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ORIGINAL ARTICLE

STUDY OF SUPPRESSION OF HIV VIRAL LOAD AMONG PEOPLE RECEIVING ANTIRETROVIRAL THERAPY IN PALEMBANG CITY

Studi Penekanan Viral Load HIV Pada Orang Yang Mendapat Terapi Antiretroviral di Kota Palembang

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ABSTRACT

Background: Suppression of viral load is a targeted strategy for preventing HIV transmission. Viral load (VL) testing can be done at all health centers in Palembang City with free services. **Purpose:** This study aims to evaluate VL suppression and factors associated with VL suppression. **Methods:** The study design of this research was a cross-sectional study with data analysis using the Chi-square and binomial logistic regression tests. The population in this study was all HIV patients who accessed health services for VL testing. Data sources were obtained from the HIV/AIDS Information System (SIHA) for the period 2023–June 2024. **Results:** The majority of PLHIV cases were male (1072 people) (83%) and unmarried (802 people) (62.1%). The transmission group was male-sexual males, 54.88%, with an average age of 36.62 years. The results of multivariate analysis showed that there were three variables associated with viral load levels, namely age with a p-value <0.03, AOR = 1.59 (95% CI: 1.04-2.43), ARV adherence with a p-value < 0.00, AOR = 1.76 (95% CI: 1.18-2.61), and clinical stage with a p-value < 0.04, AOR = 1.02 (95% CI: 1.02-2.07). **Conclusion:** Adherence to ART therapy, prevention of opportunistic infections, and early detection of clinical stage are predictors of successful viral load suppression. The role and responsibility of the community and the active participation of health workers in early detection, treatment, and care are needed.

ABSTRAK

Latar Belakang: *Penekanan viral load merupakan strategi pencegahan penularan HIV yang terarah. Tes viral load (VL) dapat dilakukan di seluruh Puskesmas di Kota Palembang dengan pelayanan gratis.* ***Tujuan:*** *Penelitian*

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ini bertujuan untuk mengevaluasi penekanan VL dan faktor-faktor yang berhubungan dengan penekanan VL. ***Metode:*** *Desain penelitian pada penelitian ini adalah studi cross-sectional dengan analisis data menggunakan uji Chi-square dan uji regresi logistik binomial. Populasi dalam penelitian ini adalah seluruh penderita HIV yang mengakses layanan kesehatan untuk pemeriksaan VL. Sumber data diperoleh dari Sistem Informasi HIV/AIDS (SIHA) periode 2023 – Juni 2024.* ***Hasil:*** *ODHIV mayoritas berjenis kelamin laki-laki sebesar 83%, belum menikah sebesar 62,1%. kelompok penularannya adalah laki-laki berjenis kelamin laki-laki sebanyak 54,88% dengan rata-rata usia 36,62 tahun. Hasil analisis multivariat menunjukkan terdapat 3 variabel yang berhubungan dengan tingkat viral load yaitu usia dengan p-value <0,03, AOR = 1,59 (95% CI: 1,04-2,43), kepatuhan ARV dengan p-value < 0,00, AOR = 1,76 (95% CI: 1,18-2,61), dan stadium klinis dengan p-value < 0,04 AOR = 1,02 (95% CI: 1,02-2,07).* ***Simpulan:*** *Penekanan viral load merupakan penanda penting keberhasilan terapi pada ODHIV. Kepatuhan terhadap terapi ART, pencegahan infeksi oportunistik, dan deteksi dini stadium klinis merupakan prediktor keberhasilan penekanan viral load. Oleh karena itu, diperlukan peran dan tanggung jawab masyarakat serta partisipasi aktif petugas kesehatan dalam deteksi dini, pengobatan dan perawatan.*

INTRODUCTION

The United Nations Programme on HIV/AIDS (UNAIDS) Fast-Track Joint triple 95% approach is that 95% of all people living with HIV (Suppressing HIV replication) know their HIV status (diagnosed), must start taking ART, and PLHIV on antiretroviral (ART) must achieve continuous treatment. Implementation of this program is a target for suppressing the virus by 2030 with an implementation system in the field without discrimination (1,2). The United Nations Programme on HIV/AIDS (UNAIDS) Fast-Track Joint triple 95% approach is that 95% of all people living with HIV (Suppressing HIV replication) know their HIV status (diagnosed), must start taking ART, and PLHIV on antiretroviral (ART) must achieve continuous treatment. Implementation of this program is a target for suppressing the virus by 2030 with an implementation system in the field without discrimination (3).

