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Factors associated with adherence to anti-retroviral therapy among adult males living with HIV in Lira regional referral hospital, Lira city, northern Uganda. A cross-sectional study.

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Abstract

Background

The use of anti-retroviral therapy (ART) in the management and prevention of the HIV/AIDS epidemic is an accepted strategy. This study aims to assess the level of adherence and factors associated with adherence to ART among Adult males living with HIV in Lira Regional Referral Hospital.

Methodology

A cross-sectional study that assessed self-reported treatment adherence among adult males living with HIV who are accessing drugs for the treatment from LRH. Random sampling was employed to select 380 participants, and data were collected using a questionnaire and entered into SPSS software for analysis.

Results

341 respondents participated in this study, 58.7% aged between 18 and 30 years, 24% were in the range of 31-45 years, 17.0% between 46 and 60 years, and a mere 0.3% aged 61years and above. Non-adherence to ART was perceived to result from individual factors such as forgetfulness, alcohol abuse, disclosure, knowledge about HIV and its treatment, among others, and health system-related factors such as distance to the health facility, waiting time at the facility, relationship with the healthcare provider, and privacy, among others. Most respondents (49.9%) take one pill daily, with 31.7% taking two pills, 18.2% taking more than two, and 0.3% not taking any pills. Weekly adherence data showed that 39.0% never miss a dose, while others miss one (23.5%), two (20.5%), or more than two doses (17.0%) per week. This results in 43.1% of respondents having good weekly adherence and 56.9% having poor adherence. Monthly adherence reveals that 37.5% never miss a dose, but 4.1% miss one dose, 15.5% miss two doses, and 42.8% miss more than two doses, leading to 46.9% good adherence and 53.1% poor adherence monthly.

Conclusion

Non-adherence to ART was attributed to 48 various factors, such as alcohol consumption, forgetfulness, and stigma.

Recommendation

Healthcare providers should minimize waiting times in healthcare facilities to improve adherence.

***Keywords**: Adherence, Antiretroviral therapy, Lira Regional Referral Hospital, Lira City.*
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Background of the study

The HIV/AIDS pandemic has remained a major global public health problem. Globally, 84.2 million people have been infected with HIV, and about 40.1 million (33.6-48.6 million) people have died of HIV since the start of the epidemic to the end of 2021 (Buh et al., 2023). Sub-Saharan Africa has experienced the highest burden of HIV, where 20.7 million people were found to be living with the virus in Eastern and Southern regions by the end of 2019 (Adrawa et al., 2020). Uganda is one of the countries in sub-Saharan Africa with the highest burden of HIV infection. The prevalence of HIV in Uganda translated to about 1.3 million people in 2021, and 37% of all the new infections were in the youth between 15 to 24 years (Twekambe et al., 2023). Uganda has 1 4 million people living with HIV, with an adult prevalence of 5.2%. The UPHIA report for 2020 shows that 80.9% of the HIV infected people in Uganda are on ART. Despite this high percentage being on treatment, there are still low adherence rates to ART. Research has shown that ART adherence level in Uganda is low among PLWH, with only 66% reporting the desired adherence outcomes (UPHIA-Summary-Sheet-2020.Pdf). In rural areas, adherence rates are much lower, with only 55% adhering to their medication (Nabunya et al., 2020). There is limited research that gives comprehensive information on the factors that affect adherence to ART among HIV adult males in Northern Uganda. Adherence is the extent to which a person's behavior in taking medications corresponds with the agreed recommendation from a health care provider. Rates of adherence for individual patients are usually reported as a percentage of the prescribed doses of medication actually taken by the patient over a specific period. Adherence to antiretroviral therapy is an essential component of individual and programmatic success, and adherence rates exceeding 95% are necessary to maximize the benefit of ART, as it is crucial for the suppression of viral replication, thus avoiding the development of drug resistance and ensuring the prevention of transmission in discordant couples (Anyaike et al., 2019). Introduction of ART improves the survival of individuals infected with HIV by delaying the progression of the infection to AIDS, since there is no cure for HIV. The success of ART, however, is dependent on the adherence of an individual to the medication process as per the prescribed regimen of treatment. Globally, around 33.5 to 38% of HIV infected adults have exhibited non-adherence due to treatment regimens of ART, with the rates of non-adherence in India varying from 14% to 86%. (Adherence to Antiretroviral Therapy and Its Effect on Survival of HIV-Infected Individuals in Jharkhand, India | PLOS ONE). The most important factor that determines the success and long-term viral suppression of antiretroviral therapy is adherence. Failure to adhere to ART results in HIV related morbidity and mortality and increases the risks of emerging HIV strains that are drug-resistant. (Legesse & Reta, 2019). Regardless of the clinical and immunologic status of PLHIV, the World Health Organization has recommended that they be initiated on ART to end the HIV pandemic. (Lubega et al., 2022). Low ART adherence can result in increased viral replication, rapid disease progression, reduced life quality, and even premature mortality. Therefore, suboptimal ART adherence among adult males living with HIV in Northern Uganda is an urgent health issue that needs to be addressed.

