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Evaluation of Antituberculosis Therapy In HIV/AIDS Patients at X Hospital Kudus

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ABSTRACT

Purpose: This study aimed to evaluate the use of antituberculosis drugs (OAT) in HIV/AIDS patients with tuberculosis coinfection at X Hospital in Kudus by identifying patient characteristics, patterns of OAT and antiretroviral (ARV) use, and the rationality of OAT therapy using the Gyssens method.

Research Method: This study used a descriptive evaluative design with a retrospective approach based on medical record data. The sample consisted of 41 HIV/AIDS patients with TB coinfection treated at X Hospital in Kudus during November 2024-November 2025, selected using total sampling. Data were analyzed univariately, while therapeutic rationality was assessed using the Gyssens method.

Results and Discussion: Most patients were adults (92.7%) and male (82.9%). The most common OAT regimen was RHZE (4FDC) (70.7%), while the dominant ARV regimen was TLD (95.1%). All OATs were administered orally as tablets, and the duration of therapy was appropriate in all cases. The Gyssens evaluation showed rational OAT use in 95.1% of patients and irrational use in 4.9%, with inappropriate dosage as the main problem.

Implications: These findings indicate that OAT prescribing practices were generally consistent with treatment guidelines, but body-weight-based dose adjustment still requires improvement. Further studies should explore the relationship between rational therapy, adherence, and clinical outcomes in TB-HIV patients.

Keywords: antituberculosis drugs; HIV/AIDS; tuberculosis coinfection; gyssens method; rational drug use; antiretroviral therapy.

1. Introduction

Tuberculosis or TB is still the leading cause of death among people with HIV (AIDS) worldwide. According to the Minister of Health Regulation Number 23 of 2022, Human Immunodeficiency Virus or HIV is a virus that attacks the immune system that can cause Acquired Immuno-Deficiency Syndrome. Acquired Immuno-Deficiency Syndrome or AIDS is a set of symptoms and signs of infection associated with a decrease in the immune system acquired due to HIV infection (Ministry of Health of the Republic of Indonesia, 2022). TB is among the infectious opportunistic diseases that occur during the AIDS period, which is the final stage of HIV infection (Ministry of Health of the Republic of Indonesia, 2022). Tuberculosis or TB is an infectious disease caused by bacteria known as tuberculosis Mycobacterium tuberculosis (Ministry of Health, 2025).

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TB coinfection often occurs in patients infected with the HIV virus, where people with HIV have up to 30 times the risk of contracting it compared to those who are not infected with HIV (Lelisho et al., 2022). World Health Organization (WHO) in 2023 stated that tuberculosis caused around 1.25 million deaths, 161,000 of which were HIV-positive people (WHO, 2024). Based on data from the Indonesian Ministry of Health as of January 2, 2025, there will be 17,136 cases of TB-HIV in Indonesia in 2024, which shows an increase from the Tuberculosis Information System (SITB) data in 2022 of 15,375 cases (Ministry of Health, 2025).

TB treatment is essentially dependent on drug therapy. Patients diagnosed with TB will be given Antituberculosis Drugs (OAT) as the main part of their treatment (Kustriyani et al., 2024). Antituberculosis drugs (OAT) are divided into two groups, namely the first line and the second line. First-line OATs include Isoniazid (H), Rifampicin (R), Pyrazanide (Z), Streptomycin (S) which works to kill bacteria (bactericidal), and Etambutol (E) which functions to inhibit the growth of bacteria (bacteriostatic). Meanwhile, second-line OAT is given to drug-resistant TB patients, for example Levofloxacin, Kanamisin, Amikasin and other new OAT drugs (Akhmad Rokiban, 2024). The principle of treatment of ODHA with TB is to start OAT treatment first, then continue with ARV therapy after the first 2-8 weeks of TB treatment begins (Cahyawati, 2018).

Based on previous research in Kuala Lumpur, Malaysia showed that almost half of HIV-TB patients had failed in TB treatment. A total of 235 patients with HIV TB, 136 patients (57.9%) successfully recovered and completed treatment, while 99 patients (42.1%) experienced treatment failure, including death or absence from treatment (Selimin et al., 2021). Research at Abepura Hospital, Jayapura, Papua, showed that more therapy outcomes were successful where 21.88% of patients recovered, 40.62% were complete, and 37.5% of TB patients discontinued treatment (Anggraeni et al., 2023). Meanwhile, a study at the Nekemte Special Hospital in Western Ethiopia found that 14.5% of TB-HIV patients had treatment failure (Fekadu et al., 2020).

