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Rationality of Anti-Tuberculosis Drugs In Adult Pulmonary Tuberculosis Patients at Andalas Public Health Center in Padang

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ABSTRACT: Tuberculosis is a chronic infectious disease caused by the bacteria Mycobacterium tuberculosis. Pulmonary tuberculosis can be cured with appropriate treatment and in accordance with tuberculosis treatment guidelines. Irrationality in the use of antituberculosis drugs, such as inappropriate dosage or inappropriate duration of treatment, can result in resistance, disease recurrence, and serious side effects. This study aims to determine the rationality of using anti-tuberculosis drugs from 5 appropriate aspects (right patient, right indication, right drug, right dose, and right frequency) and to be aware of side effects in adult pulmonary tuberculosis patients at Andalas Public Health Center, in Padang, Indonesia,for the period of January 2025. This research is a type of non-experimental descriptive research. Where data collection was carried out prospectively, using the time limited sampling method. The sample in this study was 31 patients who met the inclusion criteria. Where there were 2 patients who had the wrong dose, namely 1 patient experienced a subdose in the intensive phase and 1 patient experienced a subdose in the advanced phase. The results of evaluating the rationality of using tuberculosis drugs are not 100% rational, because there are still treatments whose accuracy is <100%, namely the right dose with a percentage of 93.54% and 51.59% of patients experiencing drug side effects. Meanwhile, pulmonary TB treatment with 100% accuracy is the right patient, the right indication, the right drug and the right frequency.

KEYWORDS: Tuberculosis, Anti-tuberculosis, Public Health Center, Rationality of drug use

I. INTRODUCTION

Tuberculosis is a direct infectious disease caused by Mycobacterium tuberculosis. Most tuberculosis bacteria attack the lung parenchyma (pulmonary tuberculosis), but these bacteria also have the ability to infect other organs (extrapulmonary tuberculosis)(Ministry of Health of the Republic of Indonesia, 2020).

In 2023, Indonesia was ranked second as the country with the largest number of tuberculosis incidents after India, which was 10.8 million cases of tuberculosis. Every year there is an increase in the number of tuberculosis incidents, there were 10.1 million cases in 2020, 10.4 million cases in 2021 and 10.7 million cases in 2022 with a higher increase(World Health Organization, 2024).

Based on data obtained by the Padang City Health Service in 2021, the number of tuberculosis cases in Padang City reached 2,488 cases.(Padang City Health Service, 2022). Meanwhile, in 2022, tuberculosis cases increased by 3454 cases (Padang City Health Service, 2023). The number of tuberculosis cases in Padang City continues to increase in 2023 to 3659 cases (Padang City Health Service, 2024)

Treatment for pulmonary tuberculosis patients is known as Anti-Tuberculosis Drugs (OAT) (Ministry of Health of the Republic of Indonesia, 2020). According to the Regulation of the Minister of Health of the Republic of Indonesia No. 67 of 2016, the use of OAT needs attention because the drug is given for a long period of 6-9 months and the side effects caused make patients fail to complete treatment.

Irrationality in the use of antituberculosis drugs, such as inappropriate dosage or inappropriate duration of treatment, can result in resistance, disease recurrence, and serious side effects(Andira et al., 2024). Pulmonary tuberculosis can be cured with proper treatment and in accordance with tuberculosis treatment guidelines (Ministry of Health of the Republic of Indonesia, 2020).

The correct use of drugs is stated in the Rational Drug Use Book (POR) which includes correct diagnosis, correct indication, correct drug selection, correct dose, correct method of

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administration, correct interval of administration, correct duration of administration, alertness to side effects, correct assessment of patient condition, correct price, correct information, correct follow-up, and correct delivery of drugs (Ministry of Health of the Republic of Indonesia, 2011).

