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Analysis of Potential Antiretroviral Drug Interactions Among HIV Patients at Puskesmas X, Jambi City, in 2025

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Abstract

Introduction: Human Immunodeficiency Virus (HIV) infection requires continuous antiretroviral (ARV) therapy involving the use of multiple medications. Such combination therapy may increase the risk of drug interactions, which may potentially affect the efficacy and safety of treatment. Methods: This study employed a non-experimental study design with a descriptive approach and retrospective design. The study data were obtained from secondary data in the form of HIV patient visit records. A total of 72 patients were selected using purposive sampling. Potential drug interactions were identified using Drugs.com, Medscape, and DrugBank, and the data were analyzed descriptively using Microsoft Excel 2021. Results: The majority of patients were in the young adult age group (26–35 years), comprising 27 patients (37.50%), and most were male, with 62 patients (86.11%). The most frequently used ARV regimen was a combination of tenofovir disoproxil fumarate (TDF), lamivudine (3TC), and dolutegravir (DTG), used by 63 patients (87.50%). A total of 18 potential drug interactions were identified, predominantly involving pharmacodynamic mechanisms, accounting for 17 cases (94.44%), while pharmacokinetic interactions accounted for 1 case (5.56%). Regarding severity, 17 cases (94.44%) were classified as moderate and 1 case (5.56%) as major, with no minor interactions identified. Conclusion: Potential ARV drug interactions among HIV patients at Puskesmas X, Jambi City, in 2025 were predominantly pharmacodynamic in mechanism and moderate in severity.

Keywords: Antiretroviral; Drug Interaction; HIV; Pharmacodynamic; Severity.

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a virus that attacks the human immune system, particularly by infecting CD4 cells (Kusuma, 2025). HIV infection can reduce immune function and increase the risk of opportunistic infections (World Health Organization, 2025a). HIV remains a global health problem, including in Indonesia and Jambi Province. Antiretroviral (ARV) therapy is administered to suppress viral replication, increase CD4 cell counts, prevent disease progression to AIDS, and reduce the risk of transmission (World Health Organization, 2025b). The long-term use of multiple ARV medications may increase the potential for drug interactions that can affect treatment efficacy and safety (Kementerian Kesehatan Republik Indonesia, 2025).

Drug interactions refer to changes in the effects of one drug resulting from the concomitant use of another drug and may occur through pharmacokinetic or pharmacodynamic mechanisms (Dinas Kesehatan Provinsi Jambi, 2022). In HIV patients, the long-term use of combination ARV therapy may increase the risk of interactions that potentially affect treatment safety and efficacy. Nabila et al. (2025) identified 35 potential drug interactions among HIV patients, while Taborat et al. (2022) reported 171 potential interactions. Meanwhile, Permatasari et al. (2020) identified 810 potential drug interactions among HIV patients at Raden Mattaher Regional General Hospital, Jambi, with moderate interactions being the predominant category. Auliafendri et al. (2025) also reported the presence of potential drug interactions among HIV patients receiving ARV therapy.

Based on these findings, this study was conducted to analyze potential ARV drug interactions among HIV patients at Puskesmas X, Jambi City, in 2025 based on the mechanisms of interaction and their severity levels.

RESEARCH METHODS

This study employed a non-experimental or observational design with a descriptive approach and retrospective design. The retrospective approach was used because the study data were obtained from previously recorded events, namely HIV patient visit records of patients receiving ARV therapy at Puskesmas X, Jambi City, during 2025. Potential drug interactions were analyzed using DrugBank, Drugs.com, and the Medscape Drug Interaction Checker. Drug interactions were classified according to pharmacokinetic and pharmacodynamic mechanisms and severity levels, namely minor, moderate, and major. Pharmacokinetic interactions involve changes in drug absorption, distribution, metabolism, or elimination, whereas pharmacodynamic interactions occur due to the effects of drugs on physiological responses without necessarily altering plasma drug concentrations (Banne et al., 2025). The severity of drug interactions was categorized as minor, moderate, or major based on their potential impact on the patient's clinical condition (Yayasan KNCV Indonesia, 2023). The data were subsequently analyzed descriptively using Microsoft Excel 2021.

