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BEHAVIOR RELATED TO THE SUCCESS OF PULMONARY TB TREATMENT

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ABSTRACT
Pulmonary Tuberculosis (TB) is an infectious disease caused by Mycobacterium Tuberculosis, this disease becomes a public health problem, especially if there is a break in treatment which has an impact on TB drug resistance. The purpose of this study is to see the correlation or relationship of determinant factors that influence the success of pulmonary tuberculosis treatment. The type of research is Observational Analytical with a Cross Sectional approach. Data collection uses questionnaires, observations and interviews. The population is 158 and the sample is 91 respondents with cluster sampling. The study was conducted in Parigi Moutong Regency during February-June 2025. Of the 91 respondents who were 94.5% compliant with taking medication, 75.8% had good Family Support, 75.8% had Drug Supervisor (PMO) Support and 83.5% had Health Worker Support, the results of the chi square test showed a relationship between medication adherence and the success of Pulmonary TB Treatment p = 0.000 <0.05, there was a relationship between family support and the success of Pulmonary TB Treatment p = 0.001 <0.05, there was a relationship between support (PMO) and the success of Pulmonary TB Treatment p = 0.001 <0.05 and there was a relationship between Health Worker support and the success of Pulmonary TB Treatment p = 0.000 <0.005. Conclusion There is a relationship between behavior (medication adherence, family support, PMO support and health worker support) and the success of pulmonary TB treatment.

Keywords: behavior; treatment success; tuberculosis

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INTRODUCTION

Pulmonary TB is a disease caused by Mycobacterium tuberculosis (MTB) which attacks the human lung organs and spreads through coughing and sneezing. TB has a negative impact on public health, leading to drug resistance if not properly managed and causing death. (Dirjen P2P, 2023; Kemenkes, 2024; Kementerian Kesehatan RI, 2022). The global prevalence of TB, according to the global TB report, is expected to rise from 10,300,000 cases in 2021 to 10,600,000 cases in 2023. Meanwhile, the global TB death rate is expected to rise from 1.4 million in 2021 to 1.3 million in 2023. 7 Similarly, the prevalence of TB in Indonesia rose from 819,000 cases in 2021 to 1,060,000 in 2023. 8 Meanwhile, the Ministry of Health reported that the TB death rate in 2021 was 144,000 and in 2022 to 134,000. , (Kementerian Kesehatan RI, 2022; Organization, 2023).

The prevalence of TB cases in Central Sulawesi Province, according to the Health Office, was 7,963 cases in 2023. and 23 deaths in 2024, bringing the total to 8,272 cases and 30 deaths. Meanwhile, from January to May 2025, there were 4,085 cases and 16 deaths. 7 The prevalence of TB cases in Parigi Moutong Regency was 1,721 cases in 2022 and 819 cases in 2024, with 46 cases lost to follow-up spread across 23 community health centers. From this data, four community health centers had the highest TB transmission rates: Tada Community Health Center (26 cases), Sidoan Community Health Center (33 cases), Palasa Community Health Center (62 cases), and Siniu Community Health Center (37 cases). (Dinkes Sulawesi Tengah, 2021, 2023; DINKESPROV, 2021).

Problems that contribute to the lack of success of TB treatment in Parigi Moutong include patient non-adherence to TB treatment, resulting in loss to follow-up or treatment failure; patients experiencing side effects from medication or experiencing a lack of symptoms, leading to interruption of TB treatment; patients being too busy working to take their medication or not taking their medication. Taking medication at health care facilities and a lack of motivation for treatment, a lack of family support, including emotional, instrumental/financial, informational, and reward support, a lack of support from Medication Supervisors (PMOs), such as reminders to visit health care facilities, reminding patients to take medication according to the dosage and schedule, and a lack of active participation by health workers in promotive, preventive, curative, and rehabilitative efforts for TB patients(Kemenkes, 2024; Kementerian Kesehatan RI, 2022; P2PM, 2023).

