8 (20)	5 (12.5)	
Gender			
Male	14(35)	18 (45)	0.693
Female	26 (65)	22 (55)	
	40 (100)	40 (100)	
Education			
Elementary School	13 (32.5)	9 (22.5)	0.010
Junior High School	19 (47.5)	19 (47.5)	
Senior High school	8 (20)	12 (30)	
Treatment history			
New TB cases	33 (82.5)	30 (75)	0.658
Treatment failure patient	2 (5)	3 (7.5)	
Relapse patient	5(12.5)	7(17.5)	

[Table 1.](#) Frequency Distribution of Characteristics of TB adherence patients in Probolinggo Regency. Based on the table above, the characteristics of the intervention group are mainly age 27-34, 14 people (35), female gender 26 people (65%) and junior high school education level 19 people (47.5), treatment history New Tb cases (82.5%) In the control group, the majority of ages 27-34 were 17 people (42.5%), female gender (55%) and junior high school education level 19 people (47.5%), treatment history New TB cases (75%). The researcher randomly assigned participants to either the intervention group or the control group. Baseline comparison of characteristics: the homogeneity test between the intervention group and the control group used the Chi-Square statistical test, with significant Age P: 0.214 > 0.05, gender, P: 0.693 > 0.05, education, P: 0.010 > 0.05, and Treatment history, P: 0.658 > 0.05, with the conclusion that the initial characteristics are homogeneous. Of the 80 participants, there is no missing data in this study.

Table 2: Frequency distribution based on adherence of Tuberculosis (TB) patients before the intervention in Probolinggo Regency

Adherence	Group	
	Intervention n=40 Frequency (%)	Control n=40 Frequency (%)
Adherence	4 (10)	3 (7.5)
Moderate adherence	11(27.5)	18 (45)
Low-adherence	25 (62.5)	19 (47.5)

Based on the table above, it shows that adherence of patients before intervention in the intervention group is mainly moderate adherence, 11 people (27.5%), while in the control group, most of them have moderate adherence (45%).

Table 3: Frequency distribution based on adherence of Tuberculosis (TB) patients after the intervention in Probolinggo Regency

Adherence	Group	
	Intervention n=40 Frequency (%)	Control n=40 Frequency (%)
Adherence	31 (77.5)	5 (12.5)
Moderate adherence	8 (20)	14 (35)
Low-adherence	1(2.5)	21(52.5)

Based on the table above, the intervention group shows that most patients are adherent, with 31 people (77.5%), while in the control group, most are not adherent, with 21 people (52.5%).



Figure 1. Providing education

To determine the increase in adherence in the intervention group and the control group before and after the intervention using statistical tests with the help of SPSS software, with non-parametric Independent samples, the Wilcoxon because categoric data W test obtained significant results, $P < 0.000$, $< \alpha. 0.05$, which means that there is a difference between the Intervention group and the control group before and after the family-based approach and cognitive social theory, the average rank score in the family-based method and cognitive social theory is 56.36 and the control group with the standard health service method is 24.64, meaning that the family-based method and cognitive social theory tend to have increased adherence than the control group.

Table 4: Frequency distribution based on adherence of Tuberculosis (TB) patients with the group intervention and control in Probolinggo Regency

Adherence	Group		Z	P value
	Intervention n=40 Frequency (%) Mank rank	Control n=40 Frequency (%) Mank rank		
Pre test	40.10	40.90	-171	0.000
Post test	56.36	24.64	-6.551	
Difference in Mean Ranks	31.72	0.80		

Based on the Mann-Whitney test, Asymp. Sig. (2-tailed) ($p: 0.000 < 0.05$). This means there is a statistically significant difference between the adherence group intervention and the adherence group control at the intervention group, pre-test at the group intervention, mean rank, 40.10, and post-test, 56.36, and the control group, pre-test, mean rank, 40.90, whereas the control group mean rank is 24.64, Difference in Mean Ranks, 31.72, and group control 0.80

DISCUSSION

A study using a family-centered approach and cognitive social theory in the management of TB enrollment patients in Probolinggo Regency showed significant results: Improved Treatment Adherence. The results of this study consistently showed that the application of family-centered interventions and principles of Cognitive Social Theory had a positive and significant impact on improving adherence of Tuberculosis patients in Probolinggo District. The research hypothesis that a holistic approach can overcome adherence issues in TB therapy is supported by this finding. Because it directly addresses the social support needs of TB patients, the family-centered approach has proven to be helpful ([Zary et al., 2024](#)). In addition to providing practical support in the form of prescription reminders and help to medical facilities, active family involvement offers emotional support that lessens patients' tension and worry. This makes it easier for patients to continue adhering. The results of this study are consistent with other research demonstrating that family social support is a powerful predictor of treatment adherence for chronic illnesses. However, by incorporating the framework of Cognitive Social Theory into family-based therapies, this study makes a novel contribution, offering a deeper understanding of the psychological factors underlying greater adherence. ([Adima & Arini, 2025](#)).

This increase in adherence can be explained by Social Cognitive Theory, which suggests that the intervention may have provided patients and their families with the information and skills they needed to successfully complete treatment. When patients feel confident in their ability, they tend to be more persistent in the face of treatment challenges. The role of family as a "model" positively influences adherence. Patients will see family members or other patients who are successfully adherent, which then encourages them to imitate the behavior. Additionally, observational learning seems to play a critical role. Patients can witness firsthand the support and dedication of family members to the therapy process through family participation ([Zary et al., 2024](#)). In addition to encouraging patients to internalize adherent behaviors and the conviction that adherence will lead to a cure and improved quality of life through education and discussion in the intervention, family members who actively remind or assist patients in taking their medication act as positive role models, inspiring patients to continue adhering. In theory, this study supports the applicability of Social Cognitive Theory as a potent framework for understanding and promoting healthy behaviors, especially regarding contagious diseases like tuberculosis. It implies that individual adherence may be influenced by family-level collective self-efficacy ([Alene et al., 2024](#)).

