



Rationality of Anti-Tuberculosis Drug (OAT) Use in Pulmonary Tuberculosis Patients at Kediri District Hospital in 2025

Arifani Siswidiarsari^{1*}, Elly Megasari², Tri Doso Supto Agus Priyono³,
Neni Probosiwi⁴

^{1,2,4}Pharmacist Professional Study Program, Faculty of Health Sciences, Kadiri University, Kediri, Indonesia

³Pharmacy Study Program, Faculty of Health Sciences, Kadiri University, Kediri, Indonesia

Corresponding Author: Arifani Siswidiarsari arifani@unik-kediri.ac.id

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ABSTRACT

Tuberculosis is a contagious infection that primarily affects the lungs and is caused by the bacteria *Mycobacterium tuberculosis*. The purpose of this study was to determine the rationality of using anti-tuberculosis drugs (OAT) in pulmonary tuberculosis patients at Kediri District Hospital in 2025. This study uses an observational method with a retrospective descriptive design based on medical record data of tuberculosis patients at Kediri District Hospital in 2025. The sampling technique used was purposive sampling which was in accordance with the inclusion criteria. This study was conducted in February 2026 with a sample of 62 patients. The collected data were then analyzed descriptively using univariate analysis, and the results were presented in the form of frequency distributions and percentages. The results of the study showed that the rationality of OAT use in tuberculosis patients was achieved by correct patient (100%), correct indication (100%), correct medication selection (96.77%), correct dose (95.16%), correct duration of medication administration (98.39%), and correct method of medication administration (100%). Conclusion: This indicates that pulmonary tuberculosis treatment is in accordance with treatment guidelines

INTRODUCTION

Tuberculosis is a chronic, infectious disease caused by the bacterium *Mycobacterium tuberculosis*. This bacterium is rod-shaped and acid-fast, so it is often known as Acid-Fast Bacillus. Most TB germs are often found to infect the lung parenchyma and cause pulmonary TB, but this bacteria also has the ability to infect other organs (extrapulmonary TB) such as the pleura, lymph nodes, bones, and other extrapulmonary organs. There are five bacteria that are closely related to TB infection: *Mycobacterium tuberculosis*, *Mycobacterium bovis*, *Mycobacterium africanum*, *Mycobacterium microti* and *Mycobacterium canettii*. *M. tuberculosis* (M. TB), to date, is the most frequently found bacteria, and is transmitted between humans through the airborne route (Menteri Kesehatan, 2019).

The prevalence of pulmonary tuberculosis in Indonesia is 0.42% or 1,017,290 people, with the highest proportion in Banten (0.76%) and the lowest in Bali (0.13%). The incidence of pulmonary tuberculosis in East Java is 0.29% or 151,878 cases (Riskesdas, 2018). Based on the 2023 Indonesian Health Survey, the prevalence of pulmonary tuberculosis in Indonesia is 0.30% with a total of 877,531 cases. East Java Province ranks second after West Java, with a prevalence rate of 0.24% and a total of 130,683 cases. Cases of pulmonary tuberculosis are more common in men, namely 0.38%, where the largest number of pulmonary tuberculosis sufferers, around 0.26%, are adults (SKI, 2023).

The goals of tuberculosis treatment are to cure the patient, maintain quality of life and productivity, prevent death from active tuberculosis, prevent relapse, reduce transmission to others, and prevent drug resistance. The principle of TB treatment emphasizes the use of an appropriate combination of anti-tuberculosis drugs consisting of at least four types of drugs to prevent resistance, with appropriate doses, taken regularly, and directly monitored by a drug supervisor (PMO) until complete. Pulmonary tuberculosis can be treated for 6 months with a regular dose of anti-tuberculosis drugs. Tuberculosis treatment consists of two stages: the initial stage and the continuation stage. The initial stage lasts two months and is given daily to effectively reduce the number of bacteria and reduce the risk of transmission, which usually decreases after two weeks of therapy. The continuation stage lasts four months with the aim of eradicating any remaining persistent bacteria so that the patient is completely cured and avoids relapse. The anti-tuberculosis medication prescribed is a combination of antibiotics, including isoniazid, rifampicin, ethambutol, and pyrazinamide. This combination of antibiotics is intended to suppress and stop the growth of *Mycobacterium tuberculosis* bacteria and reduce the possibility of resistance (Kementerian Kesehatan, 2021).