Study Design

This study used a descriptive research design with a retrospective approach. The study aimed to describe potential ARV drug interactions among HIV patients based on interaction mechanisms and severity levels.

Population and Sample

The study population consisted of all patients diagnosed with HIV who received treatment at Puskesmas X, Jambi City, during 2025, totaling 251 outpatients. The sample was selected using purposive sampling based on predetermined inclusion and exclusion criteria, resulting in 72 patients (Gandhi et al., 2025).

Study Location and Period

The study was conducted at Puskesmas X, Jambi City. The research was carried out from March to June 2026, including the processes of obtaining research permission, data collection, data processing, and data analysis.

Instruments and Equipment

The research instrument was a data collection form used to record patient information based on nursing records. The data collected included age, sex, and the ARV regimen prescribed to each patient.

Data Collection Procedure

Data were collected using a questionnaire administered directly to respondents. The collected data were subsequently checked for completeness before being processed and analyzed.

Data Analysis

The data were analyzed descriptively using Microsoft Excel 2021. Quantitative data were presented in the form of tables, percentages, and descriptive explanations. Potential drug

interactions were categorized according to pharmacokinetic and pharmacodynamic mechanisms and severity levels of minor, moderate, and major (Auliafendri et al., 2025).

Ethical Approval

This study received ethical approval from the Health Research Ethics Committee of the Jambi Ministry of Health Polytechnic under approval number LB.02.06/2/959/2026.

RESEARCH RESULTS AND DISCUSSION

Research Result

The study was conducted to identify the characteristics of HIV patients receiving ARV therapy and to analyze the potential drug interactions based on their interaction mechanisms and severity levels. A total of 72 patients who met the inclusion and exclusion criteria were included in the analysis. The results of the study are presented in the following tables.

Table 1. Respondent Characteristics

Characteristic	Category	n	Percentage (%)
Sex	Male	62	86.11
	Female	10	13.89
Age	17–25 years	9	12.50
	26–35 years	27	37.50
	36–45 years	21	29.17
	46–55 years	9	12.50
	56–65 years	6	8.33
	>65 years	0	0

Based on Table 1, the majority of respondents were male, comprising 62 respondents (86.11%), and belonged to the 26–35-year age group, comprising 27 respondents (37.50%). Based on the distribution of ARV use, lamivudine (3TC) was the most frequently used ARV, administered to all 72 patients (100.00%), followed by tenofovir disoproxil fumarate (TDF) in 71 patients and dolutegravir (DTG) in 63 patients. The most frequently used combination regimen was TDF/3TC/DTG, administered to 63 patients (87.50%).

Table 2. Distribution of ARV Use

ARV Class	Drug	Number of Patients	Combination Regimen
NRTI	Tenofovir disoproxil fumarate (TDF)	71	TDF/3TC/EFV
NRTI	Lamivudine (3TC)	72	TDF/3TC/DTG
NRTI	Zidovudine (ZDV)	1	ZDV/3TC/EFV
NNRTI	Efavirenz (EFV)	9	—
INSTI	Dolutegravir (DTG)	63	—
Total		**216**	

Note: The total of 216 represents the total number of ARV drug uses, rather than the number of patients, because each patient may receive a combination of multiple ARV drugs.

The analysis of potential ARV drug interactions showed that 18 potential drug interaction cases were identified among 9 of the 72 patients. These interactions were subsequently classified according to their mechanisms and severity levels, as presented in Table 3.

Table 3. Percentage of Interaction Mechanisms and Severity Levels

Characteristic	Category	n	Percentage (%)
Interaction Mechanism	Pharmacokinetic	1	5.56
	Pharmacodynamic	17	94.44
Severity Level	Minor	0	0

	Moderate	17	94.44
	Major	1	5.56
Total		18	100

Based on Table 3, pharmacodynamic interactions were predominant, accounting for 17 cases (94.44%), while pharmacokinetic interactions accounted for 1 case (5.56%). Regarding severity, moderate interactions were the most frequently identified, with 17 cases (94.44%), followed by 1 major interaction (5.56%). No minor interactions were identified.