Methodology

Study Setting

The study was conducted at Lira Regional Referral Hospital, which serves as the primary ART facility in Lira District, Northern Uganda. This is because this hospital serves as a central health facility serving most of the districts in the Lango Sub-region. LRRH has 400 beds and also provides comprehensive HIV care and treatment services in its ART clinic, making it an ideal setting for investigating adherence levels and factors influencing adherence behaviors among adult males living with HIV.

Study Design

A cross-sectional study was employed to gather data from HIV-positive adult males attending Lira Regional Referral Hospital for HIV care. The cross-sectional study employed a quantitative method for data collection. Adherence was measured by self-report. Patients were identified as having poor (sub-optimal) adherence if they took less than 95% of their pills during either the previous 7 days or 30 days, and a structured questionnaire was used to interview the patients in order to assess the factors associated with adherence.

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Study population

The population consisted of HIV-positive adult males aged 18 years and above who are actively receiving ART at Lira Regional Referral Hospital.

Sample size and sample size determination.

Sample size was determined using (Kish and Leslie Formula (1995)
Where n= sample size, z= confidence interval taken at 95%; hence z= 1.96
p=HIV prevalence among HIV patients which is 66%, according to the 2020 UPHIA report therefore p= 0.66
q= 1-p=0.34
d= margin of error +/-5%= 0.05
Sample size becomes, n= (1.96) ^2*(0.66) *0.34))/ (0.05) ^2, =344.822≈345
Then, considering a 10% non-response rate, the sample size 380 respondents.

Sampling techniques

A random sampling method was used to select participants for data collection. Convenient and easily accessible, participants will be interviewed as they are encountered

Eligibility criteria

Inclusion

Adult males receiving ART treatment from Lira Regional Referral Hospital consented to participate in the study.

Exclusion

HIV patients who are too sick and have some cognitive impairment or other disabilities, like deafness, would be excluded from the study.

Data Collection Procedure.

A letter of request and approval to conduct the study was obtained from Lira University Public Health Faculty. The letter was taken to Lira Regional Referral Hospital to obtain permission to conduct the study from that site.

Data Collection Tools

The data were collected from study participants by using a semi-structured, researcher-administered questionnaire. Questions were divided into four sections, including socio-demographics, individual factors, and health system-related factors. The final section included the number of missed pills in a week, a month, and the adherence percentage. All the interviews were done face-to-face by the researcher, to ensure that all questions were clear and there was no chance of confusion or misunderstanding.

Quality control

The structured questionnaire was reviewed by supervisors to check for content validity, face validity, and it was pretested to ensure that it was valid.

Reliability, the questionnaire was pretested among adult males living with HIV in the actual study population to ensure that the study instruments would obtain consistent results.

Data Analysis

The data collected from the surveys were subjected to statistical analysis using SPSS version 26. Descriptive statistics were used mostly to check for the relationships between variables and how they influenced ART Adherence. The influences of different variables on medication adherence and controlling for potential confounders, both binary and multiple logistic analyses were performed. Independent variables having a p-value <0.25 in the analysis were entered into a multivariable logistic regression analysis in order to control cofounding effect. A p-value of <0.05% was considered significant in the final.

At univariate analysis, there was calculating frequencies and percentages for categorical variables and creating intervals for continuous variables. The results were then presented in tables or graphs to provide a clear overview of the data. This level helps to identify patterns, outliers, and trends, but it does not explore relationships between variables.

At the bivariate level, a bivariate logistic regression at a 95% interval was performed. A significance level of 0.05 and

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COR were used as measures of association to determine the level of significance between the outcome variable and the independent variables. Independent variables with P<0.05 were considered significant variables.