Irrational or inappropriate use of anti-tuberculosis drugs can cause therapy failure, resistance and can trigger death. OAT resistance can occur due to inappropriate or irrational use of OAT, such as underdosing, overdosing, patient non-compliance, incomplete treatment, or discontinuation of treatment, and can even be caused by the possibility of mutation of MTB bacteria. One effort to achieve appropriate, safe, and effective treatment is to evaluate or

assess the level of rationality of drug use. Assessing the level of rationality of drug use in state health facilities and installations aims to ensure the effectiveness of drug administration in terms of quality and safety. Rational drug administration can prevent therapeutic failure and the risk of death from tuberculosis infection (Menteri Kesehatan, 2019).

Based on the results of research conducted by Kasni et al., (2024), it shows that the use of anti-tuberculosis drugs (OAT) at the Poasia Health Center in Kendari City is in accordance with national guidelines for medical services (tuberculosis management), the rationality of OAT use at the Poasia Health Center in Kendari City is 100% correct patient, 100% correct indication, 92% correct dose, 96% correct duration of administration, and 93% correct drug selection. Meanwhile, the results of research conducted by Fauziah et al., (2022), show that the use of OAT in pulmonary TB patients at M. Yunus Regional Hospital is rational (100%) for the indicators of correct indication, correct patient, correct drug selection and correct method of administration, while for the correct dose indicator the rationality obtained is still insufficient (98.5%).

Based on this description, the researcher is interested in examining the rationality of the use of anti-tuberculosis drugs (OAT) in pulmonary tuberculosis patients at Kediri District Hospital in 2025.

LITERATURE REVIEW

The World Health Organization (WHO) states that the key to a successful TB control program is implementing the Directly Observed Treatment, Short-course (DOTS) strategy, which has also become a reference in Indonesia. Therefore, understanding DOTS is crucial for TB to be managed effectively. DOTS comprises five components: government commitment to implementing the National TB program, TB case detection using microscopic AFB smear examination, short-term drug administration under direct supervision, known as Directly Observed Therapy (DOT), continuous procurement of OAT, and standardized monitoring, recording, and reporting (Menteri Kesehatan, 2019).

Tuberculosis treatment is one of the most efficient efforts to prevent further spread of tuberculosis bacteria. Adequate treatment must have the following principles: a). Treatment is given in the form of an appropriate combination of anti-tuberculosis drugs (OAT) containing at least 4 types of drugs to prevent resistance, b). Given in the correct dosage, c). Swallowed regularly and directly monitored by a drug supervisor (PMO) until the completion of the treatment period, d). Treatment is given for a sufficient period of time divided into an initial/intensive phase and a continuation phase to prevent relapse (Kementerian Kesehatan, 2020).

The stages of tuberculosis treatment are divided into 2, as follows: a). Initial/intensive stage: the combination of treatment in the intensive stage aims to reduce the number of TB germs in the body quickly and minimize the risk of transmission to others. The intensive stage is given for 2 months with daily administration of anti-tuberculosis drugs (OAT). The drugs used in this phase are a combination of Rifampicin (R), Isoniazid (H), Pyrazinamide (Z), and Ethambutol (E). The number of tablets consumed is adjusted to the patient's

body weight according to the provisions of the OAT package (KDT/Kombipak), b). Continued stage: the continued stage of treatment aims to kill any remaining germs still in the body, especially persistent germs so that the patient can recover and prevent relapse. The duration of the continued stage is 4 months. The continued stage is given for 4 months with a daily drug regimen. The drugs used in this phase are a combination of Rifampicin (R) and Isoniazid (H), with the number of tablets adjusted based on the patient's body weight according to the OAT package provisions (KDT/Kombipak) (PDPI, 2021).

Evaluation of the rationality of anti-tuberculosis drug use in various studies shows that the regimen and dosage applied comply with applicable guidelines, emphasizing the importance of rationality in therapy to optimize tuberculosis treatment and prevent side effects and drug resistance. This alignment reflects good clinical practice and adherence to established treatment guidelines (Fraga et al., 2021). Rational drug use is an effort encouraged by the World Health Organization (WHO) because more than 50% of drugs worldwide are used irrationally. Three main indicators of rational drug use are prescribing, patient care, and facilities. Inaccuracies in prescribing can lead to problems such as failure to achieve therapeutic goals and increased side effects. Pulmonary tuberculosis treatment will be effective if carried out according to guidelines, with appropriate drug use including indications, drug selection, dosage, duration, and appropriate patient (Kasni et al., 2024).

