

The 4th International Conference on Medical Laboratory Technology (ICoMLT)

**Correlation Between Level of Compliance With Antiretroviral Medicine to Viral Load
in HIV/Aids Patients**

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ABSTRACT

Human Immunodeficiency Virus (HIV) is a disease that attacks immune cells which includes primary infection, with or without acute syndrome, asymptomatic stages, to advanced stages. Treatment for HIV infection is carried out by giving antiretroviral therapy. Compliance with taking antiretroviral drugs will affect the results of viral load examination in determining treatment. Viral load is a marker of viral replication in laboratory tests. The purpose of this study was to analyze the relationship between adherence to antiretroviral medication and viral load in HIV/AIDS patients. The research design used is the cross-sectional approach method. The study used secondary data on HIV AIDS patients who were taking TLD-type ARV therapy and carrying out viral load tests at the VCT Polyclinic at Sanjiwani Hospital, Gianyar from January to December 2022, as many as 74 people. The results showed that 60 people (81.1%) were dominantly obedient in taking antiretroviral medication. The dominant viral load test results were undetectable in 35 people (47.3%). Based on the results of data analysis, it is known that there is a relationship between the level of adherence to taking antiretroviral medication and viral load in HIV/AIDS sufferers at the VCT Polyclinic at Sanjiwani Hospital, Gianyar. The result of the correlation coefficient is 0.736 which means there is a strong relationship. This shows that adherence to taking antiretroviral drugs can determine how well antiretroviral treatment is in reducing the amount of virus in the body of HIV patients.

Keywords: Antiretrivoral; Viral Load; HIV/AIDS

BACKGROUND

Human Immunodeficiency Virus (HIV) is a disease that attacks immune cells, encompassing primary infection, with or without acute syndrome, asymptomatic stages, and advanced stages. This virus has the ability to invade and damage CD4 T lymphocytes and several other immune cells that have CD4 receptors, leading to a breakdown of the patient's immune system, making them vulnerable to various opportunistic infections and malignancies. Individuals infected with HIV will experience a decline in the number of leukocytes, CD4 T lymphocytes, macrophages, neutrophils, and NK cells.

The emergence of opportunistic infections in HIV/AIDS patients is due to the gradual decrease in CD4 lymphocyte counts. Opportunistic infections generally arise when the CD4 lymphocyte count falls below 200/mm³ or lower. The skin often becomes the first organ affected during the course of HIV/AIDS (Developed by the National Institutes of Health 2021).

HIV transmission methods are categorized as common and uncommon. Common transmission methods include unprotected sexual intercourse, sharing needles, pregnancy, childbirth, breastfeeding, and working in healthcare

settings. Uncommon transmission methods include oral sex, blood transfusions, the use of sex toys, eyebrow embroidery, eyebrow tattoos, lip tattoos, blood donations, and organ transplants. The incubation period for HIV ranges from 3 to 6 months, developing into HIV positivity within 3 to 10 years, and potentially progressing to AIDS within 1 to 2 years (Vanhems et al. 2000).

AIDS stands for "Acquired Immune Deficiency Syndrome." Acquired means it is not inherited but contracted. Immune refers to the immune system. Deficiency refers to a lack or weakness, and Syndrome refers to a collection of symptoms rather than a single symptom. AIDS refers to a collection of symptoms resulting from the weakening of the immune system that develops after birth due to HIV infection, representing the final stage of HIV infection (Bekker et al. 2023).

Antiretroviral drugs (ARVs) are administered for the treatment of HIV infection. ARVs reduce the risk of HIV transmission, slow the progression of opportunistic infections, improve the quality of life for HIV patients, and reduce the viral load in the blood to undetectable levels (Moraes, Oliveira, and Costa 2014). Antiretroviral therapy during the acute phase can significantly reduce the transmission of infection to others, improve infection markers, alleviate disease symptoms, lower viral titers, reduce the viral reservoir, suppress viral replication, and preserve immune function (Filatova, Klyachko, and Kudryashova 2018).

