

INFORMASI ARTIKEL

Received: December 10, 2025

Revised: December 20, 2025

Available online: December, 31, 2025

at : <https://e-jurnal.iphorr.com/index.php/mchc>

Analysis of potential drug interactions in pulmonary tuberculosis patients in the pediatric clinic

Febria Listina*, Yuli Peristiwati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

Abstract

Background: Analysis of Potential Drug Interactions of Pulmonary Tuberculosis Patients at The Children's Poly of Imanuel Wayhalim Hospital Bandar Lampung. Tuberculosis (TB) is an infectious disease caused by infection with the bacterium *Mycobacterium tuberculosis* (MTB). Treatment in tuberculosis patients is given Anti-Tuberculosis Drugs (OAT) consisting of isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin.

Purpose: To analysis of potential drug interactions in pulmonary tuberculosis patients in the pediatric clinic.

Method: This study is a non- experimental descriptive study (observational). Sampling using purposive sampling method. The data collection was retrospectively taken from the medical records of tuberculosis patients at the children's poly of Imanuel Wayhalim Hospital Bandar Lampung for the period October – December 2025.

Results: The results of the study found that the characteristics of TB patients of the highest age were toddlers (0-5 years) as many as 35 patients (83.3%), the highest sex was male as many as 27 cases (64%), potential drug interactions contained in the therapy of TB pediatric patients were pharmacokinetic interactions in the metabolic phase of OAT and OAT as many as 2 cases (50%), pharmacodynamic interactions of OAT and OAT as many as 2 cases (50%), pharmacokinetic interactions in the metabolic phase of OAT and other drugs as many as 10 cases (45.5%), pharmacodynamic interactions of OAT and other drugs as many as 12 cases (54.5%). Based on the severity of OAT and OAT drug interactions, Major results were obtained as many as 2 cases (100%) and the severity of OAT drug interactions and other drugs obtained Moderate results as many as 8 cases (57%), Major as many as 6 cases (43%).

Conclusion: Based on research, it can be concluded that anti- tuberculosis drugs that interacted if ampicin with isoniazid and triamcinolone and the most common type of drug interaction is pharmacokinetics in the metabolic phase. The severity of drug interactions that occur is highest in the moderate category.

Keywords: Tuberculosis, OAT, Drug interactions.

INTRODUCTION

Tuberculosis is an infectious disease caused by the rod-shaped bacterium *Mycobacterium tuberculosis* (MTB). Tuberculosis primarily affects the lung parenchyma (pulmonary TB), but this bacterium can also infect other organs (extrapulmonary TB) (Ministry of Health of the Republic of Indonesia, 2019). Indonesia ranks third in the number of tuberculosis cases after India and China, with 824.000 cases and approximately 93.000 deaths per year, equivalent to

11 deaths every hour. The Indonesian Ministry of Health recorded that between January 1 and November 1, 2022, there were 503.712 people with TB, of which 61.594 were children. Details show that 34.615 children aged 0 to 5 years were infected with TB, while 26.979 children aged 5 to 14 years were also infected. The increase in TB cases in children is of particular concern. One of the locations highlighted was Bantul, Yogyakarta, where 619 children were

diagnosed with TB (Piana, 2022). Meanwhile, the Bandar Lampung Health Office recorded 3,606 TB cases in 2022, significantly higher than the 2,559 cases found in 2021 (Umar, Basit, Ali, & Iqbal, 2022).

The proportion of children among all TB cases notified in the TB program is within the normal range of 8-11%. However, when viewed at the provincial level, health care facilities represent a significant proportion, ranging from 1.8% to 15.9%. To address the problem of childhood tuberculosis, various guidelines have been issued at the global level. Currently, controlling tuberculosis in children is a crucial component of tuberculosis control, with an approach focused on higher-risk groups. Tuberculosis in children and infants is a leading cause of infant and child mortality in countries where tuberculosis is endemic (Ministry of Health of the Republic of Indonesia, 2014).