Factors contributing to successful TB treatment include: adherence to TB medication dosage and daily intake for 6-9 months, patient motivation for treatment, a proper understanding of TB information, a positive attitude toward treatment, especially during check-ups at health care facilities, providing health care assistance in the form of actions, motivation, and emotional support, health education and information, early detection and appropriate therapy, preventing treatment interruptions and drug resistance, monitoring medication intake, managing side effects, monitoring and evaluating patient recovery, communicating with family and PMOs, and breaking the chain of transmission. (Fitri, 2018), (Depo & Pademme, 2022) The role of family support includes monitoring medication intake, providing emotional, instrumental, or financial support, rewards, and information, providing handling side effects at home, providing a supportive environment in the healing process and communicating with health workers, and breaking the chain of transmission. .(Irnawati et al., 2016; Kemenkes RI, 2020).

The role of the PMO's support includes improving medication adherence, being responsible for monitoring and supervising medication intake according to the dosage and schedule, preventing discontinuation of treatment, which can lead to drug resistance, providing clear information about TB treatment, early detection and management of drug side effects, communicating with health workers, providing emotional (psychological) support and motivation, and interrupting transmission. Supervising patients in taking medication according to the doctor's regimen until completion, motivating them to regularly check their health at health facilities, providing clear information to patients about TB, especially factors that cause treatment failure and drug side effects, and reminding patients to regularly check sputum and drug stocks. (Panggayuh et al., 2019; Pardosi et al., 2024).

The role of health workers in preventing drug resistance, increasing cure rates and treatment success, breaking the chain of TB transmission, reducing the risk of relapse, improving quality of life, and ensuring successful treatment is achieved by someone who has received treatment according to OAT standards, whether the treatment is complete or incomplete. Provide health education materials, provide appropriate and correct treatment, provide information about TB, collaborate with families or PMOs to improve patient medication adherence, provide support and motivation to complete treatment, and demonstrate empathy and concern. and monitoring patients, identifying problems or obstacles experienced by patients, providing health services according to SOPs, providing the best possible care without discrimination, increasing patient confidence, and playing an active role in preventing TB transmission. .(Dehmi et al., 2021; Wang et al., 2021).

Interventions implemented to address the determinants of successful TB treatment include preventive, promotive, curative, and rehabilitative efforts supported by healthcare workers, such as providing clear information, especially about drug side effects, providing health

education on clean and healthy living behaviors (PHBS), caring for patients, providing counseling to understand the patient's condition, operating mobile community health centers (Puskesmas) to reach health services in remote areas, entrusting anti-tuberculosis drugs (OAT) to village midwives who have received training in drug monitoring and supervision to ensure easy access for patients, and educating families and PMOs by providing practical assistance to patients and their families to healthcare facilities. .(Irnawati et al., 2016; Kemenkes RI, 2020).

METHOD

This was an observational analytical study using a cross-sectional approach. Data collection used questionnaires, observations, and interviews. The population was 158, and the sample size was 91 respondents, using cluster sampling. The study was conducted in Parigi Moutong Regency from February to June 2025. The questionnaire used to assess medication adherence was the MMAS-8. The Indonesian-language MMAS-8 questionnaire was adopted from a previous study on exposure to TB medication use, eliminating the need for repeated validity and reliability tests tailored to the respondents in this study. The results of the validity and reliability test showed that all statements were valid with a P value >0.05 and reliable with a value of 0.783. Questionnaires assessing support from healthcare professionals, family support, and PMO support were validated first. The correlation between patient characteristics and their satisfaction level was explained using the chi-square test.

RESULT

Univariate Analysis

In this study univariate data analysis was conducted in February – June 2025. The distribution of respondent characteristics can be seen in the following table.

Tabel 1.
Frequency distribution based on characteristics

Variabel	f	%	Min-max	Mean Dan St Deviasi
Age				
Teenagers 11-19	9	9.9	17-63	42,34±13.983
Adults 20-59	75	82.4		
Seniors 60-70	7	7.7		
Gender				
Male	54	59,3		
Female	37	40,7		
Education				
No Education	10	11.0		
Elementary School	22	24.2		
Junior High School	19	20.9		
High School	33	36.3		
College	7	7.7		
Occupation				
Unemployed	13	14.3		
Laborer	19	20.9		
Farmer	45	49.5		
Fisherman	10	11.0		
Civil Servant	4	4.4		
BMI				
Normal	68	74,7	16-23	20,99±1.670
Low	23	25,3		

Based on the results obtained, the age ranged from 17-63 years with an average and standard deviation of 42.34±13,983 years and the majority of respondents were adults 82.4%, most respondents were male 59.3%, most respondents had high school education 36.3%, most respondents were farmers 49.5% and BMI ranged from 16-23 kg/m3 with an average and standard deviation of 20.99±1,670 kg/m3 and most respondents had a normal BMI 74.7%.