HIV depletes CD4 cells, making people with HIV vulnerable to diseases that a healthy immune system should be able to prevent (4). A key indicator important for monitoring HIV treatment response with anti-retroviral therapy (ART) is plasma HIV viral load (VL) (5).

Suppressing HIV replication can prevent transmission to other people, increasing the body's immunity, which can prevent the risk of severe illness and even the risk of death. Suppression of this virus can also prevent the disease from progressing to the advanced stages of AIDS. Suppressing HIV replication is an essential marker of therapeutic success in PLHIV. Viral load is considered suppressed when < 50 copies/ml plasma and not suppressed when ≥ 50 copies/ml plasma. Globally, the scale-up of HIV treatment continues to increase, and by 2021, 38.4 million people worldwide will be on long-term antiretroviral therapy (ART) (4,5).

Monitoring antiretroviral treatment (ART) adherence is essential to prevent treatment failure. Coverage of antiretroviral therapy (ART) for PLHIV has increased access to HIV treatment and brought about a significant change in the natural course of HIV disease (6,7). The use of antiretroviral therapy (ART) has significantly increased the life expectancy of HIV patients (8). Commonly used methods of assessing adherence are self-reported adherence, regularity of taking medication according to the number of pills, and regular return to take medication if the medication has run out (9). An important parameter to determine the effectiveness of ARV success is the suppression of viral load (VLS) (10).

Adult HIV patients on non-nucleoside reverse-transcriptase inhibitor (NNRTI)-based first-line therapy experience drug resistance between 50% and 97%. HIV that replicates due to antiretroviral drugs that inhibit the ability of certain drugs or a combination of drugs that can block viral

replication is a condition of HIV Drug Resistance (HIVDR) (11,12). Some of the factors that influence the success of ARVs are increased availability and accessibility of viral load (VL) testing services, supportive care policies, health worker support, treatment adherence, counselling adherence and preventing opportunistic infections (OI) (13–16).

Viral suppression remains a significant challenge among PLHIV in developing and emerging countries. Scaling up HIV treatment that is accompanied by solid assessment, reducing the risk of drug resistance and preventing the risk of transmission to other people is essential. Therefore, this research was designed epidemiologically to determine the predictor variables that influence the success of suppressing viral load in PLHIV who receive antiretroviral therapy in Palembang City.

METHODS

Research ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Public Health, Sriwijaya University Number 197/UN9:197/UN9.FKM/TU.KKE/2024. This research was designed as a quantitative study with a cross-sectional study design. The population of this research study were HIV sufferers who accessed health services for viral load (VL) checks. Data on people living with HIV who were recorded as undergoing treatment at SIHA was 1,606. Data is obtained from various health facilities providing HIV treatment; then, health workers report patient data to the SIHA system. The data that had been collected was then checked for data completeness for further analysis. Incomplete data was excluded, so the total data analyzed was 1,292.

The data were analyzed univariately to find out the description of each variable. Bivariate analysis was continued using the Chi-square test to determine the relationship between predictor variables and viral load. To determine the most dominant variables as predictors of viral load and to control potential confounders, a multivariate test was carried out with multiple logistic regression where a significance level of 5% was considered to predict viral load. The dependent variable was viral load level, which was divided into two categories based on the examination results: suppressed and non-suppressed. Viral load was suppressed if the viral load level was < 50 copies/ml and not suppressed if ≥ 50 copies/ml (5).