Therapy for patients with tuberculosis involves several types of anti-tuberculosis drugs, including isoniazid, rifampin, pyrazinamide, ethambutol, and streptomycin (Ministry of Health of the Republic of Indonesia, 2014). Drug interactions occur when the effect of one drug is affected by the presence of another (Baxter, 2010). The impact of these interactions can enhance or diminish the drug's action or even produce new effects that were not previously present. This is a significant concern because it can affect the body's response to the treatment. Drug interactions can have both benefits and disadvantages.

Based on research conducted at a hospital in Padang, it was found that there is a potential interaction between anti-tuberculosis drugs (OTD) and other OATs, as well as between OATs and other drugs, with a total of 28 interactions detected. Of these, 21 interactions were pharmacokinetic and the other 7 were pharmacodynamic (Utari, 2023). The severity of potential drug interactions is divided into three categories the categories were: Major (4 cases) (14.29%), Moderate (17 cases) (60.72%), and Minor (7 cases) (25%). Pharmacists' duties include preventing, detecting, and reporting adverse events, including those caused by drug interactions (Syamsudin, 2011).

Infectious diseases are diseases caused by biological microorganisms, including viruses,

bacteria, fungi, and parasites, and can be transmitted to humans. One such infectious disease is tuberculosis. Tuberculosis is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*, which can attack the lungs and other organs, but generally attacks the lungs. This disease is usually transmitted through the air when someone infected with the bacteria coughs, sneezes, or talks (Mayasari & Sari, 2025).

Therapy for pulmonary TB patients consists of anti-tuberculosis drugs (OAT) and other drugs used simultaneously, resulting in drug interactions (Afrianti, Larucy, & Widayana, 2023). Infectious diseases are diseases caused by biological microorganisms, including viruses, bacteria, fungi, and parasites, and can be transmitted to humans. One such infectious disease is tuberculosis. Tuberculosis is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*, which can attack the lungs and other organs, but generally attacks the lungs. This disease is usually transmitted through the air when someone infected with the bacteria coughs, sneezes, or talks (Halima, Rahimah, Saefulloh, Andriane, & Suherian, 2019).

RESEARCH METHOD

This study is a descriptive and experimental (observational) study that aims to describe and interpret the object according to reality. Sampling was conducted using a purposive sampling method. Data were collected retrospectively from the medical records of tuberculosis patients treated between October and December 2022. This study was conducted over one year.

The study was conducted for a period of 1 month at Imanuel Wayhalim Hospital, Bandar Lampung, in July 2023. The independent variables in this study were pediatric patients with tuberculosis (TB) and anti-TB drug therapy. The dependent variable was the potential for drug interactions, which consisted of major, minor, and moderate drug interactions. The Drug Interaction Checker application, available on medscape.com, was used to analyze the collected data in a data collection sheet. Based on the analysis, the percentage of drug interactions between anti-tuberculosis drugs and other drugs, as well as the type of drug interaction, was determined.

Febria Listina*, Yuli Peristiwati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

DOI: 10.56922/mchc.v4i9. 2065

RESEARCH RESULTS

Variable	Results
Age (Mean±SD)(Range)(Year)	(26.103±7.349) (0-11)
Toddler (0-5 years)	35/83.3
Child (6-11 years)	5/11.9
Early Adolescence (12-16 years)	2/4.8
Gender (n/%)	
Male	27/64.0
Female	15/36.0
Diagnosis (n/%)	
ARI	1/2.0
ARI Pulmonary TB and Malnutrition	1/2.0
Pulmonary Tuberculosis	26/62.0
Glandular Tuberculosis	5/12.0
Glandular TB and Malnutrition	3/7.0
Extrapulmonary TB and Malnutrition	1/2.0
Post-Hospital Typhoid and Pulmonary TB	1/2.0
Pulmonary TB and Epilepsy	1/2.0
Pulmonary TB and Malnutrition	3/7.0
Number of Drugs Given (n/%)	
1	4/9.6
2	11/26.2
3	11/26.2
4	4/9.5
5	3/7.1
6	5/11.9
7	1/2.4
8	2/4.8
9	1/2.4