In previous research, inaccuracies were still found in administration of drug therapy. Research conducted at the Sikumana Health Center showed that there was an inaccuracy in the dosage of OAT in newly diagnosed pulmonary tuberculosis patients, namely 12.3% and an inaccuracy in the duration of treatment of 16.9% (Doko et al., 2020). The results of the study conducted at the South Tangerang City Hospital on the rationality of tuberculosis drugs showed that it was not 100% rational, indicated by the existence of 2 criteria that were not 100%, namely the correct dosage of 88.70% and the correct interval of administration of 98.38% (Ismaya et al., 2021). In a study conducted at the Poasia Health Center in Kendari City regarding the rationality of the use of antituberculosis drugs in pulmonary tuberculosis patients, it was shown that there was an inaccuracy in the dosage of 8%, an inaccuracy in the duration of drug administration of 4% and an inaccuracy in drug selection of 7% (Kasni et al., 2024).

The many inaccuracies in the use of antituberculosis drugs found and the increasing cases of tuberculosis in Padang City prompted researchers to conduct a study on the rationality of the use of OAT entitled "Evaluation of the Rationality of the Use of Antituberculosis Drugs in Adult Pulmonary Tuberculosis Patients at the Andalas Public Health Center in Padang".

II. EXPERIMENTATION

This study is a type of non-experimental descriptive research. Where data collection is carried out prospectively, using the time-limited sampling method. Data were taken from medical records of adult pulmonary tuberculosis patients in the period of January 2025 at Andalas Public Health Center in Padang.

This study was conducted in November 2024 - January 2025 in Tuberculosis Polyclinic of Andalas Public Health Center, in Padang. The population in this study were all pulmonary tuberculosis patients at Andalas Public Health CenterPadang in the period of January 2025. The sample used in this study were all pulmonary tuberculosis patients at Andalas Public Health CenterPadang in the period of January 2025 who met the inclusion criteria.

III. RESULT AND DISCUSSION

Based on the research that has been conducted, the number of adult pulmonary tuberculosis patients who received anti-tuberculosis drug therapy at the Andalas Health Center, Padang City in the January 2025 period was 31 patients who met the inclusion criteria in this study.

1. Characteristics of adult pulmonary tuberculosis patients at Andalas Public Health CenterPadang, in January 2025, who received anti-tuberculosis drug therapy based on gender, 11 female patients (35.48%), and 20 male patients (64.51%).
2. Characteristics of adult pulmonary tuberculosis patients receiving anti-tuberculosis therapy based on age groups according to the Regulation of the Minister of Health of the Republic of Indonesia No. 25 of 2016, namely 19-44 years old as many as 18 patients (58.06%), 45-59 years old as many as 6 patients (19.35%) and ≥60 years old as many as 7 patients (22.58%).
3. Characteristics of adult pulmonary tuberculosis patients at Andalas Health Center, Padang City in January 2025 who received anti-tuberculosis drug therapy based on comorbidities, namely patients with comorbidity DM (Diabetes Mellitus) 7 patients (22.58%) and without comorbidities 24 patients (77.41%).
4. Characteristics of adult pulmonary tuberculosis patients at Andalas Health Center, Padang City in January 2025 who received antituberculosis drug therapy based on the profile of antituberculosis drug use, namely OAT category I intensive phase 4KDT 2RHZE (150/75/400/275) 6 patients (19.35%) and OAT category I continuation phase 2KDT RH (150/150) 25 patients (80.64%).
5. The rationality of using antituberculosis drugs in adult pulmonary tuberculosis patients is based on the appropriate patient criteria analyzed based onDrug Information Handbook23rd Edition in 2015 by looking at the presence or absence of contraindications with the patient. The results obtained were 100% correct for the patient.
6. The rationality of using antituberculosis drugs in adult pulmonary tuberculosis patients is based on appropriate indication criteria analyzed based on guideline diagnosis.Regulation of the Minister of Health No. 67 of 2016 concerning

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Tuberculosis Control. The results obtained were 100% correct indication, 100% correct patient, 93.54% correct dose, 100% correct frequency.

7. Characteristics of adult pulmonary tuberculosis patients at Andalas Health Center, Padang City in January 2025 who received antituberculosis drug therapy based on the drug side effect profile, namely red urine in 11 patients (35.48%), nausea in 3 patients (9.67%), mild itching in 1 patient (3.22%), bone pain in 1 patient (3.22%), and no drug side effects in 15 patients (48.38%).