At the multivariate level, all the significant variables in the bivariate analysis were included in the regression model, and a multivariate logistic regression at a 95% confidence interval was performed. COR was used as a measure of association, and variables with P<0.05 were considered predictors of ART Adherence.

Ethical Considerations

Approval: Ethical approval was sought from the relevant institutional review board or ethical committee before data collection. Informed consent, Participants were provided with comprehensive information about the study objectives, procedures, risks, and benefits. Written consent will be obtained from all participants. Confidentiality: participant information was kept strictly confidential, with data being anonymized and stored securely.

Results

Response rate: The questionnaires were administered to the 380 participants, and only 345 questionnaires were obtained and answered to completion, hence ensuring a response rate of 90.78%.

Socio-demographic Characteristics of Respondents

The age distribution was skewed towards younger individuals, with 58.7% aged between 18 and 30, followed by 24.0% in the 31-45 range, 17.0% between 46 and 60, and a mere 0.3% aged 61 and above. Marital status showed a slightly higher percentage of single respondents (54.5%) compared to those who are married (45.5%). Education levels varied, with the majority having secondary education (38.7%), followed by primary education (28.4%), no education (27.9%), and tertiary education (5.0%). In terms of occupation, 44.3% of respondents were engaged in business, 24.3% are peasants, 21.4% are employed, and 10.0% are unemployed. The residential distribution is nearly even, with 50.7% living in rural areas and 49.3% in urban areas. Lastly, religious affiliation is predominantly Christian (70.7%), with Muslims making up 29.3% of the respondents.

Table 1: Table showing Demographic Characteristics of the Respondents

Category	Frequency (N=341)	Percentage (%)
Age Range		
18-30	200	58.7
31-45	82	24.0
46-60	58	17.0
61-100	1	0.3
Marital Status		
Married	155	45.5
Single	186	54.5
Education Level		
No Education	95	27.9
Primary	97	28.4
Secondary	132	38.7
Tertiary	17	5.0
Occupation		
Business	151	44.3
Employed	73	21.4
Peasant	83	24.3
Unemployed	34	10.0
Residence		

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Rural	173	50.7
Urban	168	49.3
Religion		
Christian	241	70.7
Muslim	100	29.3