Table 1 shows that the average age of respondents and standard deviation are (26.103±7.349) with an age range of (0-11). The majority of respondents are male, namely 27 (64.0%) and the majority have a diagnosis of pulmonary tuberculosis. Based on diagnosis include 1 respondents with ARI (2%), 1 respondents with pulmonary tuberculosis and malnutrition (2%), 26 patients with pulmonary tuberculosis (62%), 5 patients with glandular tuberculosis (12%), 3 patients with glandular tuberculosis and malnutrition (7%), 1 respondents with extrapulmonary tuberculosis and malnutrition (2%), 1 respondents with post-hospital typhoid and pulmonary tuberculosis (2%), 1 respondents with pulmonary tuberculosis and epilepsy (2%), and 3 patients with pulmonary tuberculosis and malnutrition (7%).

Febria Listina*, Yuli Peristiwati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

Tabel 2. Distribution of the Number of Cases of Tuberculosis Drug Interactions

Type of Interaction	Drug Name	Number of Cases
OAT		
Farmakokinetik	Rifampicin+Isoniazid	39/28.3
	Rifampicin+Pyrazinamid	30/21.7
Farmakodinamik	Rifampicin+Isoniazid	39/28.3
	Rifampicin+Pyrazinamid	30/21.7
Farmakokinetik	Rifampicin+Triamcinolon	7/14.3
	Rifampicin+Paracetamol	4/8.2
	Rifampicin+Diazepam	5/10.2
	Rifampicin+Prednison	2/4.1
	Rifampicin+Dexamethasone	1/2.1
	Rifampicin+Asam Valproat	1/2.1
	INH+Dexamethasone	1/2.1
	INH+Diazepam	5/10.2
	INH+Triamcinolon	
	INH+Prednison	
Farmakodinamik	Rifampicin+Asam Valproat	1/2.1
	Rifampicin+Triamcinolon	7/14.3
	Rifampicin+Diazepam	5/10.2
	Rifampicin+Prednison	2/4.1
	Rifampicin+Azithromycin	3/6.1
	Rifampicin+Dexamethasone	1/2.1
	INH+Asam Valproat	1/2.1
	INH+Vitamin B6	5/10.2
	INH+Vitamin D3	1/2.1
	INH+Paracetamol	4/8.2
	INH+Diazepam	5/10.2
	INH+Triamcinolon	7/14.3
	INH+Prednison	2/4.1

Based on Table 1. the distribution of the number of ATD users with ATD by pharmacokinetic interaction type includes the combination of Rifampicin and Isoniazid in 39 cases (28.26%) and Rifampicin and Pyrazinamide in 30 cases (21.74%). The pharmacodynamic interaction type includes the combination of Rifampicin and Isoniazid in 39 cases (28.26%) and Rifampicin and Pyrazinamide in 30 cases (21.74%).

Based on the distribution of the number of OAT use with other drugs in the type of pharmacokinetic interaction, the most common drugs are Rifampicin and Triamcinolone with 7 cases (14.29%), INH and Triamcinolone with 7 cases (14.29%), in the type of pharmacodynamic interaction, the most common drug combination is Rifampicin and Triamcinolone with 7 cases (14.29%), and INH and Triamcinolone with 7 cases (14.29%). The distribution of drugs according to the number of drugs administered per respondents for a single prescription shows that there are three types of drugs that are most frequently used, namely in 11 cases (26.2%) and two types of drugs also in 11 cases (26.2%). In this study, it was found that the number of drugs most often given in a single prescription to a respondents was nine drugs. The respondents is respondents number 35 with medical record number 3683XX, female, aged 8 years, with a body weight of 26 kg. The drugs given include TBKid3, Mucos, Trilac, Vitamin C, Vometa, Valisan Be, Sanmol Forte Syrup, Pedigrow, and Cefadroxil.