Table 4. Potential Drug Interactions Among HIV Patients

Interacting Drugs	Severity	Mechanism	Description
Efavirenz + Zidovudine	Major	Pharmacokinetic	Potential increase in zidovudine concentration, which may increase the risk of toxicity.
Efavirenz + Lamivudine	Moderate	Pharmacodynamic	Potential increase in hepatotoxicity due to additive effects on hepatic function.
Efavirenz + Tenofovir	Moderate	Pharmacodynamic	Potential increase in hepatotoxicity due to combined effects on hepatic function.
Tenofovir + Lamivudine + Dolutegravir	No interaction	—	No potential interaction was identified based on the drug interaction sources used in this study.

Based on Table 4, the efavirenz–zidovudine combination was classified as a major pharmacokinetic interaction, while the efavirenz–lamivudine and efavirenz–tenofovir combinations were classified as moderate pharmacodynamic interactions. Meanwhile, the TDF/3TC/DTG regimen, which was the most frequently used ARV regimen, did not show any potential drug interaction based on Drugs.com, DrugBank, and Medscape.

Discussion

The findings of this study indicate that potential ARV drug interactions were identified among HIV patients at Puskesmas X, Jambi City. Among the 72 patients, the largest proportion was in the 26–35-year age group, comprising 27 patients (37.50%), while male patients predominated, accounting for 62 patients (86.11%). The predominance of patients in the productive age group is consistent with data from the Indonesian Ministry of Health indicating that HIV cases are commonly found among individuals aged 20–49 years (Kementerian Kesehatan Republik Indonesia, 2024). The predominance of male patients is also consistent with previous studies conducted at Raden Mattaher Regional General Hospital, Jambi, and BLUD Sele Be Solu Regional General Hospital, Sorong City (Permatasari et al., 2020; Taborat et al., 2022).

The findings are consistent with Permatasari et al. (2020), who reported that patients aged 26–35 years represented the largest age group among HIV/AIDS outpatients at Raden Mattaher Regional General Hospital, Jambi, accounting for 41.94%, while male patients accounted for 70.97%. Their study also found that the most frequently used ARV combination was efavirenz, lamivudine, and tenofovir, accounting for 59.14%. Regarding ARV utilization, lamivudine (3TC) was used by all 72 patients, followed by TDF in 71 patients and DTG in 63 patients. The most frequently used ARV regimen was TDF/3TC/DTG, administered to 63 patients (87.50%). The predominance of DTG-based regimens is consistent with recommendations that place integrase inhibitors among the main therapeutic options for HIV treatment (Gandhi et al., 2025). Adherence to ARV therapy is also important for maintaining viral suppression and preventing drug resistance (Reviagana & Pertiwi, 2025).

A previous study by Permatasari et al. (2020) reported that the most frequently used ARV combination among HIV-TB outpatients at H. Abdul Manap Regional General Hospital, Jambi, was TDF+3TC+EFV, accounting for 45.45%. The differences in ARV regimens between studies may reflect differences in patient characteristics and treatment patterns. The analysis identified 18 potential drug interactions among 9 patients. Pharmacodynamic interactions predominated, accounting for 17 cases (94.44%), while pharmacokinetic interactions accounted for 1 case (5.56%). This finding is consistent with the study by Permatasari et al. (2020) at Raden Mattaher Regional General Hospital, Jambi, but differs from Nabila et al. (2025), who reported a predominance of pharmacokinetic interactions.

