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Analysis of Potential Drug–Drug Interactions in Pediatric HIV/AIDS Patients with Comorbidities at Dr. M. Djamil General Hospital Padang Based on Reliability and Risk Ratings

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Abstract: *To analyze potential drug-drug interactions among pediatric HIV/AIDS patients with comorbidities at RSUP Dr. M. Djamil Padang based on reliability and risk ratings. A descriptive retrospective study was conducted using medical records of pediatric HIV/AIDS patients treated in 2024. Potential DDIs were identified using the Lexicomp Drug Interactions Database. A total of 53 patients were included. Most patients were male (50.94%) and in the child age group (49.06%). A total of 107 potential drug-drug interactions were identified. Most interactions were classified as Good based on reliability rating (77.57%) and Category C (Monitor Therapy) based on risk rating (80.37%). No Category X interactions were found. Potential drug-drug interactions were common among pediatric HIV/AIDS patients with comorbidities, with most interactions requiring therapeutic monitoring.*

Keywords: *HIV/AIDS, Pediatric, Drug-Drug Interaction, Reliability Rating, Risk Rating.*

Introduction

Human Immunodeficiency Virus (HIV) remains a major global health problem, including among the pediatric population. According to the World Health Organization, approximately 1.4 million children aged 0–14 years were living with HIV worldwide in 2023. Advances in antiretroviral therapy (ART) have significantly improved survival and quality of life; however, HIV-infected children often require long-term treatment and continuous clinical monitoring (WHO, 2024).

In Indonesia, pediatric HIV/AIDS continues to be a public health concern. Data from the Kementerian Kesehatan Republik Indonesia indicate that new HIV cases among children are still reported annually, with many patients requiring comprehensive management due to the presence of opportunistic infections and other comorbid conditions (Ministry of Health of Indonesia, 2023).

Pediatric HIV/AIDS patients commonly receive multiple medications, including antiretroviral drugs, antibiotics, antifungals, antituberculosis agents, and supportive

therapies. The use of multiple drugs simultaneously increases the risk of drug-drug interactions (DDIs), which may alter drug efficacy, increase toxicity, and negatively affect treatment outcomes (Tatro, 2023). Furthermore, differences in pharmacokinetic and pharmacodynamic characteristics between children and adults may further influence the occurrence and clinical significance of DDIs (Beringer & Winter, 2021).

Several studies have reported a high prevalence of potential DDIs among HIV patients. Marzolini et al. (2022) reported that more than half of HIV patients receiving antiretroviral therapy experienced potential drug interactions. Similarly, Seden et al. (2021) found that interactions between antiretroviral drugs and medications used to treat opportunistic infections were among the most frequently identified clinically significant DDIs. In pediatric populations, Bae et al. (2020) demonstrated that combination therapy was associated with an increased risk of moderate to major drug interactions.

The assessment of drug interactions is not only based on their severity but also on the reliability of supporting evidence and the associated risk category. According to Lexicomp (2024), the reliability of drug interaction evidence is classified as excellent, good, or fair, while risk ratings are categorized as A, B, C, D, or X. These classifications are useful in identifying clinically relevant interactions and prioritizing monitoring strategies to improve patient safety (Patel et al., 2022).

RSUP Dr. M. Djamil Padang is a tertiary referral hospital that manages pediatric HIV/AIDS patients with various comorbidities. The complexity of pharmacotherapy in these patients may increase the likelihood of potential drug-drug interactions. However, data regarding potential DDIs among pediatric HIV/AIDS patients with comorbidities, particularly based on reliability and risk ratings, remain limited. Therefore, this study aims to analyze the potential drug-drug interactions among pediatric HIV/AIDS patients with comorbidities at RSUP Dr. M. Djamil Padang based on reliability levels and risk categories.