METHODOLOGY

This study used an observational method with a retrospective descriptive design based on medical record data of tuberculosis patients at Kediri District Hospital. The sampling technique in this study was purposeful sampling taken from the medical records of pulmonary tuberculosis patients who met the inclusion criteria. The population in this study were all pulmonary tuberculosis patients at Kediri District Hospital in 2025. This study was conducted at Kediri District Hospital in February 2026 with a sample of 62 patients. The inclusion criteria in this study were patients with a diagnosis of pulmonary tuberculosis recorded in the medical records of Kediri District Hospital in 2025, aged 18-60 years, having clear, complete, and easy-to-read medical record data. The exclusion criteria were: pulmonary tuberculosis patients who moved to another hospital and patients who died. The collected data were then analyzed descriptively using univariate analysis, and the results were presented in the form of frequency distributions and percentages.

RESEARCH RESULT

Demographic Data on Pulmonary Tuberculosis Patients

Research at Kediri Regency Hospital revealed that the majority of patients were male (39 patients, 62.90%), aged 46-55 (20 patients, 32.26%), had a junior high school education (24 patients, 38.71%), were self-employed (20 patients, 32.26%), had comorbid diabetes mellitus (36 patients, 58.06%), and were in the initial/intensive treatment stage (53 patients, 85.48%).

Table 1. Demographics of Pulmonary Tuberculosis Patients

Demographic Data	f	%
Gender		
Man	39	62.90
Woman	23	37.10
Age (year)		
16-25	5	8.06
26-35	7	11.29
36-45	11	17.74
46-55	20	32.26
56-65	19	30.65
Education		
Elementary School	17	27.42
Middle School	24	38.71
High School	19	30.64
College	2	3.23
Work		
Self-Employed	20	32.26
Laborers	13	20.97
Housewives	16	25.81
Farmers	12	19.35
Students	1	1.61
Comorbidities		
Diabetes Mellitus	36	58.06
Hypertension	19	30.65
Anemia	6	9.68
Heart Disease	1	1.61
Treatment Categories		
Category 1 (intensive)	53	85.48
Category 2 (advanced)	9	14.52

Anti-Tuberculosis Drug Rationality Data Results

The results of this study indicate that the rationality of anti-tuberculosis drug use in pulmonary tuberculosis patients was highest in the following categories: correct patient (100%), correct indication (100%), correct medication selection (96.77%), correct dose (95.16%), correct duration of medication administration (98.39%), and correct method of medication administration (100%).

Table 2. Rationality of Anti-Tuberculosis Drug Use

Rationality	Category			
	Correct		Incorrect	
	f	%	f	%
Correct Patient	62	100	0	0
Correct Indication	62	100	0	0
Correct Medication Selection	60	96.77	2	3.23
Correct Dose	59	95.16	3	4.84
Correct Duration of Medication Administration	61	98.39	1	1.61
Correct Method of Medication Administration	62	100	0	0

Anti-Tuberculosis Drug (OAT) Dosage Inaccuracy Data

Based on table 3, it shows that patients weighing 53 kg and 51 kg received category 1 treatment, namely in the intensive phase they were given RHZE as much as 3 FDC tablets (4KDT) every day for 56 days, and the continuation phase was given RHZE as much as 3 FDC tablets (2KDT), this is not in accordance with the National Tuberculosis Control Program in Indonesia in 2019. According to the treatment guidelines for patients weighing 53 kg and 51 kg, they should be given a dose of RHZE as much as 3 tablets (4KDT) + 750 mg Streptomycin injection, every day for 56 days for the initial or intensive phase. While for the continuation phase, 3 tablets (2KDT) + 3 Ethambutol tablets were given 3 times a week for 20 weeks.