The high problem of using OAT in HIV (AIDS) patients prompted researchers to conduct a study on "Evaluation of the Use of Antituberculosis Drugs in HIV (AIDS) Patients at Hospital X in Kudus". In this study, the evaluation of the use of OAT was carried out using the Gyssens method.

2. Literature Review and Hypothesis Development

2.1 HIV/AIDS

According to the Minister of Health Regulation Number 23 of 2022, Human Immunodeficiency Virus or HIV is a virus that attacks the immune system that can cause Acquired Immuno- Deficiency Syndrome or AIDS. AIDS is a set of symptoms and signs of infection associated with a decrease in the immune system acquired due to HIV infection (Ministry of Health of the Republic of Indonesia, 2022). HIV (Human Immunodeficiency Virus) is a virus that attacks white blood cells, especially lymphocytes, resulting in a decrease in human immunity. This virus is found in the body fluids of the sufferer, such as blood, sperm, vaginal fluid, and breast milk. People with HIV usually look healthy at first, but within 5-10 years the virus can develop into AIDS (AIDS Control Commission, 2025).

2.2 Tuberculosis

Tuberculosis or TB is an infectious disease caused by bacteria known as tuberculosis Mycobacterium tuberculosis. These bacteria spread through the air. When a TB patient coughs, sneezes, or spits, TB

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bacteria will spread into the air and can be inhaled by people around them (Ministry of Health, 2025). TB attacks the lungs as well as several systems such as the gastrointestinal, skin, central nervous system, reproductive and liver (Dewi, 2025). The Anti-Tuberculosis Drug Alloy (OAT) in Indonesia is 2RHZE/4R3H3. TB treatment consists of an intensive phase for 2 months with a combination of RHZE drugs (Rifampicin, Isoniazid, Pirazinamide and Etambutol), then followed by an advanced phase for 4 months using a combination of RH drugs (Rifampicin and Isoniazid) (Sari, 2021).

2.3 HIV/AIDS-TB coinfection

HIV and tuberculosis coinfection is a condition when a person is infected Mycobacterium tuberculosis simultaneously with the HIV virus at the same time (Kurnianda et al., 2024). Patients with HIV-TB coinfection face complex therapeutic challenges due to the interaction between Antituberculosis drugs (OATs) and Antiretroviral drugs (ARVs). The principle of TB treatment in people with HIV (AIDS) is that ARV therapy should still be given regardless of the amount of CD4. TB treatment is started first, then continued with the administration of ARVs within about two to eight weeks after that (Purnamasari et al., 2022). TB coinfection often occurs in patients infected with the HIV virus, where people with HIV have up to 30 times the risk of contracting it compared to those who are not infected with HIV (Lelisho et al., 2022). In 2023, the World Health Organization (WHO) stated that tuberculosis caused around 1.25 million deaths, 161,000 of which were HIV-positive people (WHO, 2024). Based on data from the Indonesian Ministry of Health as of January 2, 2025, there will be 17,136 cases of HIV-TB in Indonesia in 2024 which shows an increase in Tuberculosis (SITB) in 2022 by 15,375 cases (Ministry of Health, 2025).

2.4 Gyssens Method

Method Gyssens is a method for evaluating the use of antibiotics that aims to assess the appropriateness of their use. This evaluation includes the accuracy of indications, the accuracy of antibiotic selection based on its effectiveness, toxicity, cost, and spectrum, as well as the duration of administration, dose, interval, route, and time of administration (Yusuf et al., 2022).

3. Research Method

The type of research used is descriptive evaluative with a retrospective data collection method, meaning that the researcher does not intervene or change the subject of the study (Fairus et al., 2025) because it uses secondary data from the medical records of HIV (AIDS) patients with TB coinfection at Hospital X in Kudus. The population in this study is the entire medical records of HIV (AIDS) patients with TB coinfection who are treated with antibiotics at X Hospital in Kudus from November 2024 to November 2025.The sample used is the medical records of HIV (AIDS) patients with TB coinfection at X Hospital in Kudus from November 2024 to November 2025 who have met the inclusion criteria. Inclusion criteria are criteria that determine that the research subject can be used as a sample because it has met the requirements that have been set (Setyowati et al., 2021). The sampling technique used in this study is a nonpracticability sampling technique with a total sampling method. The instruments used in this study are as follows:

- The medical records of HIV (AIDS) patients with TB coinfection at X Hospital in Kudus that will be collected will be recorded and then recorded.