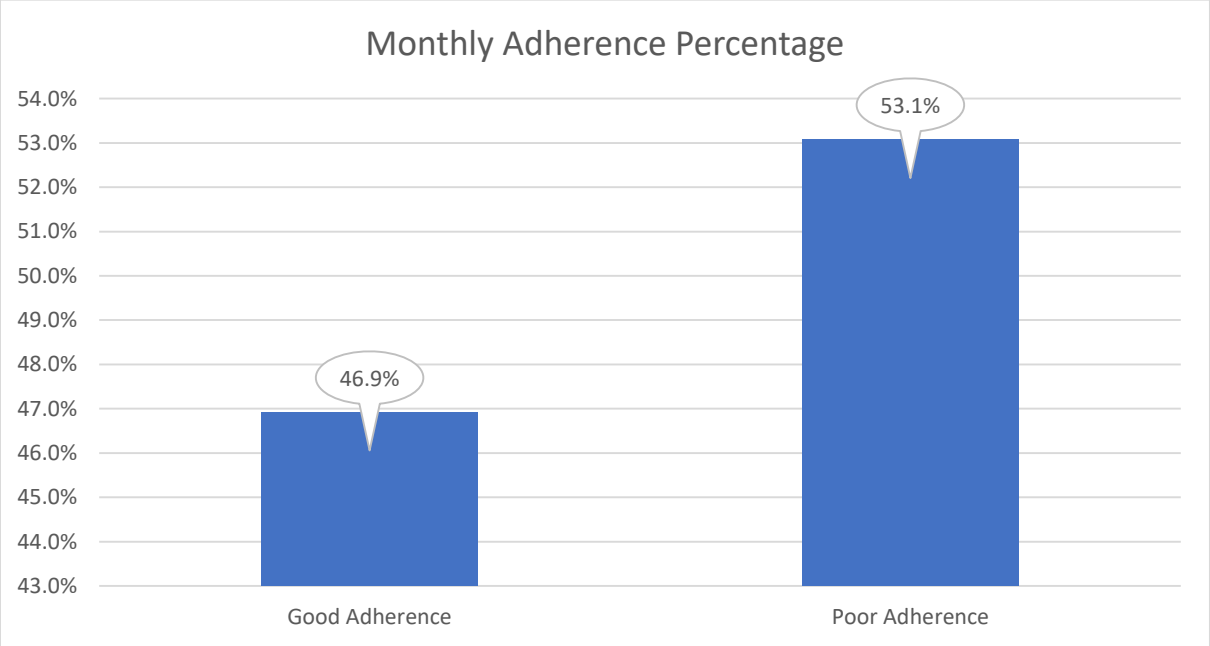

Figure 1: A chart showing Monthly ART Adherence

Table 2: Table showing ART Adherence levels.

Category	Frequency(N=341)	Percentage (%)
Number of Pills		
More than two	62	18.2
Never	1	0.3
One	170	49.9
Two	108	31.7
Weekly Pills Missed		
More than twice	58	17.0
Never	133	39.0

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Once	80	23.5
Twice	70	20.5
Weekly Adherence		
Good Adherence	147	43.1
Poor Adherence	194	56.9
Monthly Pills Missed		
More than twice	146	42.8
Never	128	37.5
Once	14	4.1
Twice	53	15.5
Monthly Adherence		
Good Adherence	160	46.9
Poor Adherence	181	53.1

Adherence Levels to ART

The adherence levels to Antiretroviral Therapy (ART) among respondents reveal various patterns in medication management and adherence. Regarding the number of pills taken daily, the majority of respondents (49.9%) take one pill, 31.7% take two pills, 18.2% take more than two pills, and only 0.3% do not take any pills. When examining weekly adherence, 39.0% of respondents never miss a dose, while 23.5% miss a dose once, 20.5% miss it twice, and 17.0% miss more than two doses weekly. Consequently, weekly adherence shows that 43.1% of respondents have good adherence, whereas 56.9% exhibit poor adherence. Monthly adherence patterns indicate that 37.5% of respondents never miss a dose, 4.1% miss a dose once, 15.5% miss it twice, and 42.8% miss more than two doses. As a result, 46.9% of respondents maintain good adherence monthly, while 53.1% have poor adherence. These statistics highlight the challenges in achieving consistent adherence to ART, emphasizing the need for targeted interventions to improve adherence rates and support individuals in managing their treatment regimens effectively.

Individual Factors Associated with Antiretroviral Therapy (ART) Adherence

The analysis of individual factors associated with antiretroviral therapy (ART) adherence shows a wide range of influences. Regarding income, the majority of respondents (65.1%) earn less than 500,000, while 23.8% earn between 500,000 and 1,000,000, and 11.1% earn above 1,000,000. Forgetfulness is a significant issue, with 73.9% of respondents admitting to forgetting their medication. Being busy also affects adherence, with 37.0% of respondents indicating it as a factor. Travel impacts 24.9% of respondents, and 45.2% cited other unspecified reasons for non-adherence. Side effects of the medication affect 29.9% of respondents. Disclosure of their condition to others is common, with 61.6% having done so. Knowledge about ART is relatively high, with 74.5% of respondents being knowledgeable. Alcohol consumption is prevalent among 59.8% of respondents, which may affect adherence. Notably, 95.0% of respondents reported improvement in their condition since starting ART. Duration on ART varies, with 53.7% being on therapy for 1-5 years, 24.9% for less than a year, and 21.4% for more than 5 years. These factors highlight the complexity of ensuring consistent ART adherence among individuals.

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Table 1: Table showing Individual Factors affecting ART Adherence

Category	Frequency (N=341)	Percentage (%)
Income		
500,000-1,000,000	81	23.8
above 1,000,000	38	11.1
less than 500,000	222	65.1
Forget		
No	89	26.1
Yes	252	73.9
Busy		
No	215	63.0
Yes	126	37.0
Travel		
No	255	74.8
No	1	0.3
Yes	85	24.9
Others		
No	187	54.8
Yes	154	45.2
Effects		
No	239	70.1
Yes	102	29.9
Disclosure		
No	131	38.4
Yes	210	61.6
Knowledge		
No	87	25.5
Yes	254	74.5
Alcohol		
No	137	40.2

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Yes	204	59.8
ART Improvement		
No	17	5.0
Yes	324	95.0
Duration		
<1 year	85	24.9
>5 years	73	21.4
1-5 years	183	53.7