Table 3. Inaccurate Dosages in Tuberculosis Patients

Patient Weight	Anti-tuberculosis drugs (OAT)	Tuberculosis Management Guidelines (2020)
53 kg	3 FDC tablets (4KDT) daily, for 56 days	3 tablets (4KDT) + 750 mg Streptomycin injection daily, for 56 days
	3 FDC tablets (2KDT) 3 times a week for 16 weeks	3 tablets (2KDT) + 3 tablets of Ethambutol 3 times a week, for 20 weeks
51 kg	3 FDC tablets (4KDT) daily, for 56 days	3 tablets (4KDT) + 750 mg Streptomycin injection daily, for 56 days
	3 FDC tablets (2KDT) 3 times a week, for 16 weeks	3 tablets (2KDT) + 3 tablets of Ethambutol 3 times a week, for 20 weeks
51 kg	3 FDC tablets (4KDT) daily, for 56 days	3 tablets (4KDT) + 750 mg Streptomycin injection daily, for

		56 days
	3 FDC tablets (2KDT) 3 times a week, for 16 weeks	3 tablets (2KDT) + 3 tablets of Ethambutol 3 times a week, for 20 weeks

Description:

FDC: Fixed Drug Combination

KDT: Correct Dose Combination

2KDT: Consists of Isoniazid and Rifampin

4KDT: Consists of Rifampin, Isoniazid, Pyrazinamide, and Ethambutol

DISCUSSION

Demographics of Pulmonary Tuberculosis Patients

Based on research results, men are more likely to experience pulmonary tuberculosis than women. This occurs because men tend to be more exposed to risk factors for pulmonary TB, such as smoking, consuming alcoholic beverages, and non-compliance with medication. In addition, men are generally less concerned about their health and have a lifestyle that involves more activities outside the home due to work, thus increasing the possibility of being exposed to pulmonary TB (Menteri Kesehatan, 2019). This is supported by a WHO report that the prevalence of tuberculosis in men is 1.7 times higher than in women (WHO, 2022). This study is in line with research conducted by Fauziah et al., (2022), at a hospital in Bengkulu, which found that patient characteristics based on gender were higher in men than women.

Overall, the results of this study indicate that tuberculosis can occur in all age groups, but is more prevalent in adults and the elderly. This is in line with previous research, which reported that the risk of tuberculosis increases in old age due to decreased immunity and the presence of additional risk factors such as comorbidities and an environment that supports transmission. The productive age group is an age group with high activity levels, so at this age, people spend more time and energy working. Therefore, reduced rest time can increase the risk of decreased immunity (Arisandi et al., 2023). At this age, patients tend to interact frequently with others, exhibit high mobility, and are more likely to transmit the disease to others and their environment (Bayan et al., 2022).

Education is related to patient knowledge, indicating that education influences treatment success (Azizah, 2020). Based on a survey by the Indonesian Ministry of Health, the higher a person's education level, the lower their risk of contracting tuberculosis, and vice versa (Nababan et al., 2022). These results are similar to research conducted by Bakhtiar et al., (2021), on pulmonary TB patients at the Bantul Regency Community Health Center, which found that the higher a person's educational background, the better their knowledge of pulmonary TB, enabling them to control infection and seek treatment if infected.

Based on research results, self-employment is found to be more common than other occupations. This is because the transmission of pulmonary TB is strongly linked to the type of work, especially those that increase the risk of exposure through the work environment and socioeconomic conditions. Closed work environments, minimal natural lighting, and poor ventilation are among the factors that can make it easier for someone to become infected with TB (Arisandi et al., 2023). Meanwhile, research conducted by Nababan et al., (2022), found that patients in work environments with high levels of interaction with many people, such as civil servants, private employees, self-employed workers, and traders, tend to have a greater risk of contracting pulmonary TB.

The high proportion of patients with comorbidities indicates that nearly half of TB patients at this facility have comorbidities that could potentially impact their therapy. Diabetes mellitus was the most prevalent comorbidity in this study. This finding aligns with research by Gotera et al., (2021), which found that DM patients have a threefold higher risk of developing active TB compared to the general population. Chronic hyperglycemia can decrease cellular immune function, increasing susceptibility to *Mycobacterium tuberculosis* infection. Furthermore, DM can slow sputum conversion, increase the risk of relapse, and complicate the management of anti-TB therapy. These findings emphasize the need for integrated TB-DM programs through routine blood sugar screening in TB patients and monitoring glycemic control during therapy.