Febria Listina*, Yuli Peristiowati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

Tabel 3 Distribution of Drug Interaction Severity Levels

Type of Severity	Type of Medication	Jumlah Kasus	
		Medscape	Drugs.com
Minor	INH+Pirazinamid	32/100	0/0
Moderate	-	0/0	0/0
Major	Rifampicin+INH	0/0	38/54.3
	Rifampicin+Pirazinamid	0/0	32/45.7
Minor	Rifampicin+Paracetamol	5/16.7	5/10.9
	Rifampicin+Diazepam	6/20.0	6/13.0
	INH+VitaminB6	2/6.7	0/0
	INH+Dexamethasone	1/3.3	1/2.2
	INH+Paracetamol	5/16.7	4/8.7
	INH+Prednison	3/10.3	3/6.6
Moderate	Rifampicin+Asam Valproat	0/0	1/2.2
	Rifampicin+Triamcinolon	0/0	6/13.0
	Rifampicin+Prednison	3/10.3	3/10.0
	INH+Asam Valproat	0/0	1/2.2
	INH+VitaminD3	0/0	1/2.2
	INH+Paracetamol	5/16.7	4/8.7
	INH+Diazepam	0/0	6/13.0
	INH+Triamcinolon	0/0	5/10.9
Major	-	0/0	0/0

Based on Table 3. the distribution of the severity of interactions between ATD and OAT shows that the combination of INH and pyrazinamide has a potential for minor severity, with 32 cases (100%), and the combination of rifampicin and INH has a potential for major severity, with 38 cases (54.29%), and rifampicin and pyrazinamide has a potential for major severity, with 32 cases (45.71%).

DISCUSSION

Tuberculosis is a disease that requires treatment using multiple drug combinations. One factor that can influence the potential for drug interactions is the use of more than one drug (polypharmacy). Drug interactions are the modification of a drug's effect due to the presence of other drugs administered initially or concurrently, which can alter the effects of one or more drugs. This can not only affect the effectiveness of the drug but also alter its toxicity (Abdillah & Asmini, 2018).

This study aims to determine the interactions between anti-tuberculosis drugs (ATD) and other

ATDs, as well as the interactions between ATDs and other drugs administered to tuberculosis patients in the Pediatric Clinic of Imanuel Hospital, Bandar Lampung, from October to December 2022. The study population consisted of 73 tuberculosis patients registered in medical records. Sampling was conducted using the Slovin formula, and based on the inclusion criteria, 42 patients were eligible for participation in this study.

Table 1 shows the characteristics of pediatric tuberculosis patients based on oddlers (0 to 5 years) accounted for 35 patients (83.3%), children (6 to 11 years) for 5 patients (11.9%), and adolescents (12-16 years) for 2 patients (4.8%). Tuberculosis transmission occurs when inhaled air containing tuberculosis bacteria from individuals such as parents, siblings, or neighbors. Parents often assume that the symptoms they experience are not signs of tuberculosis, so they often go unnoticed. The spread of the disease is more easily achieved when children are in close proximity to tuberculosis sufferers. Furthermore, unsanitary housing conditions and poor nutrition contribute to the development of tuberculosis

Febria Listina*, Yuli Peristiwati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

DOI: 10.56922/mchc.v4i9. 2065

bacteria among children (DiPiro, 2010).

Respondents characteristics by gender, tuberculosis patients in the pediatric clinic at Imanuel Hospital, Bandar Lampung, were 27 male patients (64%), compared to 15 female patients (36%). These results are consistent with Khutsiyah's (2018) study, which found that 53 (66.25%) male patients outnumbered 27 (33.75%) female patients. This contrasts with Mahardika's (2014) study, which found that 44 (53%) female patients with tuberculosis were female and 39 (47%) male. There were no significant problems. There is a significant gender difference in tuberculosis cases, considering that both men and women are at equal risk of developing the disease. However, over time, the prevalence of tuberculosis tends to be more male. This is due to higher risk factors, particularly those associated with smoking (DiPiro, 2010).