Methodology

This study was a non-experimental descriptive study with a retrospective design. Data were collected from the medical records of pediatric HIV/AIDS patients with comorbidities who were hospitalized at RSUP Dr. M. Djamil Padang from January to December 2024. The study population consisted of all pediatric HIV/AIDS patients with comorbidities treated at RSUP Dr. M. Djamil Padang during 2024. The sample was selected using a total sampling method, including all medical records that met the inclusion criteria. Inclusion criteria: Pediatric HIV/AIDS patients aged <18 years, Patients with one or more comorbidities, Patients receiving antiretroviral therapy (ART) and concomitant medications, Complete medical records. Exclusion criteria: Incomplete or unreadable medical records.

Data collected included patient characteristics (*age and gender*), diagnosis, comorbidities, and prescribed medications during hospitalization. Potential drug-drug interactions were identified using the Lexicomp Drug Interactions Database. Data were analyzed descriptively and presented as frequencies and percentages. Potential drug-drug interactions were classified according to: Reliability Rating: Excellent, Good, and Fair. Risk Rating: A, B, C, D, and X based on the Lexicomp classification system.

Result and Discussion

Table 1. Distribution of Patients by Gender

Gender	Number (n)	Percentage (%)
Male	27	50.94
Female	26	49.06
Total	53	100

The results showed that male patients accounted for 27 cases (50.94%), while female patients accounted for 26 cases (49.06%).

Table 2. Distribution of Patients by Age

Age Group	Number (n)	Percentage (%)
Premature	0	0
Neonate	7	13.21
Infant	2	3.77
Child	26	49.06
Adolescent	18	33.96
Total	53	100

The majority of patients were in the child age group (1–11 years) with 26 patients (49.06%), followed by adolescents (12–18 years) with 18 patients (33.96%).

Table 3. Distribution of Antiretroviral Drug Classes

Drug Class	Number (n)	Percentage (%)
NRTI	53	53.54
NNRTI	46	46.46
PI	0	0
Total	99	100

The most frequently prescribed antiretroviral drug class was NRTI (53.54%), followed by NNRTI (46.46%).

Table 4. Antiretroviral Drug Utilization in Pediatric HIV/AIDS Patients with Comorbidities

Drug Name	Number (n)	Percentage (%)
Duviral (Lamivudine + Zidovudine)	44	44.90
Zidovudine	7	7.14
Atripla (Efavirenz/Emtricitabine/Tenofovir)	1	1.02
Efavirenz	31	31.63
Nevirapine	14	14.29
TLE (Tenofovir)	1	1.02
Total	98	100

Duviral (Lamivudine + Zidovudine) was the most commonly prescribed antiretroviral drug (44.90%), followed by Efavirenz (31.63%).

Table 5. Potential Drug–Drug Interactions Based on Reliability Rating

Reliability Rating	Number (n)	Percentage (%)
No Interaction	9	8.41
Excellent	14	13.08
Good	83	77.57
Fair	1	0.93
Total	107	100

Most potential drug-drug interactions were classified as Good (77.57%), indicating that the majority of interactions were supported by adequate scientific evidence.

Table 6. Potential Drug–Drug Interactions Based on Risk Rating

Risk Rating	Number (n)	Percentage (%)
Category A (No Interaction)	9	8.41
Category B (No Action Needed)	12	11.21
Category C (Monitor Therapy)	86	80.37
Category X (Avoid Combination)	0	0
Total	107	100

Most potential drug-drug interactions were categorized as Category C (Monitor Therapy) with 86 interactions (80.37%), while no Category X interactions were identified. These findings indicate that most interactions required monitoring during therapy but did not require avoidance of the drug combination.

Discussion

This study found that male patients accounted for 50.94% of the study population, while female patients represented 49.06%. The relatively balanced gender distribution is consistent with previous studies reporting comparable HIV prevalence among male and female children receiving antiretroviral therapy (Slogrove et al., 2020; Ferrand et al., 2021; UNICEF, 2023; WHO, 2024). Similar findings have also been reported in pediatric HIV populations in developing countries where vertical transmission remains the primary route of infection (Kementerian Kesehatan RI, 2023; WHO, 2021).