Research on the Evaluation of the Rationality of the Use of Antituberculosis Drugs in Adult Pulmonary Tuberculosis Patients at the Andalas Public Health Center, Padang City aims to determine the rationality of the use of antituberculosis drugs seen from 5 appropriate aspects (right patient, right indication, right drug, right dose, and right frequency) in adult pulmonary tuberculosis patients at Andalas Public Health Center, in Padang.

The total population of pulmonary tuberculosis patients at Andalas Public Health Center, Padang City for the period of January 2025 was 73 patients. From the total population, there were 31 pulmonary tuberculosis patients who met the inclusion criteria. This is because many patients are under 18 years old, patients who have discontinued treatment, incomplete patient medical record data such as not including age, as many as 42 patients.

In this study, the gender group of adult pulmonary tuberculosis patients who received antituberculosis drug therapy at the Andalas Health Center, Padang City in the January 2025 period was more male 20 patients (64.51%) compared to female 11 patients (35.48%). The number of tuberculosis cases in men tends to be higher than in women, this is due to several risk factors, such as smoking habits, consuming alcoholic beverages, which increase the risk of contracting tuberculosis.

This research is in line with research that has been conducted previously. In research conducted byKasni et al., (2024)shows the results of the number of male patients 46 patients (56.09%) more than female patients 36 patients (43.90%), because men are more often exposed to TB risk factors such as smoking habits, alcohol consumption habits and non-compliance with taking medication.

Based on the age of the patient according to the Regulation of the Minister of Health of the Republic of Indonesia No. 25 of 2016, in this study it was categorized into three, namely, 19-44 years, 45-59 years and ≥60 years. Where this study shows that the age of patients who suffer the most from pulmonary tuberculosis is the adult age range of 19-44 years as many as 18 patients (58.06%), while in the pre-elderly age range of 45-59 years as many as 6 patients (19.35%) and in the elderly age range, ≥60 years as many as 7 patients (22.58%). The results of this study are in line with researchThahir & Muhammad (2023), with the results of the study of adult pulmonary tuberculosis patients 69 patients (54.76%). The most vulnerable group to contracting TB is the young adult age group which is also the productive age group(Thahir & Muhammad, 2023).

Based on comorbidities in adult pulmonary tuberculosis patients who received antituberculosis drug therapy at the Andalas Health Center, Padang City, in the January 2025 period, there were more patients without comorbidities, 26 patients (83.87%) compared to those with comorbidities of diabetes mellitus, 7 patients (22.58%). The results of this study are in line withIsmail et al., (2023)which shows the largest distribution of patients, namely TB patients without chronic comorbidities, amounting to 40%.

Pulmonary TB patients with comorbidities experience a decrease in the immune system in the body, which affects the healing process, which can trigger the failure of the results of Pulmonary TB treatment (Tirangga et al., 2022). Patients with comorbid type 2 diabetes mellitus have a high risk of developing tuberculosis compared to patients without comorbid type 2 diabetes mellitus because they experience bronchial reactivation disorders in the physiological lung system, in the form of slowing down the clearance of microorganisms from the respiratory system and allowing the spread of infection in the host body (Tiara & Tri, 2021).

Profile of antituberculosis drug usein adult pulmonary tuberculosis patients with OAT KDT category I intensive phase 6 patients (19.35%) and OAT KDT category I continuation phase 25 patients (80.64%). Where patients who consume OAT continuation phase are more than patients who consume OAT intensive phase. Different from the researchThahir & Muhammad (2023)where the research results show that the number of patients using OAT category I intensive phase 114 patients is more than the number of patients consuming OAT category I continuation phase 109 patients.

For category I in the intensive stage, a combination of RHZE (Rifampicin 150 mg,

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Isoniazid 75 mg, Pyrazinamide 400 mg, Ethambutol 275 mg) or 4KDT (Fixed Dose Combination) is given every day for 56 days or 2 months, then continued with the continuation stage of RH (Rifampicin 150 mg, Isoniazid 75 mg) or 2KDT (Fixed Dose Combination) for 16 weeks or 4 months. The use of daily dose KDT antituberculosis drugs at the Andalas Health Center, Padang City is guided by the Regulation of the Minister of Health No. 67 of 2016 concerning Tuberculosis Control.