The causative factor for tuberculosis is cigarette smoke or exposure to local cigarette smoke. Inhaling cigarette smoke can lead to decreased function of the hair cells in a child's respiratory tract. These hair cells play a crucial role in protecting lung health. Exposure to cigarette smoke can reduce the number and activity of immune cells in a child's body, thus decreasing the body's ability to defend itself against infection (Utari, 2020).

Respondents characteristics based on diagnoses include 1 respondents (2%) with ARI, 1 respondents with pulmonary tuberculosis and malnutrition, 26 patients with pulmonary tuberculosis (62%), 5 patients with glandular tuberculosis (12%), 3 patients with glandular tuberculosis and malnutrition (7%), 1 respondents with extrapulmonary tuberculosis and malnutrition (2%), 1 respondents with post-hospital typhoid and pulmonary tuberculosis (2%), 1 respondents with pulmonary tuberculosis and epilepsy (2%), and 3 patients with pulmonary tuberculosis and malnutrition (7%). The diagnoses of pediatric patients included malnutrition, ARI, and post-hospital typhoid. Acute respiratory infections (ARI) and tuberculosis (TB) remain significant health problems in Indonesia. Symptoms of ARI in children include fever, cough, runny nose, and shortness of breath. Symptoms can also be found in patients with pulmonary tuberculosis, such as prolonged cough, shortness of breath, weight loss, night sweats, coughing up blood, and weakness. This can worsen a child's health condition (Ramayanti, Nurfadhilah,

Srisantyorini, & Ernyasih, 2022).

Malnutrition can exacerbate the risk of pulmonary tuberculosis (TB) and increase the likelihood of latent tuberculosis bacteria developing into active tuberculosis. Malnutrition can affect tuberculosis (TB) in several ways. One major way is by increasing the risk of TB infection progressing to primary disease in the short term and increasing the risk of TB reactivation in the long term (Musuenge, Poda, & Chen, 2020). Furthermore, children require adequate nutrition for growth and development. A lack of proper nutrition can negatively impact the development and function of the immune system, making children more susceptible to disease. Weight loss is one sign of TB. Nutritional deficiencies can increase the risk of infection due to a decreased immune system function (Gupta, Gupta, Atreja, Verma, & Vishvkarma, 2009).

Tuberculosis is a disease that requires treatment with a combination of various drugs. One factor that can influence the potential for drug interactions is the use of more than one type of drug, known as polypharmacy. Based on Table 4, the distribution of the number of ATD use with other drugs by pharmacokinetic interaction type includes 39 cases (28.26%) of rifampicin and isoniazid, and 30 cases (21.74%) of rifampicin and pyrazinamide. Meanwhile, pharmacodynamic interaction types include 39 cases (28.26%) of rifampicin and isoniazid, and 30 cases (21.74%) of rifampicin and pyrazinamide.

Based on the distribution of ATD use with other drugs by pharmacokinetic interaction type, 7 cases were found in the combination of rifampicin and triamcinolone 14.29%), Rifampicin and Paracetamol (4 cases) (8.16%), Rifampicin and Diazepam (5 cases) (10.2%), Rifampicin and Prednisone (2 cases) (4.08%), Rifampicin and Dexamethasone (1 case) (2.04%), INH + Valproic Acid (1 case) (2.04%), INH and Dexamethasone (1 case) (2.04%), INH and Diazepam (5 cases) (10.2%), INH and Triamcinolone (7 cases) (14.29%), INH and Prednisone (2 cases) (4.08%). Pharmacodynamic interactions included the combination of Rifampicin and Valproic Acid (1 case) (2.04%), Rifampicin and Triamcinolone (7 cases) (14.29%), and Rifampicin and Diazepam (5 cases) (10.2%). (10.2%), Rifampicin and Prednisone (2 cases) (4.08%), Rifampicin and Azithromycin (3 cases) (6.12%), Rifampicin and Dexamethasone (1 case) (2.04%), INH and Valproic Acid (1 case) (2.04%), INH and Vitamin B6 (5 cases) (10.2%), INH