Generally, the first choice of ARV for adolescents and adults is Tenofovir, Lamivudine, and Dolutegravir (TLD). The advantages of TLD include smaller tablets for easier consumption, faster viral suppression, milder side effects, a lower likelihood of therapy failure, and fewer drug interactions. TLD can be taken before or after meals. However, the side effects of TLD may include central nervous system disorders (such as nightmares, depression, confusion, hallucinations, dizziness),

nausea, liver dysfunction, gynecomastia (enlarged breasts in men), and increased fat levels in the blood. TLD is prescribed for newly diagnosed HIV patients (new clients), those experiencing severe side effects from other medications, and those with treatment failure on other drugs. The gold standard for assessing treatment success is viral load testing (Chimukangara et al. 2021; Mounika et al. 2022).

Viral load (VL) refers to the amount of HIV in the blood, measured in copies per milliliter. Viral load is one of the markers of viral replication in laboratory tests. Plasma viral load testing is now widely used in clinical practice, as it is a more specific parameter for measuring risk (Council 2021; Panel on Antiretroviral Guidelines for Adults and Adolescents 2024).

Adherence to ARV medication affects VL test results, and doctors will assess treatment based on this test. Simple monitoring by healthcare providers includes measuring the patient's weight. Monitoring the side effects of ARV treatment can be done through regular blood tests, liver function tests, kidney function tests, or as needed. Body weight typically increases if ARV treatment is effective, but VL testing is still required to confirm this.

The relationship between ARV medication adherence and VL testing results influences VL outcomes. VL testing is mandatory at 6 and 12 months after starting ARV treatment, and then annually. If the VL result is < 1000 copies/ml, it is considered suppressed (good). If the VL result is > 1000 copies/ml, it is considered unsuppressed (not good), necessitating further evaluation of treatment adherence and other factors (Song et al. 2023). Based on this background, the author is interested in analyzing the relationship between adherence to antiretroviral medication and viral load in HIV/AIDS patients at the VCT Clinic of Sanjiwani Gianyar General Hospital

RESEARCH METHODS

This study employs a cross-sectional approach, which is a method that describes a particular state or situation. The research and data collection were conducted at the Sanjiwani Gianyar General Hospital Laboratory from February to March 2023. The research sample consists of HIV/AIDS patients undergoing TLD-type ARV therapy and viral load testing at the VCT Clinic of Sanjiwani Gianyar General Hospital from January to December 2022.

The data obtained in this study were analyzed using descriptive and bivariate analysis. Descriptive analysis was conducted by examining the characteristics of the respondents, patient adherence levels, and viral load results. Subsequently, the data were analyzed using bivariate analysis to assess the relationship or correlation between two variables using statistical tests. Bivariate analysis was employed to investigate the relationship between two variables: the independent and dependent variables. In this study, the relationship between these two variables is the adherence to medication and the viral load. The relationship between the independent and dependent variables was analyzed using Spearman's rho test at a 95% confidence level, as the data are nominally scaled.

RESULTS

The characteristics of the respondents obtained in this study are based on gender and age. The characteristics of the respondents are as follows:

Table 1. Respondents' Characteristics Based on Gender

Characteristics	Number of Respondents	Percentage (%)
Gender		
Male	47	63,5
Female	27	36,5
Total	74	100

In Table 1, the respondents' characteristics based on gender show that 47 respondents (63.5%) are male, and 27 respondents (36.5%) are female. Thus, the total number of male and female respondents in this study is 74 patients.

Table 2. Respondents' Characteristics Based on Age Group

Characteristics	Number of Respondents	Percentage (%)
Age Group		
0 – 10 years	6	8,1
11 – 20 years	3	4,1
21 – 30 years	16	21,6
31 – 40 years	13	17,6
41 – 50 years	24	32,4
51 - 60 years	12	16,2
Total	74	100

In Table 2, the respondents' characteristics based on age group show that 6 respondents (8.1%) are aged 0–10 years, 3 respondents (4.1%) are aged 11–20 years, 16 respondents (21.6%) are aged 21–30 years, 13 respondents (17.6%) are aged 31–40 years, 24 respondents (32.4%) are aged 41–50 years, and 12 respondents (16.2%) are aged 51–60 years. The highest number of respondents falls within the 41–50 years age group.