Patient suitability in this study was seen from the presence or absence of drug contraindications and drug allergies based on Drug Information Handbook23rd Edition in 2015. In this study, the results obtained were 100% accurate because there were no patients with special conditions such as pregnant patients, patients with chronic liver disorders, acute hepatitis patients, or patients with severe kidney disorders. This study is in line with the study conducted byDoko et al., (2020)AndKasni et al., (2024)states patient accuracy of (100%).

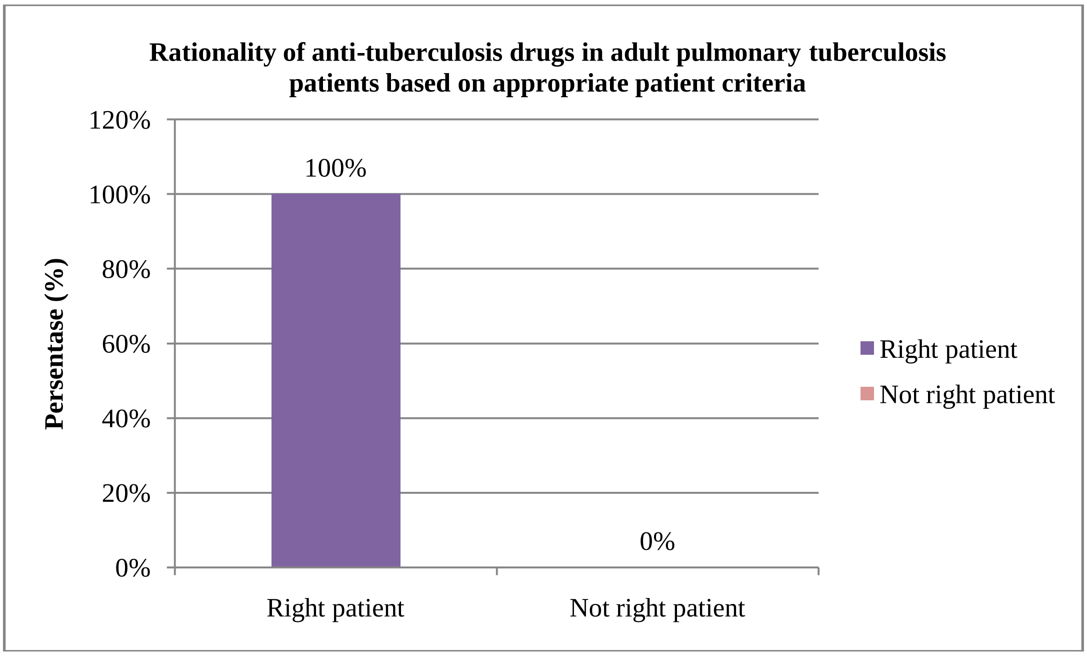

Figure 1. Rationality of anti-tuberculosis drugs in adult pulmonary tuberculosis patients based on appropriate patient criteria.

The accuracy of the indication is carried out by determining whether or not the therapy needs to begiven or the selection of drugs in accordance with the diagnosis that has been established based on the Regulation of the Minister of Health No. 67 of 2016 concerningTuberculosis Control. In this study, the results obtained were 100% accurate indication. All samples of pulmonary tuberculosis were considered accurate indications based on the symptoms experienced, laboratory test results and the established diagnosis(Anuku et al., 2020).

This research is in line with research conducted byAnuku et al., (2020)states that the accuracy of the indication is 100%. This research is also in line withKasni et al., (2024)shows all patients 100% are appropriately indicated.