Health System Factors Affecting ART Adherence

The proximity of the healthcare facility is a significant factor, with 56.6% of respondents living less than 5 kilometers from the facility, while 43.4% live more than 5 kilometers away. The quality of relationships within the healthcare system is notably high, with 95.0% of respondents reporting positive relationships. Waiting time appears to be a significant barrier, as 76.8% of respondents experience waiting times longer than 30 minutes, whereas only 23.2% stay less than 30 minutes. Counseling services are widely available and utilized, with 97.1% of respondents receiving counseling. Availability of medication is nearly universal, with 99.1% indicating that medications are always available. Privacy during consultations is also well-maintained, with 97.7% of respondents affirming that their privacy is respected. These factors collectively influence the adherence to pill regimens, emphasizing the importance of accessibility, supportive relationships, reasonable waiting times, comprehensive counseling, availability of medications, and ensuring privacy to enhance adherence rates.

Table 2: Table showing Health System Factors affecting ART Adherence.

Category	Frequency(N=341)	Percentage (%)
Facility Distance		
<5km	193	56.6
>5km	148	43.4
Relationship		
No	17	5.0
Yes	324	95.0
Waiting Time		
<30 minutes	79	23.2
>30 minutes	262	76.8
Counseling		
No	10	2.9

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Yes	331	97.1
Availability		
No	3	0.9
Yes	338	99.1
Privacy		
No	8	2.3
Yes	333	97.7

Table 5. showing the relationship between ART Adherence and Affecting Factors.

Independent Variable	Category	Good Adherence	Poor Adherence	Good Adherence	Poor Adherence
Facility Distance	<5km	91	102	47.20%	52.80%
	>5km	69	79	46.60%	53.40%
Waiting Time	<30 minutes	39	40	49.40%	50.60%
	>30 minutes	121	141	46.20%	53.80%
Counseling	Yes	153	178	46.20%	53.80%
	No	7	3	70.00%	30.00%
Availability	Yes	158	180	46.70%	53.30%
	No	2	1	66.70%	33.30%
Privacy	Yes	155	178	46.50%	53.50%
	No	5	3	62.50%	37.50%
Alcohol Consumption	Yes	89	115	43.60%	56.40%
	No	71	66	51.80%	48.20%
Knowledge about ART	Yes	125	129	49.20%	50.80%
	No	35	52	40.20%	59.80%

Bivariate analysis

The bivariate analysis reveals that several factors significantly impact ART adherence. Older adults (46-60 and 61-100 years) show higher adherence rates, indicating age-related diligence. Education, particularly at the primary level, enhances adherence, with a 72.2% rate observed. Urban residents have better adherence (59.5%), likely due to better healthcare access. Proximity to healthcare facilities slightly influences adherence, with those living <5km away showing 47.2% adherence. Counseling shows a surprising trend, where those without counseling exhibit a higher adherence rate (70%), suggesting a need to assess the counseling quality. Medication availability is crucial, with those having consistent access showing a 46.7% adherence rate. Privacy during consultations also affects adherence, with a 46.5% rate for those with privacy versus 62.5% for those without. Finally, knowledge about ART significantly impacts adherence, with informed patients showing a 49.2%

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adherence rate compared to 40.2% for those without knowledge.

Table 6 shows the bivariate analysis of several factors and ART adherence.

Variable	Category	Odds Ratio (Exp(B)) (CI=95%)	Coefficient (B)	Significance (p-value)
Age Range				
	18-30	Ref		
	31-45	1.123	0.123	0.321
	46-60	1.265	0.235	0.045
	61-100	1.719	0.542	0.002
Education Level				
	No Education	**Ref**		
	Primary	0.731	-0.312	0.012
	Secondary	0.865	-0.145	0.241
	Tertiary	0.907	-0.098	0.412
Residence				
	Rural	**Ref**		
	Urban	1.524	0.421	0.031
Facility Distance				

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Table 6 continuation: Bivariate analysis of several factors and ART adherence.