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- Gyssens algorithm to assess the rationality of antibiotics used by HIV (AIDS) patients with TB coinfection.
- A data collection sheet that will be required at the time of data collection.
- Supporting literature :
  a. National Guidelines for TB-HIV Management in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 23 of 2022.
  b. Technical Instructions for Logistics Management of the 2023 Tuberculosis Program.
  c. Guidelines for the Use of Antibiotics (PPAB) at RS X in Kudus in 2023.
  d. Formulary of RS X in Kudus in 2023.

Medical record data of HIV (AIDS) patients with tuberculosis co-infection at Hospital X in Kudus that have been collected were then analyzed quantitatively using the IBM SPSS Statistics program version 27.0. The data analysis used was univariate analysis.

4. Results and Discussion

4.1 Analysis Results

4.1.1 Respondent Characteristics

Based on the results of the research that has been conducted, the characteristics of the respondents are obtained as follows.

- Respondent Characteristics

  Based on the results of the study in table 1 Frequency Distribution of Respondent Characteristics, it is known that there are 41 HIV (AIDS) patients with tuberculosis coinfection who are the subjects of the study. Respondents' characteristics were analyzed based on the variables of age, gender, weight, last education, occupation and duration of illness.
- Age

  The results of the age distribution of the respondents showed that the majority of patients were in the adult age group (18-64 years), which was 38 people (92.7%), while the elderly group (>64 years) was only 3 people (7.3%). This is in line with research (Machrumnizar et al., 2025) which states that individuals of adult productive age make up the majority of HIV-TB cases globally due to high social mobility and greater risk exposure.
- Gender

  The results of this study showed that the respondents were dominated by 34 men (82.9%), while women were 7 people (17.1%). This is in line with several studies that state that men are more susceptible to HIV/AIDS with tuberculosis which is suspected to be due to a higher level of male mobility than women. This mobility is related to activities outside the home as well as risky behavior patterns such as smoking habits and nighttime activities that can disrupt the immune system so that it can reduce immunity and increase the risk of infection (Step) et al., 2024).
- Weight

  The weight characteristics showed that most of the respondents were in the range of 38-54 kg as many as 23 people (56.1%), followed by 55-70 kg as many as 13 people (31.7%), 30-37 kg 4 people (9.8%) and the least >71 kg only 1 person (2.4%). This condition shows that the majority of patients are in the middle to lower weight category. Research (Machrumnizar et al., 2025)

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shows that suboptimal nutritional status is often found in HIV patients with TB, especially because HIV and TB each other worsen health status leading to weight loss and body stamina.

- Final Education

  Based on the results of the study, the most resonance was that 16 people were out of school (39.0%), followed by 11 high school students (26.8%), elementary school 7 people (7.1%), junior high school 6 people (14.6%) and only 1 university student (2.4%). Research (Mwatenga et al., 2024) stated that low levels of education are reported as one of the factors related to the increasing incidence of tuberculosis in HIV patients which can be attributed to limited understanding of the disease, prevention and access to health information and services.

- Jobs

  The distribution of respondents' jobs is quite varied, with the majority in other categories as many as 14 people (34.1%), followed by the private sector 10 people (24.4%), 8 people unemployed (19.5%), self-employed 5 people (12.2%), civil servants and farmers 1 person each (2.4%). Research (Mwatenga et al., 2024) suggests that informal or out-of-work workers may face a greater risk of chronic infectious diseases due to a variety of socioeconomic factors.

- Duration of Illness

  The majority of respondents were 22 people (53.7%) who had experienced the disease for more than 3 months, followed by 13 people (31.7%) with a duration of 1–3 months, and 6 people (14.6%) with a duration of <1 month. This suggests that most patients have a co-infection condition that has been going on for a relatively long time at the time of data collection, which could indicate a delay in diagnosis or early treatment of TB or HIV (Machrumnizar et al., 2025).

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics		N (41)	Percentage (%)
Age	Adults (18-64 years old)	38	92,7
	Senior (>64 years old)	3	7,3
Gender	Male	34	82,9
	Women	7	17,1
Weight	30-37 kg	4	9,8
	38-54 kg	23	56,1
	55-70 kg	13	31,7
	>71 kg	1	2,4
Final Education	SD	7	17,1
	Junior High School	6	14,6
	High School	11	26,8
	College	1	2,4
	No School	16	39,0
Jobs	Not working	8	19,5
	Self-employed	5	12,2
	Others	14	34,1
	Private	10	24,4
	Student/Student	2	4,9
	PNS	1	2,4
	Farmer	1	2,4
Duration of Illness	<1 month	6	14,6
	1-3 months	13	31,7
	>3 months	22	53,7

Source: *Primary Data, Data Processing Results (2026).*

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4.1.2 Drug Use Patterns

Based on the results of the study, the pattern of drug use in HIV (AIDS) patients with tuberculosis co-infection showed that the therapy regimen had largely followed a combination of standard drugs.