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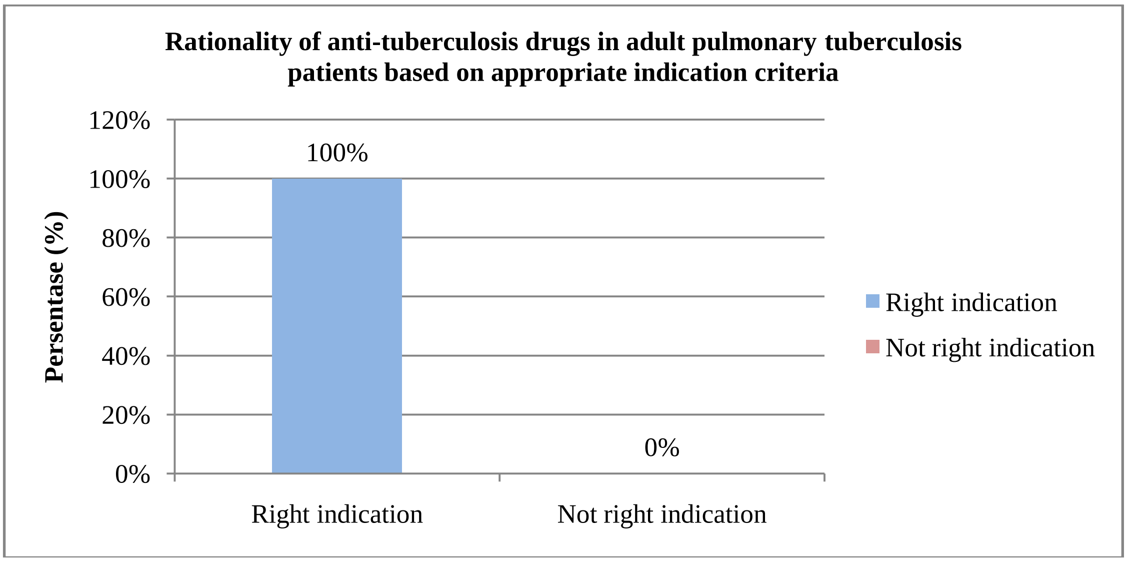

Figure 2. Rationality of anti-tuberculosis drugs in adult pulmonary tuberculosis patients based on appropriate indication criteria.

Drug accuracy is related to the selection of therapeutic classes and types of drugs based on considerations of benefits, safety, price and quality. As a reference for drug selection, it can be based on the Regulation of the Minister of Health No. 67 of 2016 concerningTuberculosis Control. The accuracy of the drug in this study was seen from the prescribed drugs compared to the diagnosis and history of the patient's TB treatment. In the Andalas Health Center, Padang City itself, drugs with a fixed dose combination known as OAT KDT were used for patients who had been diagnosed with TB.

The results of this study indicate that 31 samples undergoing tuberculosis treatment were 100% on the right medication. This study is in line withAnuku et al., (2020)with 100% drug accuracy. However, this study is not in line withKasni et al., (2024)with a drug accuracy of 93%, where in the study drug inaccuracy was found in the provision of OAT to patients not in accordance with the recommendations of the National Guidelines Tuberculosis Control of the Ministry of Health of the Republic of Indonesia in 2020.