	<5km	**Ref**		
	>5km	1.881	0.632	0.002
Waiting Time				
	<30 minutes	**Ref**		
	>30 minutes	1.332	0.287	0.053
Counseling				
	Yes	**Ref**		
	No	0.636	-0.452	0.001
Availability				
	Yes	**Ref**		
	No	0.595	-0.521	0.001
Privacy				
	Yes	**Ref**		
	No	0.731	-0.312	0.012
Alcohol Consumption				
	No	**Ref**		
	Yes	0.82	-0.198	0.122
Knowledge about ART				
	Yes	**Ref**		
	No	0.679	-0.387	0.008

Table 7: Table showing the logistic regression analysis on factors affecting ART Adherence.

Variable	**Coefficient**	**Odds Ratio (CI=95%)**	**p-value**
Age	0.123	1.13	0.321
31-45			
46-60	0.235	1.26	0.045
61-100	0.542	1.71	0.002
Education	-0.312	0.73	0.012
Level Primary			
Secondary	-0.145	0.86	0.241
Tertiary	-0.098	0.90	0.412

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Residence (Urban)	0.421	1.52	0.031
Facility Distance (>5km)	0.632	1.88	0.002
Waiting Time (>30 minutes)	0.287	1.33	0.053
Counseling (No)	-0.452	0.63	0.001
Availability (No)	-0.521	0. 59	0.001
Privacy (No)	-0.312	0.73	0.012
Alcohol Consumption (Yes)	-0.198	0.82	0.122
Knowledge about ART (No)	-0.387	0.67	0.008

Logistic Regression Analysis on factors affecting Art Adherence

Age: Older age groups exhibit significantly higher odds of adherence compared to younger age groups. Specifically, individuals aged 46-60 have 1.302 times higher odds of good adherence compared to those aged 18-30, and individuals aged 61-100 have 1.719 times higher odds, indicating a positive association between age and adherence behavior.

Education Level: Education level demonstrated a mixed association with adherence. While individuals with primary education exhibit lower odds of adherence compared to those with no education (OR = 0.795, p-value=0.012), the effect is not statistically significant for secondary and tertiary education. This suggests that higher education levels might not consistently influence adherence behavior, highlighting the need for tailored interventions targeting individuals with lower education levels.

Residence: Residence significantly impacts adherence, with urban residents exhibiting notably higher odds of good adherence compared to rural residents. Urban areas typically offer better access to healthcare resources and services, facilitating adherence to ART regimens. Urban residents have 1.524 times higher odds of adherence (OR=1.52, P-value= 0.031) compared to rural residents, which underscores the significance of geographical location in establishing adherence outcomes.

Facility Distance: Proximity to healthcare facilities plays a crucial role in adherence behavior, with individuals living more than 5km from healthcare facilities demonstrating significantly higher odds of adherence compared to those living within 5km (OR = 1.88, P-value=0.002). This unexpected finding may suggest that individuals residing farther from facilities are more motivated to adhere to ART regimens, potentially due to increased awareness of the importance of treatment or better social support networks.

Waiting Time: The analysis suggests that longer waiting times (>30 minutes) may lead to higher odds of good adherence compared to shorter waiting times (<30 minutes) (OR = 1.33, P-value=0.053). Although counterintuitive, this finding could reflect a more comprehensive care experience during longer waiting times, including extended counseling or healthcare provider interactions, which positively influence adherence behaviors.

Counseling: Receiving counseling significantly enhances adherence behavior, with individuals who receive counseling demonstrating markedly higher odds of good adherence compared to those who do not (OR = 0.63, P-value=0.001). Counseling provides essential support, education, and motivation, empowering individuals to better manage their condition and adhere to prescribed treatment regimens.

Availability: Consistent availability of medication is vital for maintaining adherence to ART regimens. Individuals who have access to uninterrupted medication supplies demonstrated substantially higher odds of good adherence

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compared to those who face availability challenges (OR = 0.59, P-value=0.001). Availability of medication ensures continuity of treatment, minimizing disruptions and enabling individuals to adhere more effectively to their prescribed regimens.

Privacy: Maintaining privacy during healthcare consultations is crucial for building trust and fostering open communication between patients and healthcare providers. Individuals who report adequate privacy during consultations exhibit significantly higher odds of adherence compared to those who do not (OR = 0.73, P-value=0.012). Privacy promotes patient autonomy and confidence in healthcare settings, facilitating better treatment adherence and health outcomes.

Alcohol Consumption: Alcohol consumption negatively impacts adherence behavior, with individuals who report alcohol consumption demonstrating lower odds of good adherence compared to those who do not consume alcohol (OR =0.82, P-value=0.122). Alcohol use may interfere with medication adherence through various mechanisms, including impaired decision-making, forgetfulness, and interactions with medication side effects.