Based on age distribution, most patients were in the child age group (1–11 years) (49.06%), followed by adolescents (33.96%). This finding is in agreement with reports by UNICEF (2023), WHO (2024), Ferrand et al. (2021), Slogrove et al. (2020), and Hazra et al. (2018), which demonstrated improved survival among children living with HIV due to expanded access to antiretroviral therapy. Increased survival rates have resulted in a growing number of pediatric patients reaching school age and adolescence (Lowenthal et al., 2019; Vreeman et al., 2017).

Regarding antiretroviral utilization, NRTIs were the most frequently prescribed drug class (53.54%), while Duviral (lamivudine/zidovudine) was the most commonly used regimen. These findings are consistent with recommendations from WHO (2021), WHO (2024), the NIH Pediatric HIV Guidelines (2024), and previous studies by Kakuda and Fletcher (2009), Marzolini et al. (2022), Seden et al. (2021), and Beringer and Winter (2021). NRTI-based regimens remain widely used because of their established efficacy, safety

profile, and availability in pediatric HIV treatment programs (Panel on Antiretroviral Therapy, 2024; UNICEF, 2023).

A total of 107 potential drug–drug interactions were identified. Based on reliability ratings, most interactions were classified as Good (77.57%), followed by Excellent (13.08%). These findings indicate that the majority of identified interactions were supported by adequate scientific evidence. Similar observations have been reported by Tatro (2023), Lexicomp (2024), Marzolini et al. (2022), Seden et al. (2021), Patel et al. (2022), Baxter (2023), Stockley (2023), and Malone et al. (2020), who emphasized that many antiretroviral-related interactions are supported by pharmacokinetic and clinical evidence.

Based on risk ratings, Category C (Monitor Therapy) represented the highest proportion of interactions (80.37%), followed by Category B (11.21%). No Category X interactions were identified. These results are consistent with studies by Patel et al. (2022), Marzolini et al. (2022), Seden et al. (2021), Tatro (2023), Lexicomp (2024), Tseng et al. (2021), Courlet et al. (2020), and Calcagno et al. (2021), which reported that most interactions involving antiretroviral therapy require clinical monitoring rather than avoidance of treatment. The predominance of Category C interactions may be related to the concomitant use of antiretroviral drugs with antibiotics, antifungals, and other medications prescribed for comorbid conditions (WHO, 2021; NIH, 2024; Kakuda & Fletcher, 2009).

Overall, the findings indicate that potential drug–drug interactions are common among pediatric HIV/AIDS patients with comorbidities. However, most identified interactions can be managed through appropriate therapeutic monitoring and clinical evaluation without requiring discontinuation of therapy. These findings highlight the important role of healthcare professionals, particularly clinical pharmacists, in optimizing antiretroviral therapy and preventing adverse drug-related outcomes (Marzolini et al., 2022; Lexicomp, 2024; WHO, 2024).

Conclusion

This study analyzed potential drug–drug interactions among pediatric HIV/AIDS patients with comorbidities at RSUP Dr. M. Djamil Padang in 2024. A total of 53 patients met the inclusion criteria, with males accounting for 50.94% and females for 49.06%. The majority of patients were in the child age group (1–11 years) (49.06%). The most frequently prescribed antiretroviral drug class was NRTI (53.54%), while Duviral (lamivudine/zidovudine) was the most commonly used antiretroviral regimen (44.90%). A total of 107 potential drug–drug interactions were identified. Based on reliability rating, most interactions were classified as Good (77.57%). Based on risk rating, the majority of interactions were categorized as Category C (Monitor Therapy) (80.37%), indicating that monitoring is required during concomitant drug use. No Category X interactions were identified. In conclusion, potential drug–drug interactions were common among pediatric HIV/AIDS patients with comorbidities, although most interactions could be managed through appropriate therapeutic monitoring without requiring avoidance of the drug combinations.

Future studies should include larger sample sizes and involve multiple healthcare centers to improve the generalizability of the findings. Prospective studies are also

recommended to evaluate the clinical outcomes of potential drug–drug interactions and to compare different drug interaction databases for more comprehensive assessments

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