Tabel 2.
Frequency distribution based on variables

Variabel	f	%	Min-Max	Mean Dan St Deviasi
Healthcare Professional Support			20-58	48.3077±
Poor	3	3.3		8.30755
Sufficient	11	12.1		
Good	77	84.6		
Family Support			14-43	35.8571
Poor	5	5.5		± 5.75533
Sufficient	17	18.7		
Good	69	75.8		
PMO Support			14-43	35.8571
Insufficient	5	5.5		± 5.75533
Sufficient	17	18.7		
Good	69	75.8		
Medication Compliance			18-27	18.4945 ±
Non-Compliant	5	5,5		2.06222
Compliant	86	94,5		
Treatment Success				
Incomplete	5	5,5		
Complete	86	94,5		

Based on the results obtained support from health workers between 20-58 values with an average and standard deviation of 48.3077 ± 8.30755, family support between 14-43 values with an average and standard deviation of 35.8571 ± 5.75533, PMO support between 14-43 values with an average and standard deviation of 35.8571 ± 5.75533, medication adherence support between 18-27 with an average and standard deviation of 18.4945 ± 2.06222. The majority of respondents received good health worker support 84.6%, good family support 75.8%, good PMO support 75.8%, medication adherence 94.5% and treatment success in the complete treatment category 94.5%.

Bivariate analysis

To determine the relationship between determinant factors that influence the success of pulmonary tuberculosis treatment, the bivariate analysis used in this study is the Chi Square test because it meets the requirements with the aim of seeing the correlation or relationship between determinant factors that influence the success of pulmonary tuberculosis treatment.

Tabel 3.
Behavioral Variables Related to the Success of Pulmonary TB Treatment

	Treatment Success						*P-value*
	Incomplete		Complete		Total		
	f	%	f	%	f	%	
Medication Compliance							
Non-Compliant	5	5,5	0	0,0	5	5,5	
Compliant	0	0,0	86	94,5	86	94,5	0.000
Family Support							
Poor	5	5,5	0	0,0	5	5,5	
Sufficient	0	0,0	17	18,7	17	18,7	0.001
Good	0	0,0	69	75,8	69	75,8	
PMO Support							
Poor	5	5,5	0	0,0	5	5,5	
Sufficient	0	0,0	17	18,7	17	18,7	0.001
Good	0	0,0	69	75,8	69	75,8	
Healthcare Professional Support							
Poor	3	3,3	0	0,0	3	3,3	
Sufficient	2	2,2	9	9,9	11	13,2	0.000
Good	0	0,0	77	83,5	77	83,5	

Based on the results obtained from 91 respondents who had medication adherence in the complete treatment category, namely 0.0% non-adherent and 94.5% compliant, the results indicate that higher medication adherence, the greater the success of pulmonary TB treatment. The test results showed a p-value of 0.000 <0.05, indicating a relationship between medication adherence and the success of pulmonary TB treatment in Parigi Moutong Regency in 2025. Based on the results obtained from 91 respondents who had family support in the complete treatment category, namely 0.0% lacking, 18.7% sufficient, and 75.8% good, the results indicate that better family support, the higher the success of pulmonary TB treatment. The test results showed a p-value of 0.001 < 0.05, indicating a relationship between family support and the success of pulmonary TB treatment in Parigi Moutong Regency in 2025.

Based on the results obtained from 91 respondents who had PMO support in the complete treatment category, namely 0.0% lacking, 18.7% sufficient, and 75.8% good. These results indicate that the better the PMO support, the higher the success of pulmonary TB treatment. The test results with a p-value of 0.001 <0.05 indicate a relationship between PMO support and the success of pulmonary TB treatment in Parigi Moutong Regency in 2025. Based on the results obtained from 91 respondents who had health worker support in the complete treatment category, namely 0.0% lacking, 11.0% sufficient, and 83.5% good, the results indicate that the better the support of health workers, the greater the success of pulmonary TB treatment. The test results with a p-value of 0.000 <0.05 indicate a relationship between health worker support and the success of pulmonary TB treatment in Parigi Moutong Regency in 2025.