RESULTS

The results of data analysis based on gender showed that the majority of PLHIV were male at 83%. The characteristics of respondents based on marriage were found that the majority of respondents were not married, which amounted to 62.1%. HIV transmission was obtained from several groups, namely male-sexual men 54.88%, partners of PLHIV 14.47%, the general population 13.78%, Injection Drug Use (IDUs) 4.02% and customers of sex workers 3.63%. The average age of the respondents was 36.62 years, and they had varying job characteristics. Respondents with HIV were mostly private sector employees. The results of this study also showed that many respondents did not want to admit the type of work where in Table 1 it was mentioned as work and others at 25.70% and PLHIV who did not work at 40.80%. (Table 1)

Table 2 shows that age (p-value 0.03), ARV adherence (p-value 0.02), opportunistic infections (p-value 0.01), and clinical stage (p-value 0.04) were significantly associated with viral load (VL). Nevertheless, gender and ARV Side Effects and duration of ART are not related to viral load.

Table 3 shows the results of multivariate analysis where there are three variables associated with viral load levels of PLHIV on treatment, namely age with a p-value < 0.03: AOR = 1.59 (95% CI: 1.04-2.43), ARV adherence with a p-value < 0.00: AOR = 1.76 (95% CI: 1.18-2.61), and clinical stage with a p-value < 0.04 with AOR = 1.02 (95% CI: 1.02-2.07). Of the three variables that are predictors of viral load levels of PLHIV on treatment, the most dominant variable affecting viral load levels of PLHIV is a clinical-stage with an AOR of 1.76, which means that PLHIV who are not compliant with treatment have a risk of 1.76 times to experience unsuppressed viral load levels compared to PLHIV who are on regular treatment.

Table 1
Distribution of Sociodemographic Characteristics

Sociodemographic Characteristics	n	%
Age (years) Mean	36.62	
Age (years)		
>30 Years	949	73.50
≤ 30 Years	343	26.50
Gender		
Male	1,072	83.00
Female	220	17.00
Marital Status		
Unmarried	802	62.10
Married	430	33.30
Divorce while living	36	2.80
Divorce by death	24	1.90
Jobs		
Private Employee	135	10.40
Entrepreneur	124	9.60
Housewife	50	3.87
Civil Servants	35	2.70
Non-medical professionals	31	2.40
Students	21	1.50
Laborer	14	1.00
Medical Professionals	13	1.00
Sex Workers	3	0.20
Driver	2	0.15
Sailor	1	0.15
Farmer	1	0.08
Other	333	25.70
Unemployed	527	40.80
Population Group		
Men Sex Men	709	54.88
PLHIV Couple	187	14.47
General Population	178	13.78
High Risk Couple	73	5.65
IDUs	52	402
Sex Worker Customers	47	3.64
Tuberculosis Patients	17	1.32
Sex Workers	13	1.01
Transgender	10	0.77
Pregnant Woman	6	0.46
Viral Load		
Suppressed	1,153	87.84
Not suppressed	157	12.16

DISCUSSION

The results of the study showed that HIV patients undergoing treatment mostly experienced viral load suppression, with 1153 people (87.84%). Based on multivariate analysis with multiple logistic regression, three variables that influenced viral load suppression were obtained: age, ARV compliance, and clinical stage. Compliance with taking medication, maintaining a healthy diet, and a lifestyle that is in accordance with the recommendations of health workers are essential parts and indicators of antiretroviral adherence. Adherence to treatment with this new combination regimen further enhances suppression of viral replication, resulting in immune solid reconstitution and can prevent chronic disease (17,18). The results of this study showed a suppression of viral load for PLWHIV by about 87.84 %. To suppress the virus, HIV treatment called antiretroviral therapy (ART) is required. Sustained reduction of peak plasma viral load and immune restoration are the main goals of ART (19).