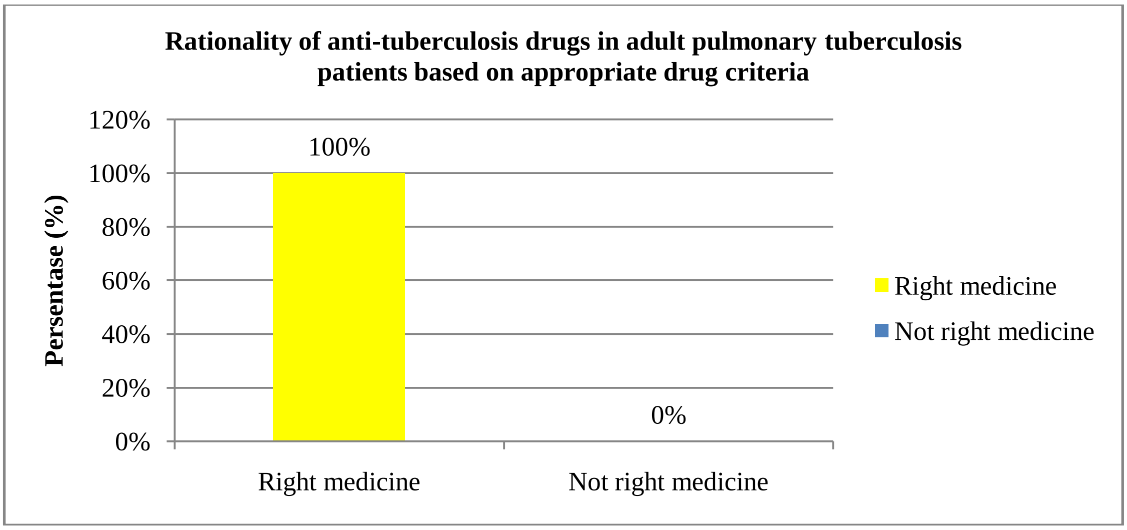

Figure 3. Rationality of anti-tuberculosis drugs in adult pulmonary tuberculosis patients based on appropriate drug criteria.

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Evaluation of dosage accuracy by comparing the dose of antituberculosis drugs received by the patient with the dose in the guidelines of the Minister of Health Regulation No. 67 of 2016 concerningTuberculosis Control.Andalas Health Center, Padang City itself uses drugs with a fixed dose combination known as OAT KDT, the accuracy of the dose is assessed from the suitability of the amount of medicine for 1 dose based on the rules of use compared to the dosage provisions based on body weight and duration of drug administration as seen from the amount of medicine given. The results of the analysis in this study obtained an exact dose of93.54% and inappropriate dosage 6.45%. Because there was an inaccuracy in the dosage given to patient no. 3 (Mr. M) and patient no. 10 (Mr. AC), where the dosage given was less or inappropriate.

In patient no. 3 (Mr. M) where the dose given did not match the patient's body weight in the intensive phase, the patientwith a body weight of 54 kg, get 2 KDT tablets per day. Based on the guidelinesMinister of Health Regulation No. 67 of 2016 ConcerningTuberculosis control should be patients weighing 38-54 kg receiving 3 KDT tablets per day. Similar to patient no. 3, patient no. 10 (Mr. AC) also received a dose that was not in accordance with body weight in the continuation phase, where a patient weighing 60 kg received 3 KDT tablets per day. Based on the guidelinesMinister of Health Regulation No. 67 of 2016 ConcerningTuberculosis control should involve patients weighing 55-70 kg receiving 4 KDT tablets per day.

The results of this study are in line withAnuku et al., (2020)with a dose accuracy of 86%, where the dose inaccuracy occurred because the dose given was insufficient. This study is also in line withKasni et al., (2024)with a dose accuracy of 92%, dose inaccuracy occurs because the dose given is insufficient or does not match the patient's body weight.