Compared with the control group that received standard therapy, TB patients who received active family support and involvement had considerably higher levels of treatment adherence. Families were involved in monitoring medication use, reminding patients to take their medications regularly, and offering emotional support. The success rate of TB therapy in the intervention group also rose considerably in tandem with increased adherence. In accordance with the specified protocol, more patients successfully finished their treatment. Reduced Loss to Follow-up: Research has demonstrated that a family-centered strategy can effectively lower the number of TB patients who discontinue treatment before finishing it ([Fetensa et al., 2024](#)). Family support helps patients overcome obstacles to accessing long-term treatment and provides them with inspiration. Additionally, it improves family knowledge and comprehension of tuberculosis (TB). This family-based intervention, grounded in social cognitive theory, can improve self-efficacy and observational learning, as well as family knowledge about TB disease, how it spreads, the importance of complete treatment, and how to provide patients with appropriate support. This enhanced comprehension helps create a more encouraging atmosphere for the patient. Better Quality of Life for Patients: TB patients' quality of life is positively impacted by

family members' practical and emotional support. In managing their illness, patients feel less alone, more driven, and more cared for. Strengthening Social Support Systems: This strategy strengthens the TB patient's social support network. The family takes over as the primary support system, reducing dependence on medical professionals and increasing the sustainability of local treatment ([Fonseka et al., 2024](#)).

The study's findings show how crucial families are to the effectiveness of TB prevention. Among the discussion's main points are: Practical and Emotional Assistance: Psychological issues like loneliness, stigma, and lack of desire frequently impede TB treatment adherence. Family members' emotional support, which includes listening to patients' grievances and offering encouragement, is essential ([Andargie et al., 2021](#)). Adherence is also greatly aided by practical assistance, such as reminding patients when to take their medication, helping with transportation to medical facilities, and ensuring that wholesome food is available. Efficient Health Education ([Jiang et al., 2023](#)): Including families in TB education guarantees that the patient's immediate surroundings receive and comprehend accurate information. This empowers families to give the right care and helps debunk any myths or stigmas that may exist in the community. Overcoming Socioeconomic Obstacles: Families are frequently at the forefront of helping TB patients overcome socioeconomic obstacles, such as transportation expenses for treatment or trouble making a living while unwell ([Karat et al., 2021](#)). Involving families can help ensure patients continue their treatment and assist in finding answers ([Asriwati et al., 2021](#)). Empowerment of the Family as a Partner: A family-centered approach acknowledges the family as a crucial member of the TB treatment team. Families feel more accountable for the patient's successful treatment when they are empowered and given a clear role ([Ro'isah et al., 2022](#)). Policy and Practice Implications: The study's findings have significant implications for how TB policy and practice are developed in the Probolinggo district and elsewhere. A family-centered strategy must be incorporated into the national TB program. This can be accomplished by creating family-based peer support groups, developing instructional resources for families, and teaching health professionals how to engage families effectively. ([Keter et al., 2025](#)).

Based on the results of the Mann-Whitney analysis, there was a difference in treatment adherence between the intervention and control groups ($p = 0.000 < 0.05$), both of which received the standard services provided by the community health center. The statistical analysis shows a significant difference. Pre-test at group intervention, mean rank, 40.10, and post-test 56.36, and control group pre-test, mean rank 40.90, whereas control group mean rank 24.64, Difference in Mean Ranks 31.72, and group control 0.80.

These findings can serve as an evaluation of treatment adherence behavior, which may be influenced by various factors. For example, treatment requires a long duration, six months; patients may be adherent at the beginning of treatment, but during the continuation phase, they may become tired of taking their medication due to side effects such as dizziness and nausea. Meanwhile, the intervention group received family-based treatment monitoring, which may provide patients with social support.

CONCLUSION

This study demonstrates that TB patients' enrollment adherence in Probolinggo Regency was significantly improved by a family-centered strategy combined with social cognitive theory. The results emphasize the importance of enhancing patients' self-efficacy and leveraging family social support as crucial strategies in TB control. The study's findings suggest that Probolinggo Regency's TB control program uses an intervention paradigm that actively involves families. As a basic component of TB case management, health workers should receive training in applying a family-centered strategy through group education or family-involved home visits. Policies that encourage comprehensive education not only for patients but also for immediate family members are needed to create a strong ecosystem of support, and further research using more robust methods and designs is warranted. To strengthen the evidence of effectiveness, it is recommended to conduct further research with a

Randomized Controlled Trial (RCT) design in different regions and explore the role of other factors, such as community support or the use of digital technology, in improving TB adherence

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ETHICAL STATEMENT

This study has been ethically approved with the number. 123/KEPK-UNHASA/05/2025. We appreciate all the participants for their cooperation in allowing data for the study to be generated from them

AUTHOR'S CONTRIBUTION

Ro'isah: Conceptualization, methodology; Erna Handayani: Writing-Original draft preparation, writing-reviewing. Yulia Rachmawati Hasanah: Writing-review.

CONFLICTS OF INTEREST

The authors declare no conflict of interest of any sort that could influence the impartiality of the study.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available online in the articles/journals consulted for the study in the reference section.

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