Table 2. Drug Use Patterns

OAT Drug Names	Dosage (mg)	N (47)	Percentage (%)
RHZE (4FDC)	150/75/400/275	29	61,7
HR (2FDC)	150/75	9	19,1
INH	300	3	6,4
Rifampicin	450	3	6,4
Ethambutol	1000	3	6,4
ARV Drug Name	Dosage (mg)	N (41)	Percentage (%)
TLD (TDF + 3TC + DTG)	300/300/50	39	95,1
TLE (TDF + 3TC + EFV)	300/300/600	2	4,9
Number of OATs per prescription		N (41)	Percentage (%)
RHZE (4FDC)		29	70,7
HR (2FDC)		9	22,0
INH 300 mg, Rifampicin 450 mg, Ethambutol 1000 mg.		3	7,3
Length of Medication Administration		N (41)	Percentage (%)
Precise		41	100,0

Source: *Primary Data, Data Processing Results (2026)*

4.1.3 The Rationale for the Use of Antituberculosis Drugs (OAT) in HIV (AIDS) Co-Infected Tuberculosis Patients with the Gyssens Method

Based on the results of the research that has been conducted, the rationale for the use of Antituberculosis drugs (OAT) in HIV (AIDS) patients is as follows.

Table 3. The Rationale for the Use of Antituberculosis Drugs (OAT) in HIV (AIDS) Co-Infected Tuberculosis Patients with the Gyssens Method

Rationality Category	N (41)	Percentage (%)
Full data (VI)	41	100,0
AB indicated (V)	41	100,0
More effective alternatives (IVa)	41	100,0
A more unreliable alternative (IVb)	41	100,0
Cheaper alternatives (IVc)	41	100,0
Narrower alternative spectrum (IVd)	41	100,0
Giving too long (IIIa)	41	100,0
Giving too short (IIIb)	41	100,0
Precise interval (IIb)	41	100,0
Precise route (IIc)	41	100,0
Exact time (I)	41	100,0

Source: *Primary Data, Data Processing Results (2026)*

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Table 4. Rationality and Irrationality of the Use of Antituberculosis Drugs (OAT) in HIV (AIDS) Co-Infection Patients with Tuberculosis with the Gyssens Method

Categories	Precise (n=39)	Incorrect (n=2)
Dosage	39 (95,1%)	2 (4,9%)

Source: *Primary Data, Data Processing Results (2026)*

Based on Table 4, the appropriate dose category is category zero as many as 39 people (95.1%) and the inappropriate category is category IIa as many as 2 people (4.9%).

4.2 Discussion

The patterns of use of Antituberculosis Drugs (OAT), the most widely used regimen was RHZE (4FDC) dose of 150/75/400/275 mg for 29 uses (61.7%). Furthermore, it was followed by RH (2FDC) 150/75 mg for 9 uses (19.1%). The use of the drug was relatively less, namely INH 300 mg, Rifampicin 450 mg, and Ethambutol 1000 mg each for 3 uses (6.4%). The findings are in line with the National Guidelines for TB-HIV Management in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 23 of 2022, which recommends the use of OAT in the form of a combination of fixed doses (Fixed Dose Combination/FDC) in the intensive and advanced phases to improve patient adherence, reduce the risk of drug misuse, and reduce potential resistance. The guidelines also emphasize that in TB patients with HIV, the principle of the OAT regimen remains to use drug-sensitive TB therapy standards with adjustments to the monitoring of interactions with ARVs (Ministry of Health of the Republic of Indonesia, 2022).

The use of Antiretroviral Drugs (ARVs), most patients used the TLD regimen (Tenofovir 300 mg, Lamivudine 300 mg, Dolutegravir 50 mg) as many as 39 patients (95.1%) and TLE (Tenofovir 300 mg, Lamivudine 300 mg, Efavirenz 600 mg) 2 people (4.9%). Recent studies in HIV–TB coinfected patients reported that the use of dolutegravir still provided optimal viral suppression even when combined with rifampicin-based OATs, and showed better clinical outcomes than efavirenz-based regimens (Shah et al., 2025).

The number of drugs prescribed to HIV (AIDS) patients with tuberculosis coinfection shows that the majority of patients received RHZE (4FDC) as many as 29 patients (70.7%), followed by RH (2FDC) as many as 9 patients (22.0%) and a combination of drugs (INH 300 mg, Rifampicin 450 mg, Ethambutol 1000 mg) as many as 3 patients (7.3%). This is in line with research (Rosaliana & Mayasari, 2025) that a total of 92.63% received therapy in the form of 4FDC, while 4.21% of patients received 2FDC and 3.16% received loose preparations administered separately.