Rationality of Using Anti-Tuberculosis Drugs

Based on the results obtained, the rationality of OAT use is based on appropriate patient criteria with excellent results. This indicates that OAT administration is appropriate to the patient's clinical condition, including taking into account age, gender, and the presence of comorbidities that can influence therapy selection. This high figure supports the success of the tuberculosis treatment program, because appropriate therapy for patients will increase treatment effectiveness, reduce the risk of side effects, and prevent drug resistance. The results of this study are in line with the research of Kasni et al., (2024) and Fauziah et al., (2022), which stated that the rationality with appropriate patient categories in OAT administration for pulmonary tuberculosis patients reached 100%.

This high rate of indication accuracy reflects the quality of service in the diagnosis and management of TB patients. This study aligns with the principle of rational drug use, which requires targeted therapy only for patients with clear medical indications. The results of this study also align with research conducted by Kasni et al., (2024) and Fauziah et al., (2022), which stated that the rationality of anti-TB drug administration in pulmonary tuberculosis patients with appropriate indications reached 100%.

Selecting the right medication is crucial because it is a key factor in successful treatment and preventing drug resistance. The high accuracy rate in drug selection demonstrates that the type of anti-TB drug (OAT) is in accordance with tuberculosis therapy guidelines, both in terms of drug class, combination, and suitability for the patient's TB type. The study found that two

patients had inappropriate drug selection. This is similar to the results of a study by Kasni et al., (2024), which reported that the accuracy of OAT drug selection in pulmonary tuberculosis patients was 93%.

Based on the research results, three patients received inappropriate doses of anti-tuberculosis drugs. The appropriate dose in this study was determined based on the appropriateness of the tuberculosis drug given to the patient's weight, age, and clinical condition. Dosing above the recommended dose, especially for drugs with a narrow therapeutic range, carries the risk of side effects. Conversely, lower doses do not guarantee optimal therapeutic levels (Kementerian Kesehatan, 2021). These results align with those of Kasni et al., (2024), who reported that the appropriate dose rate for anti-tuberculosis drug administration in pulmonary TB patients was 92%. The results of the same study by Fauziah et al., (2022), showed that the accuracy of the OAT dose was 98.5%.

The study found one patient with an inappropriate medication duration. The appropriate duration of treatment is considered appropriate if the patient receives 56 days of intensive TB treatment (daily) and 48 days of continuation treatment over 16 weeks. Initial treatment aims to effectively reduce TB-causing germs in the body, while the continuation phase aims to kill any remaining germs. This inappropriate medication duration is categorized as a "dropout" patient, meaning a patient who has been receiving treatment and then stopped treatment for 2 months or more (Kementerian Kesehatan, 2020).

The high accuracy rate of drug administration indicates that anti-tuberculosis drug administration was carried out according to guidelines, which are administered orally at doses adjusted based on the patient's age and weight. Correct drug administration is a crucial aspect of rational drug use, as it influences therapeutic effectiveness and patient compliance. These study results align with those of Fauziah et al., (2022), who reported that the accuracy of anti-tuberculosis drug administration in pulmonary tuberculosis patients reached 100%.

CONCLUSIONS AND RECOMMENDATIONS

The use of anti-tuberculosis drugs (OAT) at Kediri Regency Hospital in 2021 complied with the National Guidelines for Tuberculosis Management, which demonstrated the rationality of anti-tuberculosis drug (OAT) use, including the right patient (100%), the right indication (100%), the right drug selection (96.77%), the right dose (95.16%), the right duration of drug administration (98.39%), and the right route of administration (100%). Implementing the results of the rationality study on pulmonary anti-tuberculosis drugs is a global health effort recommended by the World Health Organization (WHO). Rationality of drug use is based on three main indicators: prescription, patient services, and facilities. Inaccurate prescriptions can lead to ineffective therapy and increase side effects, so quality assurance is needed in drug use. Pulmonary tuberculosis treatment will be effective if used correctly, according to instructions, and meets the principles of rationality, namely the

right patient, the right indication, the right drug selection, the right dose, the right duration of administration, and the right route of administration.

ADVANCED RESEARCH

It is recommended for future researchers to develop research by adding other indicators in the study of the rationality of using anti-tuberculosis drugs (OAT) so that the research results are more comprehensive.

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