HIV treatment with antiretroviral drugs (ARVs) is lifelong, hence the need to support access to care and adherence. HIV patients who do not adhere to treatment will have a negative impact on their health, such as experiencing depression, comorbidities appearing, the disease getting worse and even death. Viruses that are stressed over prolonged, sustained therapeutic drug concentrations constitute a Long-term drug regimen (LA). Therefore, therapeutic compliance of less than 89% must be avoided so as to avoid the risk of non-suppression of VL (20).

Preventing transmission of HIV to other people can be prevented by continuous viral suppression and also reducing the risk of opportunistic infections (21). The increasing severity of HIV disease, which can even result in death for sufferers, can be attributed to opportunistic infections (22). Children with HIV who develop opportunistic infections are at an advanced stage of disease with a greater risk of death from infection (23). The results of this study revealed that opportunistic infections experienced by HIV patients are syphilis, tuberculosis, oral candidiasis and angular cheilitis. People with uncontrolled viral load have more opportunistic infections. The higher the clinical stage of HIV, the more opportunistic infections are experienced.

The results of this study showed that people with HIV with early clinical staging had lower viral loads with higher clinical staging. This study is in line with Widiyanti et al (24) who stated that the clinical stage and progression of HIV are related to CD4 and viral load. Clinical staging of people living with HIV recognized early achieves virologic suppression by 87.84 % (25). HIV diagnosis needs to be done as early as possible to prevent severe

morbidity, risk of further transmission and even death. Untreated HIV results in unsuppressed viral replication and progresses to higher clinical stages (26).

Table 2
Bivariate Analysis to Determine The Association Between Predictors and Viral Load

Variable	Variable category	Viral Load				*p-value*
		Non-Suppression		Suppression		
		n	%	n	%	
Age	>30 Years	127	13.40	822	86.60	0.03
	≤ 30 Years	30	8.70	313	91.30	
Gender	Male	127	11.80	945	88.20	0.53
	Female	30	13.60	190	86.40	
ARV Side Effect	Yes	8	16.00	42	84.00	0.53
	No	149	12.00	1,093	88.00	
ARV Adherence	Poor Adherence	41	16.50	208	83.50	0.02
	Good Adherence	116	11.10	927	88.90	
Opportunistic Infections	Yes	74	15.00	419	85.00	0.01
	No	83	10.40	716	89.60	
Clinical Stage	Advanced Stage	61	15.00	347	85.00	0.04
	Early Stage	96	10.90	788	89.10	
Duration on ART	≤ 12 Months	13	15.10	73	84,90	0.48
	>12 Months	144	12.20	1,062	88.10	

Table 3
Multivariable Analysis Logistic Regression Modeling

Variable	β	*p-value*	OR	95% CI	
				Lower	Upper
Age	0.46	0.03	1.59	1.04	2.43
ARV Adherence	0.56	0.00	1.76	1.18	2.61
Clinical Stage	0.37	0,03	1.02	1.02	2.07

Human Immunodeficiency Virus (HIV) with advanced stages leads to Acquired Immunodeficiency Syndrome (AIDS), where a progressive destructive process takes place that is complicated by the development of comorbidities, clinical stages and an unsuppressed viral load (27,28) and missed early detection results in greater risk for sufferers. The stigma they continue to face also results in patients with HIV avoiding testing. Therefore, community awareness and responsibility and active participation of health workers in treatment and care are needed. Good cooperation between patients, communities and health services is essential so that delayed diagonalization can be prevented, viral load can be reduced, the burden of care can be reduced, and quality of life can be improved (25).

CONCLUSION

The factor that most contributes to suppressing viral load in people with HIV is treatment adherence. The viral load needs to be suppressed for people living with HIV. Increasing access to health services is needed in VL monitoring so that treatment compliance can be implemented. Effective and sustainable interventions to address non-suppressed VL could be developed in the future.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

ASV: Draft Preparation, Data Analysis: RJS: Conceptualization, Methodology, and Writing: N: Correcting the draft article, proofreading.

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