DISCUSSION

Compliance with taking medication is related to the success of pulmonary TB treatment.

The test results showed a relationship between medication adherence and TB treatment success. Of the 91 respondents, 94.5% were compliant and received the full course of treatment, while a small percentage (5.5%) were non-compliant. The relationship between medication adherence and TB treatment success is demonstrated by monitoring and controlling medication intake to prevent discontinuation, which can lead to drug resistance. Patients should take medication according to the prescribed dosage and schedule, complete medication intake, ask healthcare workers about side effects, and undergo regular check-ups at healthcare facilities. Patients should also demonstrate commitment, demonstrated by attitudes and behaviors that promote recovery from TB, such as adhering to every doctor's recommendation, avoiding forgetting to take medication and smoking, improving quality of life by consuming nutritious food, engaging with TB cadres or communities, and preventing transmission to others. This is consistent with the questionnaire items: "Have you ever felt pressured about following your TB treatment plan?" 94.5% answered no; "Do you sometimes forget to take your medication?" 94.5% answered no; "Have you ever reduced or stopped taking your medication without telling your doctor?" 94.5% answered no. (Sormin, 2014;)(Ginting, 2019)

Family support for successful pulmonary TB treatment

The results of the chi square test showed that there was a relationship between family support and the success of TB treatment from 91 respondents who received family support with a complete treatment category of 75.8% while those lacking were 5.5%. The relationship between family support and the success of treatment is to supervise taking medication according to the dosage and schedule from the doctor so that treatment is more effective and efficient and reminding to have regular check-ups at health facilities, providing assistance during check-ups and taking medication and providing adequate nutrition, emotional support so that patients feel cared for by their families, reminding patients to always check sputum and drug stocks, providing support and giving attention to patients, ensuring compliance in taking medication, preventing drug resistance, as a social support system to reduce treatment

failure and collaborating with health workers in monitoring TB patients. [23,24] There are four categories of family support: Emotional support provided by families to patients includes providing motivation and encouragement to pursue treatment, as TB treatment takes a long time; providing attention, empathy, warmth, and love to reduce anxiety and negative stigma from the community; and improving mental health in dealing with stress or side effects of treatment, such as nausea, vomiting, body aches, and urine color. This aligns with the questionnaire item

"Does the family always accompany the patient during treatment?"
With 52.7% responding "always," indicating that emotional support is crucial for improving treatment success, especially as interpersonal relationships within the family can improve medication adherence. Instrumental/financial support includes providing funding for treatment, providing nutritious food and transportation to healthcare facilities, providing good housing and a supportive environment, such as a clean and well-ventilated home, ensuring the patient receives treatment on schedule, and preventing transmission to other family members. This aligns with the question

"Does your family assist you with your needs?"
With a 38.5% response rate, there is a relationship between instrumental support and treatment success, including supporting basic living needs and providing a supportive environment, both physically and psychologically. (Rajagukguk, 2019; Zulfikar A. Mokambu et al., 2023) Appreciative support, especially the family's willingness to accompany the patient to treatment, devoting more time to patient care, and providing appreciation for the patient's mental and psychological support, is crucial for improving treatment compliance because the patient understands their illness and is willing to practice a clean and healthy lifestyle to accelerate recovery. This aligns with the questionnaire item,

"Does the family always give praise and attention to the patient?"
The answer was 56.0% frequently. [23,24] Informational support, where the family plays a role in providing clear information, supporting monitoring of treatment or medication intake, explaining that regular medication can cure the disease and explaining the side effects of medication, reminding them to have regular check-ups with healthcare facilities, especially for sputum tests and medication availability, knowing how to manage or treat the disease, and collaborating with healthcare workers or PMOs to monitor the patient's medication intake. This aligns with the question,

"Does your family always remind you not to be late taking your medication?"
With a 59.3% frequent response, the relationship between information support and treatment success is due to the fact that correct information and guidance will prevent drug withdrawal and provide an understanding of the dangers of not checking with healthcare facilities.(Rajagukguk, 2019; Zulfikar A. Mokambu et al., 2023)