Regarding severity, moderate interactions were predominant, accounting for 17 cases (94.44%), while major interactions accounted for 1 case (5.56%). This finding is consistent with studies by Auliafendri et al. (2025) and Permatasari et al. (2020), which reported a predominance of moderate interactions among HIV patients. Based on the specific interactions identified, the combination of efavirenz and zidovudine was classified as a major pharmacokinetic interaction, whereas the combinations of efavirenz with lamivudine and efavirenz with tenofovir were classified as moderate pharmacodynamic interactions. Although the TDF/3TC/DTG regimen was the most frequently used regimen in this study, it did not demonstrate potential drug interactions based on Drugs.com, DrugBank, and Medscape. Although only one major interaction was identified, continued monitoring is necessary to minimize potential clinical risks and support the safety and effectiveness of ARV therapy.

Interpretation of the Main Findings

The main findings of this study showed that among 72 patients, 9 patients experienced potential drug interactions, with a total of 18 cases. Most of the interactions involved pharmacodynamic mechanisms and were classified as moderate in severity. These findings indicate that although the ARV regimens used have followed developments in HIV treatment, monitoring of potential drug interactions remains necessary. The continuous use of combination ARV therapy is an important component of HIV management; however, it may also increase the possibility of drug interactions. Therefore, the identification of potential interactions using drug information sources such as DrugBank, Drugs.com, and Medscape may assist healthcare professionals in monitoring ARV therapy.

Comparison with Previous Studies

Nabila et al. (2025) identified 35 potential drug interactions among HIV patients, predominantly involving pharmacokinetic mechanisms and moderate severity. Taborat et al. (2022) identified 171 potential drug interactions, predominantly involving minor severity and pharmacokinetic mechanisms. Meanwhile, Permatasari et al. (2020) identified 810 potential drug interactions, predominantly involving pharmacodynamic mechanisms and moderate severity. Differences in the number and patterns of potential drug interactions among studies may be influenced by differences in the number of patients, ARV regimens, concomitant medications, patient characteristics, and the methods or drug information sources used to identify interactions. Therefore, findings regarding potential drug interactions should be interpreted according to the characteristics of the study population and treatment regimen.

Limitations and Considerations

This study used secondary data obtained from patient visit records; therefore, the findings depend on the completeness and accuracy of the available documentation. In addition, this study identified potential drug interactions and therefore cannot directly establish that all identified interactions resulted in clinical events in patients. The identification of drug

interactions was performed using DrugBank, Drugs.com, and Medscape; therefore, the findings represent potential interactions based on the information available from these sources. Individual clinical conditions, such as laboratory results, organ function, treatment adherence, and other medications not included in the available data, may influence the actual clinical occurrence of drug interactions.

Recommendations for Future Research

For healthcare professionals, particularly pharmacists, optimization of the identification and monitoring of potential drug interactions is recommended among HIV patients receiving ARV therapy, particularly for moderate and major interactions. Collaboration among pharmacists, physicians, and other healthcare professionals is needed to determine appropriate management strategies to minimize the risk of drug interactions (World Health Organization, 2021). For Puskesmas X, Jambi City, the findings of this study may serve as input for improving the quality of pharmaceutical services through continuous monitoring of potential drug interactions among HIV patients receiving ARV therapy. For future researchers, studies involving larger sample sizes and broader study locations are recommended, as well as evaluation of the relationship between potential drug interactions and clinical outcomes such as adverse effects, treatment adherence, ARV treatment success, and adverse drug reactions (Auliafendri et al., 2025).

CONCLUSION

This study found that potential ARV drug interactions occurred in 9 of 72 HIV patients, with a total of 18 potential interaction cases. Based on the interaction mechanism, pharmacodynamic interactions predominated, accounting for 17 cases (94.44%), while pharmacokinetic interactions accounted for 1 case (5.56%). Regarding severity, 17 cases (94.44%) were classified as moderate and 1 case (5.56%) as major, with no minor interactions identified. These findings highlight the importance of continuous monitoring of ARV therapy to support the safety and effectiveness of HIV treatment.

BIBLIOGRAPHY

Auliafendri, N., Sinaga, A. H., & Hasibuan, N. N. (2025). Evaluasi interaksi obat antiretroviral pasien HIV-AIDS rawat inap di Rumah Sakit Umum Imelda Pekerja Indonesia Medan. *JIFI (Jurnal Ilmiah Farmasi Imelda), 8*(2), 129–136.