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and Vitamin D3 (1 case) (2.04%), INH and Paracetamol (4 cases) (8.16%), INH and Diazepam (5 cases) (10.2%), INH and Triamcinolone (7 cases) (14.29%), INH and Prednisone (2 cases) (4.08%). The types of interactions between the use of ATD with ATD in pharmacokinetic interactions are stated to occur in the metabolic phase. Rifampicin and INH increase INH toxicity by accelerating metabolism. The combination of Rifampicin and Pyrazinamide can increase the toxicity of the other drug. by increasing the effect of the drug. The interaction of the combination of OAT with other drugs such as Rifampicin and Valproic Acid occurs due to the induction of Valproic Acid by rifampicin and a decrease in the effectiveness of Valproic Acid, the combination of Rifampicin and Triamcinolone can reduce the effectiveness of triamcinolone, the combination of Rifampicin and Paracetamol can slightly reduce paracetamol levels by accelerating metabolism, the combination of Rifampicin and Diazepam can result in weakening or decreasing the effect of diazepam, the combination of Rifampicin and Prednisone drugs significantly decreased in plasma isoniazid concentrations in slow and fast inactivators and changed the effect of prednisone on the biodisposition of isoniazid, Rifampicin and Dexamethasone can decrease the effectiveness of Dexamethasone, INH and Valproic Acid can decrease the metabolism of valproate acid by inhibiting the CYP enzyme resulting in increased serum concentrations of Valproic Acid, the combination of INH and Vitamin B6 drugs namely making INH reduce vitamin B6 levels, the combination of INH and Vitamin D3 drugs can inhibit vitamin D3 metabolism, the combination of INH and Dexamethasone drugs can cause a decrease in serum isoniazid concentrations, the combination of INH and Paracetamol drugs can increase the effect of paracetamol by changing drug metabolism, the combination of INH and Diazepam drugs namely INH will increase the level or effect of diazepam by affecting the metabolism of the liver/intestine CYP3A4 enzyme, INH and Triamcinolone decrease serum isoniazid concentrations (Belang, 2019).

Based on the distribution of the severity of ATD-drug interactions is shown in the Minor category, with the combination of INH and pyrazinamide (32 cases (100%)), and the Major category, with the combination of Rifampicin and INH (38 cases (54.29%)), and Rifampicin and pyrazinamide (32 cases (45.71%)).

Based on the distribution of the severity of ATD interactions with other drugs, the Minor category includes the combination of Rifampicin and Paracetamol (5 cases, 16.67%) according to Medscape (5 cases, 10.87%), Rifampicin and Diazepam (6 cases, 20%) according to Drugs.com (6 cases, 13.04%), INH and Vitamin B6 (2 cases, 6.67%), and INH and Dexamethasone (1 case, 3.33%). According to Drugs.com, there were 1 case (2.17%), INH and Paracetamol according to Medscape, there were 5 cases (16.67%), according to Drugs.com, there were 4 cases (8.7%), INH and Prednisone according to Medscape, there were 3 cases (10%), according to Drugs.com, there were 3 cases (6.52%), and the potentially Moderate severity category was a combination of Rifampicin and Valproic Acid according to Drugs.com, there were 1 case (2.17%), Rifampicin and Triamcinolone according to Drugs.com, there were 6 cases (13.04%), Rifampicin and Prednisone according to Medscape, there were 3 cases (10%) according to Drugs.com, there were 3 cases (6.52%), INH and Valproic Acid according to Drugs.com, there were 1 case (2.17%), INH and Vitamin D3 according to Drugs.com, there were 1 case (2.17%), INH and Paracetamol according to Medscape, there were 5 cases (16.67%). According to Drugs.com, there were 4 cases (8.7%), INH and Diazepam according to Drugs.com, 6 cases (13.04%), INH and Triamcinolone according to Drugs.com, 5 cases (10.87%).