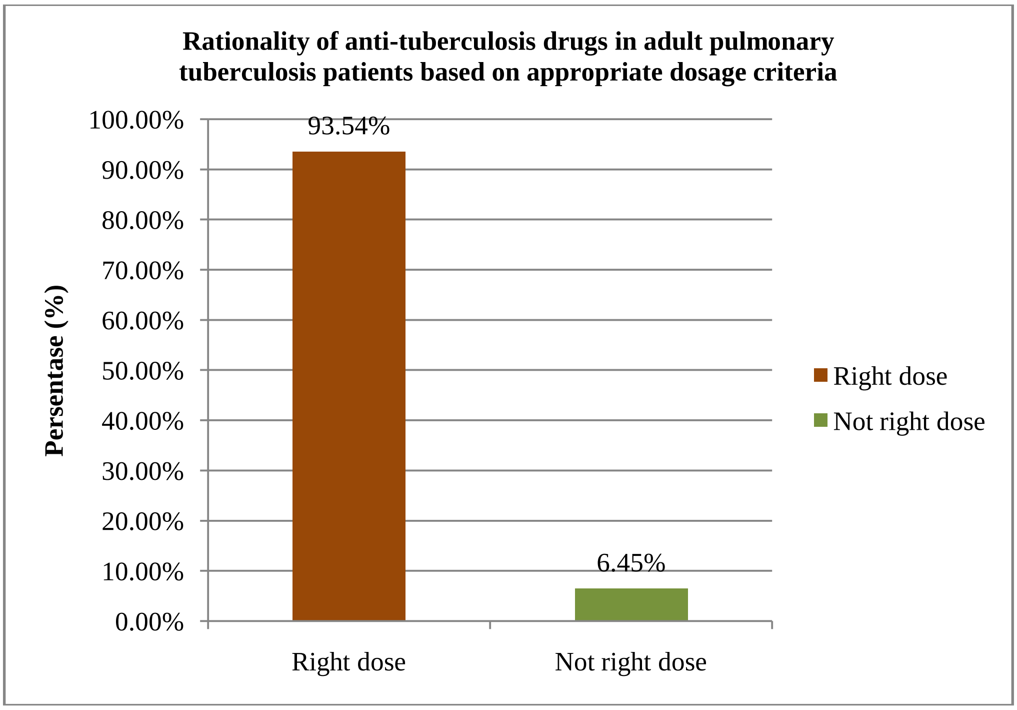

Figure 4. Rationality of anti-tuberculosis drugs in adult pulmonary tuberculosis patients based on appropriate dosage criteria.

The evaluation of the correct frequency of administration is analyzed by comparing the frequency of administration of drugs to patients with the guidelines of the Minister of Health Regulation No. 67 of 2016 concerningTuberculosis Control.The frequency of administration for OAT KDT category 1 intensive stage and continuation stage is given once a day. In this study, the accuracy of the frequency of drug administrationshows 100%. This research is in line withSurani et al., (2023)with research results showing the frequency of drug administration was 100%. This is different from research conducted byIsmaya et al., (2021)with accurate results of the frequency of administration of 98.38%, inaccuracy occurred because the frequency of drug administration did not correspond to the literature.

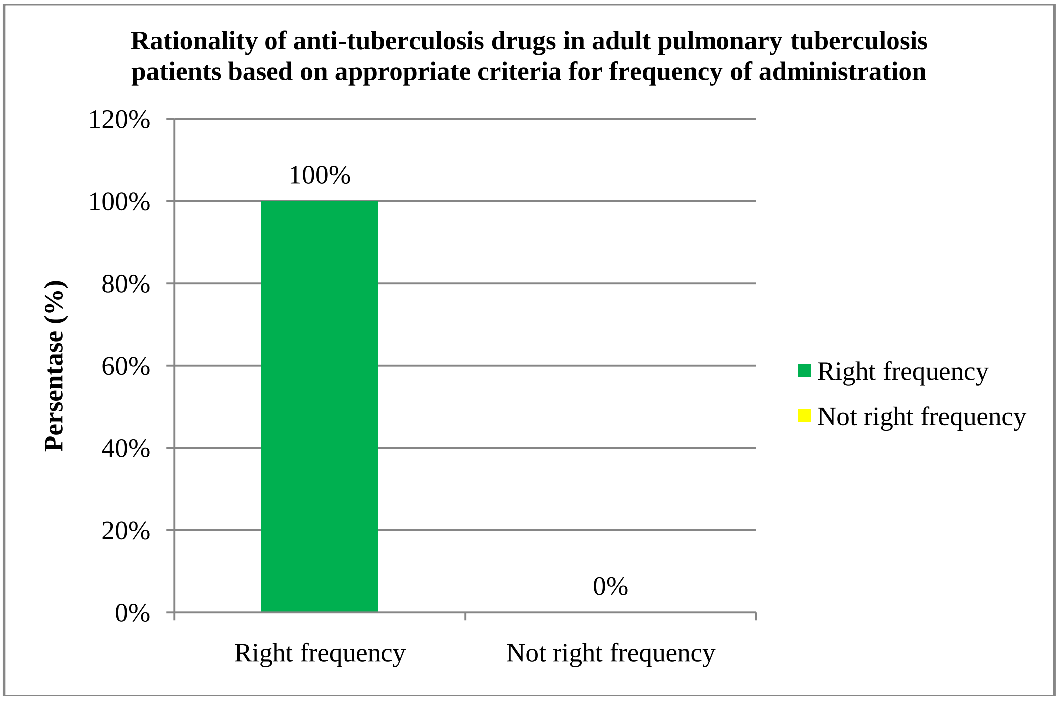

Figure 5. Rationality of anti-tuberculosis drugs in adult pulmonary tuberculosis patients based on appropriate criteria for frequency of administration.