Banne, Y., Gurning, S. H., Brata, A., & Jannah, F. (2025). *Interaksi obat*. Perkumpulan Pendidikan dan Pelatihan Tenaga Kesehatan Progres Ilmiah Kesehatan.

Cachay, E. R. (2024). Human Immunodeficiency Virus (HIV) infection. *MSD Manual Professional Edition*.

Cachay, E. R., et al. (2024). Human Immunodeficiency Virus (HIV) infection. *MSD Manual Professional Version*.

Dinas Kesehatan Provinsi Jambi. (2022). *Profil kesehatan Provinsi Jambi*.

Gandhi, R. T., et al. (2025). Antiretroviral drugs for treatment and prevention of HIV in adults: 2024 recommendations of the International Antiviral Society-USA Panel. *PubMed*.

Kementerian Kesehatan Republik Indonesia. (2024). *Profil kesehatan Indonesia*. Kementerian Kesehatan Republik Indonesia.

Kementerian Kesehatan Republik Indonesia. (2025). *Berani tes, berani lindungi diri, Kemenkes targetkan eliminasi HIV dan IMS tahun 2030*. Kementerian Kesehatan Republik Indonesia.

Kusuma, R. (2025). Upaya pencegahan HIV pada remaja melalui edukasi di Posrem Eirin Kota Jambi. *7*(1), 15–24.

Nabila, N. A., Karim, M. A., & Akhmad, A. D. (2025). Characteristics and evaluation of potential drug interactions among HIV/AIDS outpatients: A retrospective study at primary health center in a North Lampung Regency, Indonesia. *Pharmacy Reports, 5*(1), 102.

Permatasari, J., Budi, M., & Meirista, I. (2020). Profil sosiodemografi dan terapi antiretroviral pada pasien HIV/AIDS rawat jalan RSUD Raden Mattaher Jambi periode tahun 2017–2018. *As-Syifaa Jurnal Farmasi, 12*(2), 84–90.

Permatasari, J., Budi, M., & Meirista, I. (2020). Profil sosiodemografi dan terapi antiretroviral pada pasien HIV/AIDS rawat jalan RSUD H. Abdul Manap Jambi. *Journal Pharmasci (Journal of Pharmacy and Science), 6*(2), 75–79.

Permatasari, J., Sutrisno, D., & Herdiyanti, R. (2020). Studi interaksi obat antiretroviral pada pasien HIV/AIDS rawat jalan di RSUD Raden Mattaher Jambi. *Farmasains: Jurnal Ilmiah Ilmu Kefarmasian, 7*(1), 21–25.

Reviagana, K. P., & Pertiwi, M. R. (2025). Strategi peningkatan kepatuhan pengobatan antiretroviral (SIPATUH ARV) pada orang dengan HIV AIDS (ODHIV), 212–231.

Setiadi, S., et al. (Eds.). (2014). *PAPDI: Buku ajar ilmu penyakit dalam* (Edisi ke-6). InternaPublishing.

Taborat, M., et al. (2022). Potensi interaksi obat antiretroviral (ARV) pada pasien Human Immunodeficiency Virus (HIV) dan Acquired Immune Deficiency Syndrome (AIDS) di BLUD RSUD Sele Be Solu Kota Sorong tahun 2021. *12*(3), 38–43.

World Health Organization. (2021). *Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: Recommendations for a public health approach*. World Health Organization.

World Health Organization. (2023). *HIV WHO 2023*. World Health Organization.

World Health Organization. (2025a). *Definisi HIV*. World Health Organization.

World Health Organization. (2025b). *HIV and AIDS*. World Health Organization.

World Health Organization. (2025c). *HIV terbaru*. World Health Organization.

Yayasan KNCV Indonesia. (2023). *Pencegahan, pemeriksaan, dan pengobatan HIV untuk kesehatan optimal*. Ayo Sehat, Kementerian Kesehatan Republik Indonesia.