Medication Supervision (PMO) and Successful Treatment of Pulmonary TB
The test results showed a correlation between PMO support and TB treatment success. Those who received PMO support with a complete treatment category achieved 75.8%, while those who received insufficient support only achieved 5.5%. The correlation between PMO support and TB treatment success includes: monitoring medication intake to prevent interruptions, which can lead to drug resistance; collaborating with health workers to provide clear information about TB; and fostering trust and hope in patients, encouraging them to continue treatment until cured. This can motivate patients to consistently improve their adherence to treatment. This is consistent with the question "Are you supervised when taking your medication?", which was answered consistently by 67.0%. This indicates that the PMO plays

a crucial role in monitoring and controlling patients. (Trystiyana, 2019)

The next role is to detect early problems and side effects of treatment, such as observing the patient's condition (nausea, vomiting, body aches, urine color, etc.). The goal is to prevent patients from reducing the dose or stopping treatment without notifying the doctor. Breaking the chain of transmission by always reminding patients to undergo routine check-ups, such as checking sputum and ensuring medication availability at home. Knowing how to prevent TB infection is in accordance with the questionnaire item "Does the PMO always remind you to check sputum and take medication according to the specified schedule?" (52.7%). (Trystiyana, 2019)

Support from Healthcare Professionals and the Success of Pulmonary TB Treatment.
Chi-square test results indicate a correlation between support from healthcare professionals and the success of TB treatment. Of the 91 respondents, 83% received good support from healthcare professionals, while a small proportion received poor support from healthcare professionals, 5.5%. The correlation between support from healthcare professionals and the success of Pulmonary TB treatment was influenced by the question of whether healthcare professionals provided education about pulmonary TB, with a score of 54.9%. Several studies have shown that healthcare professionals play a crucial role in providing education and counseling, which are closely related to preventive and promotive efforts. They provide clear information about medication timing, dosage, and the dangers of discontinuing treatment, which can lead to drug resistance. This can prolong the healing process and potentially transmit the virus to others. They also foster relationships with patients to foster self-confidence, particularly by demonstrating empathy, caring, and respect to gain patient trust, facilitating monitoring and improving medication adherence.

The supportive relationship between healthcare workers and patients is influenced by several factors, including caring for patients, such as providing problem-solving support, as long-term treatment can impact their mental and psychological well-being. Collaborating with families and PMOs to monitor medication intake and improve their understanding of medication side effects, particularly the dangers of drug withdrawal, to prevent drug resistance. Collaborating with families and PMOs to build humanistic values that prioritize patients, providing them with a sense of appreciation, empathy, and respect, which can improve treatment adherence. This was borne out by the questionnaire item "Does a healthcare worker supervise you in taking your medication?", with 46.2% responding consistently. This means that better supervision is provided, the greater the success of TB treatment.

The role of healthcare workers also includes early detection and appropriate treatment. This is closely related to the screening and investigation process, both active and passive, with the aim of identifying TB cases and initiating treatment, thereby expediting treatment and preventing disease transmission or worsening the patient's health condition. Providing adequate health services relates to the responsibility of healthcare workers to provide services, facilities, and the availability of adequate infrastructure, especially anti-tuberculosis medication stocks. Therefore, healthcare workers ensure patients receive the appropriate treatment regimen. This role aligns with the questionnaire item, "Do healthcare workers always remind you to check and take your medication?" With a 54.9% response, this indicates that the role of healthcare workers is essential to improving treatment success. One of these measures is treating and monitoring medication adherence to prevent discontinuation, which can lead to OAT resistance. Managing complications and side effects (nausea, vomiting, body aches, urine color, etc.) relates to the role of healthcare workers in providing information on how to handle them, addressing them to prevent discontinuation, and conducting monitoring and evaluation. This aims to monitor treatment and collect sputum samples for testing to determine whether treatment is effective. (Raji & Rusdi, 2022; Swarjana et al., 2024)

CONCLUSION

There is a relationship between behavior (medication adherence, family support, PMO support, and health worker support) and the success of pulmonary TB treatment. p = 0.000 and p = 0.001.

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