Adult pulmonary tuberculosis patients receiving antituberculosis drug therapy based on the drug's side effect profile, patients with side effects were found red urine in 11 patients (35.48%), nausea in 3 patients (9.67%), mild itching in 1 patient (3.22%), bone pain in 1 patient (3.22%), and no side effects in 15 patients (48.38%).

This research is supported by researchFarhanisa et al., (2015)that the most common side effect experienced by patient was red urin 62,5%. In the study Farhanisa et al.,(2015) stated that the side effects of OAT that often occur are red urine in 11 patients (100%), nausea in 8 patients (72.73%), weakness in 6 patients (54.54%), vomiting and digestive disorders in 4 patients (36.36%), joint pain and dizziness in 3 patients (27.27%), itching of the skin, drowsiness, and tingling in 2 patients (9.09%).

The limitation of this study is that the study was conducted prospectively so that the side effects of inappropriate OAT use can be identified, but no re screening of patients who have received treatmentwas carried out. Re-screening of patients aims to ensure that patients have benefited from the treatment that has been given.

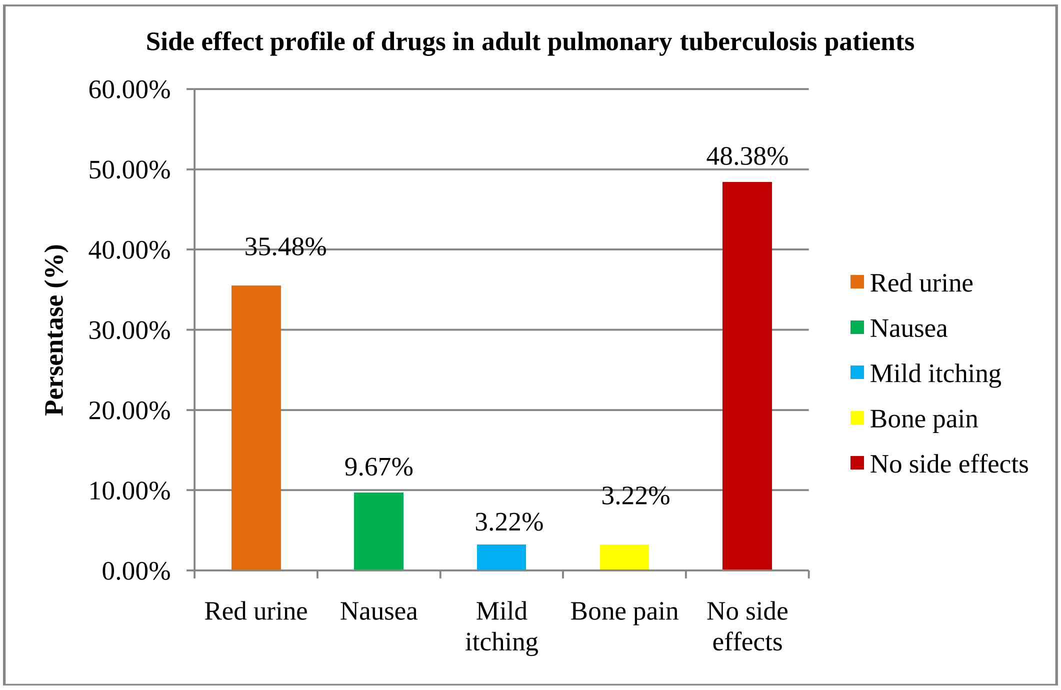

Figure 6. Side effect profile of drugs in adult pulmonary tuberculosis patients

IV. CONCLUSION

Based on research that has been conducted regarding Rationality of Antituberculosis Drugs in Adult Pulmonary Tuberculosis Patients at Andalas Public Health Center, Padang, in January 2025, it canbe concluded that patients undergoing pulmonary tuberculosis treatment are not 100% rational.

Because there is still treatment whose accuracy is <100% namely the right dose with a percentage of 93.54% and 51.59% of patients experienced drug side effects. While the treatment of pulmonary tuberculosis with 100% accuracy is the right patient, right indication, right drug, and right frequency of administration.

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