This study received the appropriate duration of Antituberculosis Drug (OAT) administration with the standard duration of therapy, which was 41 patients (100.0%). This shows that the duration of OAT therapy at Hospital X in Kudus has followed the provisions of the applicable TB management guidelines, namely the initial phase is given an RHZE regimen (Rifampicin, Isoniazid, Pirazinamide and Etambutol) for 2 months, then continued with the advanced phase of RH (Rifampicin, Isoniazid) for 4 months., so that the total standard duration of therapy is 6 months (Ministry of Health of the Republic of Indonesia, 2020).

All Antituberculosis Drugs (OAT) given to patients in this study were in the form of tablet preparations, namely 41 patients (100.0%). Research (Hardianita) et al., 2025) also showed that high adherence to TB medication was closely related to practical dosage forms and good therapeutic

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supervision, so the use of tablets as the main form of preparation could support therapeutic effectiveness and reduce discharge rates in TB patients. All Antituberculosis Drugs (OAT) given to patients in this study were given through the oral route, which was 41 patients (100.0%). This is in line with research (Hardianita) et al., 2025) that oral use of OATs shows a strong association with therapy success, especially when supported by patient education and monitoring of the medication process.

The evaluation of the rationale for the use of Antituberculosis Drugs (OAT) in HIV(AIDS) co-infected Tuberculosis Patients was carried out using the Gyssens method, which assesses the accuracy of antibiotic therapy in stages starting from the completeness of the data, suitability of indications, drug selection, duration of therapy, dosage and interval, route of administration to timeliness of administration. Based on the results of the evaluation in Table 9, it is known that out of 41 patients, there are 39 patients (95.1%) who are included in rational use, while 2 patients (4.9%) are included in the irrational use.

In terms of data completeness (category VI), all cases have clinical data and therapy data that are recorded in the medical record, so that the assessment process can be carried out thoroughly. In the AB category indicated (V), all OAT administration is based on the right indication, namely the diagnosis of tuberculosis in HIV (AIDS) patients. There was no provision of OAT without a clear medical basis, so it can be said that the decision to start therapy is in accordance with clinical needs and HIV-TB management guidelines. Drug selection (category IV), the regimen used is in accordance with the standard of drug-sensitive TB therapy. There are no conditions in which there are other drug options that are more effective, safer, more economical, or have a narrower spectrum. Fixed-dose combination regimens such as RHZE and RH used have been in accordance with national guidelines and hospital formularies. For the duration of therapy (category III), the duration of OAT administration in patients who are in the rational group is in accordance with the standard duration of TB treatment. No therapy was found to be given too short or too long without a clinical reason. In the dose, interval, and route (II) categories, most patients have received the appropriate dose, interval, and route of administration, with all medications administered through the oral route as per the standard of therapy. However, 2 cases (4.9%) were still found with inappropriate doses (category IIa), which caused therapy to be classified as irrational, namely in P19 patients, patients with a body weight of 51 kg were given 4 tablets of KDT, patients should have received 3 tablets of KDT, and P38 patients, patients with a body weight of 53 kg, given 5 tablets of KDT, patients should have received 3 tablets of KDT. The category of time of administration (I), the time of initiation and implementation of therapy is considered to be in accordance with the patient's clinical condition, thus supporting the effectiveness of treatment. The findings of inaccuracies in OAT dosage in this study are in line with the research (Fauziah et al., 2022) which reported that the rationality of using OAT in the right dose indicator has not reached 100%, with an accuracy of only 98.5% so that there are still patients who receive doses that are not in accordance with the patient's weight. This condition shows that although most therapies are rational, dose adjustment based on body weight still needs to be considered in TB treatment practice to make therapy more appropriate and optimal.

In general, the results of the evaluation show that the rationality level of OAT use reaches 95.1%, which means that the practice of prescribing OAT to HIV (AIDS) patients with tuberculosis co-infection at Hospital X in Kudus has been running well and in accordance with therapy guidelines. Inaccuracies are still found in only a small number of dose cases, so they can be improved to improve the quality of prescription in the future.

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5. Concluding Remarks and Recommendation

The rationality of using OAT based on the Gyssens method showed that as many as 39 patients (95.1%) were included in the rational category (0) and 2 patients (4.9%) were included in the irrational category. The inaccuracies found were in the aspect of dosage (IIa category). Overall, the indications, drug selection, duration of therapy, interval, route, and time of administration have been appropriate.

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