The test performed in this study was the hemoglobin level before and after administering Fe tablets to pregnant women in their third trimester. The hemoglobin test results before and after administering Fe tablets can be seen in the following table:

Table 3. Respondents' Adherence to Antiretroviral Medication Based on Gender

Gender	Adherence			
	Number (People)	Percentage (%)	Number (People)	Percentage (%)
Male	37	50,00	10	13,51
Female	24	32,43	3	4,06

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Total	61	82,43	13	17,57

Based on Table 3, the results show that 37 male respondents (50.00%) adhered to antiretroviral medication, while 10 male respondents (13.51%) did not adhere. Among female respondents, 24 (32.43%) adhered to antiretroviral medication, while 3 (4.06%) did not adhere.

Table 4. Respondents' Adherence to Antiretroviral Medication Based on Age Group

Age Group	Adherence			
	Adherence		Non-Adherence	
	Number (People)	Percentage (%)	Number (People)	Percentage (%)
0–10 years	5	6,8	1	1,4
11–20 years	2	2,7	1	1,4
21–30 years	14	18,9	2	2,7
31–40 years	11	14,9	2	2,7
41–50 years	18	24,3	6	8,1
51-60 years	10	13,5	2	2,7
Total	60	81,1	14	18,9

Based on Table 4, the adherence to antiretroviral medication among respondents aged 0–10 years is 5 people (6.8%), with 1 respondent (1.4%) not adhering. Among respondents aged 11–20 years, 2 people (2.7%) adhered, and 1 (1.4%) did not adhere. For those aged 21–30 years, 14 people (18.9%) adhered, and 2 (2.7%) did not. Among respondents aged 31–40 years, 11 people (14.9%) adhered, and 2 (2.7%) did not. Among those aged 41–50 years, 18 people (24.3%) adhered, while 6 (8.1%) did not. In the 51–60 years

age group, 10 people (13.5%) adhered, while 2 (2.7%) did not.

Table 5. Viral Load Test Results of HIV/AIDS Patients

Adherence	Number (People)	Percentage (%)
Undetectable	35	47,3
< 40	25	33,8
< 50	14	18,9
Total	74	100

Based on Table 5, the viral load test results show that 35 respondents (47.3%) had undetectable viral loads, 25 respondents (33.8%) had viral loads < 40, and 14 respondents (18.9%) had viral loads < 50.

The research data were statistically analyzed using the Statistical Product and Service Solutions (SPSS) version 25.0 program. The test used was Spearman's rho test because the data are ordinal. The data analysis results are shown in the following table:

Table 6. Data Analysis Results

	<i>Spearman's rho</i>	Correlation Coefficient
Adherence	0.000	0.736
Viral load		

Based on the table above, the p-value is 0.000, indicating that the p-value is < 0.05. This means that H_a is accepted and H_0 is rejected, indicating a significant relationship between adherence to antiretroviral medication and viral load among HIV/AIDS patients at the VCT Clinic of Sanjiwani Gianyar General Hospital. The correlation coefficient is 0.736, indicating a strong relationship.

DISCUSSION

Adherence to Antiretroviral Medication in HIV/AIDS Patients at the VCT Clinic of Sanjiwani Gianyar General Hospital

In this study, the results showed that 81.1% of patients adhered to antiretroviral medication. Research conducted by (O'Halloran Leach et al. 2021), indicates that at least a 95% adherence rate is required for effective antiretroviral therapy in HIV/AIDS patients. In his study, O'Halloran Leach measured adherence by monitoring whether the patients had consumed all their prescribed medication or if any doses were missed. A 95% adherence rate can be illustrated as follows: if an HIV/AIDS patient is required to take medication twice a day, they should consume 60 pills in a month (100% adherence). If a patient only consumes 57 out of 60 pills, their adherence rate is classified as 95%. When interpreted using the MMAS (Morisky Medication Adherence Scale), 95% adherence would classify the patient as having moderate adherence (with a maximum of two missed doses per month).

This study aligns with research by (Manuaba and Yasa 2017), which showed that 70 patients (77.8%) had high adherence to antiretroviral medication at the VCT Clinic of Sanglah General Hospital. However, it contrasts with the study by Andriani, Rika, and Sandhita (2014), which reported a lower adherence rate of 26.67%.