Significant drug interactions are divided into three categories: serious, which can cause harmful effects to patients; moderate, which can cause organ damage; and minor, which can cause mild side effects (Syamsudin et al., 2011). All types of Anti-Tuberculosis Drugs (ATB) used in this study were first-line class I ATBs, namely Isoniazid, Rifampicin, Pyrazinamide, Ethambutol, and Streptomycin, which are the drugs of choice for tuberculosis treatment. The high number of pediatric tuberculosis patients results in the highest use of INH, rifampicin, and pyrazinamide. In pediatric tuberculosis patients, ethambutol is not recommended as a primary therapy option. This is due to the potential side effects of ethambutol, namely ocular damage, which cannot be detected in children. Therefore, the use of ethambutol in it is not recommended for tuberculosis patients in the pediatric age group (Cairns, 2009). Drugs in the

Febria Listina*, Yuli Peristiwati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

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primary therapy of tuberculosis patients, namely first-line class I anti-tuberculosis drugs (OAT), have the potential to interact when administered concurrently (Chelmon, Geibel, Grimm, Harris, Maron, & Meyers, 2014). Tuberculosis in the pediatric age group is not recommended (Chairms, 2006). Drugs in the primary treatment of tuberculosis patients, namely first-line class I anti-tuberculosis drugs (OAT), have the potential to interact when administered concurrently (Chelmon et al., 2014).

Based on Table 6, the distribution of medications by number of prescriptions per respondents shows that the most frequently prescribed medications were as follows: nine medications in 1 case (2.4%), eight medications in 2 cases (4.8%), seven medications in 1 case (2.4%), six medications in 5 cases (11.9%), five medications in 3 cases (7.1%), four medications in 4 cases (9.5%), three medications in 11 cases (26.2%), two medications in 11 cases (26.2%), and one medication in 4 cases (9.5%). In this study, the most frequently prescribed medications were nine medications. The respondents is respondents number 35 with medical record number 3683XX, an 8-year-old female weighing 26 kg. The medications prescribed include TB Kid 3, Mucos, Trilac, Vitamin C, Vometa, Valisanbe, Sanmol Forte Syrup, Pedigrow, and Cefadroxil.

Based on the National Guidelines for Tuberculosis Control from the Indonesian Ministry of Health (2011), the principle of tuberculosis treatment is carried out with a combination approach that includes several types of Anti-Tuberculosis Drugs (OAT). In addition to receiving OAT, tuberculosis patients are also given additional medications used to relieve signs and symptoms. These interactions arise from tuberculosis infection and are used to treat comorbidities experienced by patients. Additional medications can be administered to prevent worsening of the patient's condition (Ministry of Health of the Republic of Indonesia, 2011).

Tuberculosis is one of the top ten causes of death in the world. In 2015, as many as 10.4 million people had this disease and 1.8 million of them died. Treatment of tuberculosis patients is given several types of anti-tuberculosis drugs accompanied by other drugs in combination or simultaneously can cause drug interactions (Suryani, 2023).

CONCLUSION

The distribution of anti-tuberculosis drug use patterns based on the number of drugs administered in a single prescription was highest at 26.2%. Potential drug interactions found in the treatment of pediatric tuberculosis (TB) patients showed two cases (50%) of pharmacokinetic interactions between anti-tuberculosis drugs (ATD) and ATD, and two cases (50%) of pharmacodynamic interactions between ATD and ATD. In addition, there were ten cases (45.5%) of pharmacokinetic interactions between ATD and other drugs, and twelve cases (54.5%) of pharmacodynamic interactions between ATD and other drugs. Based on the severity of drug interactions, interactions between ATD and ATD were categorized as major, accounting for two cases (100%). Meanwhile, drug interactions between OAT and other drugs were categorized as moderate severity in eight cases (57%) and major severity in six cases (43%).

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Febria Listina*, Yuli Peristiowati

University of Strada Indonesia

Corresponding author: *Email: febria@umitra.ac.id

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Febria Listina*, Yuli Peristiwati

University of Strada Indonesia
Corresponding author: *Email: febria@umitra.ac.id

DOI: 10.56922/mchc.v4i9. 2065