Based on this explanation, the researcher's opinion is that every HIV patient must adhere to antiretroviral therapy. Non-adherence to antiretroviral therapy can lead to drug resistance, causing the medication to become ineffective or the treatment to fail. Before starting antiretroviral therapy, the patient's willingness to commit to the therapy must be clearly established. A treatment plan should be devised, understood, and agreed upon by the patient to ensure consistency in adhering to the therapy, as this treatment is lifelong. Therefore, it is essential for patients to fully assess their readiness before beginning antiretroviral therapy.

Viral Load in HIV/AIDS Patients at the VCT Clinic of Sanjiwani Gianyar General Hospital

The study results showed that the majority of patients had a favorable viral load, with 47.3% being undetectable. This finding aligns with the study by Arifa, Tursinawati, and Wahab (2022), which reported a 100% favorable viral load. The mechanism of action of ARV drugs involves inhibiting HIV reverse transcriptase, thereby halting the growth of DNA chains and stopping HIV replication. It also inhibits the transcription of HIV RNA into DNA—an essential step in the virus replication process—and inhibits HIV protease, which prevents the maturation of infectious HIV viruses (Maritati et al. 2020; Marra et al. 2024).

The rising trend of HIV cases year after year is largely due to the fear among at-risk groups of getting tested, as a reactive result may lead to social exclusion. People living with HIV often fear disclosing their HIV status and delay seeking treatment when they fall ill, which worsens their health and makes HIV transmission harder to control.

Analysis of Antiretroviral Medication Adherence and Viral Load in HIV/AIDS Patients at the VCT Clinic of Sanjiwani Gianyar General Hospital

The study results showed that the proportion of male respondents was higher than that of female respondents, with males accounting for 63.5%. The higher proportion of males with HIV is assumed to be due to a greater number of men engaging in risky sexual behavior and using injected drugs (IDUs), compared to women, who are more likely to acquire HIV from their sexual partners.

According to (Yusri, Muda, and Rasmaliah 2013), cited in (Pramesyanti, Mustafa, and Bustamam 2020), of 163 cases transmitted through sexual intercourse, the majority were males, with 119 individuals (73.0%). Similarly, among 58 cases transmitted through blood and

blood products, the highest proportion was male, with 45 individuals (77.6%). There is also a difference between men and women in terms of health maintenance, as women tend to be more health-conscious and more likely to seek medical treatment compared to men. Another study by (Busch, Bloch, and Kleinman 2019) also found that male respondents were more dominant than female respondents, accounting for 53.33%.

The findings of this study show a relationship between adherence to antiretroviral medication and viral load in HIV/AIDS patients at the VCT Clinic of Sanjiwani Gianyar General Hospital. This indicates that adherence to antiretroviral medication significantly influences how effectively the treatment reduces the viral load in HIV patients. When adherence to ARV medication is low or when patients are non-compliant, the therapy becomes less effective, and the virus may develop resistance to ARV drugs.

This study is consistent with research by (Fuge, Tsourtos, and Miller 2022), which showed a significant relationship between adherence to antiretroviral medication and viral load in HIV patients. Another study by (Manuaba and Yasa 2017) also found a statistically strong correlation between adherence and CD4 counts in HIV/AIDS patients at the VCT Clinic of Sanglah General Hospital. However, this study contrasts with the findings of (Andriani et al. 2014), which found no relationship between adherence to antiretroviral medication and an increase in CD4 counts among people living with HIV in Lancang Kuning, Pekanbaru, in 2014.

CONCLUSION

The adherence rate to antiretroviral medication among HIV/AIDS patients at the VCT clinic of Sanjiwani Gianyar General Hospital shows that 60 respondents (81.1%) adhered to taking antiretroviral drugs, while 14 respondents (18.9%) did not. The viral load test results for these

patients indicated that 35 patients (47.3%) had undetectable viral loads, 25 patients (33.8%) had viral loads of <40, and 14 patients (18.9%) had viral loads of <50. There is a correlation between adherence to antiretroviral medication and viral load in HIV/AIDS patients at the VCT clinic of Sanjiwani Gianyar General Hospital, with a correlation coefficient of 0.736, indicating a strong relationship

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