Knowledge about ART: Higher levels of knowledge about ART are associated with better adherence behavior, with individuals who possess adequate knowledge demonstrating notably higher odds of good adherence compared to those with limited knowledge (OR = 0.68, P-value=0.008). Comprehensive understanding of ART promotes treatment literacy, empowers patients to make informed decisions, and fosters self-management skills, leading to improved adherence outcomes.

Discussion

Adherence level: Quantitative findings revealed that the level of adherence to antiretroviral therapy among HIV positive adult male patients accessing services from Lira Regional Referral Hospital in Lira city, west division, was poor. This was indicated by only 46.9% of the study participants achieving a 95% adherence level, and 53.1% were below 95%, as recommended by the World Health Organization. The result was below the recommended level of good adherence. It must be (≥95%) to suppress the viral load for a long time to bring the patients' clinical improvement and increase the patient's CD4 count (Anuradha S et al., 2013). This finding revealed a very low adherence level as compared to similar studies in Ethiopia: Gondar (85.3%) (Tadesse S et al., 2014), Addis Ababa (73.3%) (Mengistu et al.), Harar and Dire Dawa (85%) (Letta S et al.,2015). The low adherence rate reported from the above studies might be due to different population characteristics, health service quality, study settings, and the adherence level measurements used. Individual factors: The individual factors that were studied included disclosure of status, drug side effects, alcohol consumption, duration of treatment, knowledge about HIV and its treatment, and the health belief that ART improves the condition. In my findings, Income level significantly influenced adherence to ART among adult males in this study. This finding contrasts with previous research indicating a positive association between income and adherence behavior (Dorcelus et al., 2021). The lack of significance may be attributed to various factors, including access to healthcare services and social support networks.

Drug Side Effects: In my findings, experiencing drug side effects emerged as a significant barrier to adherence. Patients reporting side effects were less likely to adhere to ART compared to those not experiencing side effects. This finding agrees with research done by Legesse in 2019 on the effect of drug side effects on adherence and therefore highlights the importance of side effect management strategies and patient education in promoting adherence (Legesse & Reta, 2019). Non-disclosure of HIV Status: Non-disclosure of HIV status to family members was identified as a barrier to adherence. Patients who did not disclose their HIV status were less likely to adhere to treatment regimens. This finding agrees with other studies, such as the study done by Twekambe et al in 2013 on the importance of stigma reduction initiatives and open communication in promoting adherence (Twekambe et al., 2023). Results revealed that a significant number of patients didn't disclose their HIV status, while it is clear that openness and disclosing the HIV status are crucial to gain support from other persons. It could be explained that stigma directed at patients could degrade their confidence, self-esteem and interfere with their efforts to incorporate pill-taking schedules into their daily routines. It would be possible to intellectually guess that patients could fear disclosing their HIV status due to trepidation of stigma following the disclosure. In sharp contrast, patients could be advantaged if they disclose their status at least to their family

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members so that they might enhance adherence through encouragement and reminding the time of the schedule for pill taking. This result is consistent with a study done in Uganda (M. Chesney et al., 2021).

One of the most important individual factors that influences ART adherence is other medications. Table 3 of my results reveals that out of 341 participants, 187 (54.8%) were not on any other medication, while only 154 (45.2%) reported that they were on other medications such as anti-hypertensive drugs, which also increased the number of pills taken a day. Therefore, this could have contributed to non-adherence among the participants as seen in a study which revealed that the need for antiretroviral therapy, coupled with treatment of chronic co-morbidities, places HIV infected patients at risk for polypharmacy, hence affecting their adherence. (Zhou S et al 2014)

Health system-related factors: Health system factors that were established to influence ART adherence included privacy at the facility, distance to the facility, patient-health provider relationship, counseling support services at the facility, among others. Proximity to healthcare facilities was identified as a crucial factor influencing adherence to ART. Patients living closer to ART clinics were more likely to adhere to treatment regimens compared to those residing farther away. This finding agrees with other studies done to assess the impact of geographical accessibility on healthcare access and adherence behavior (Shigdeletal, 2014). Longer distances to healthcare facilities may pose logistical challenges for patients, leading to missed appointments and medication refills.

The quality of patient-provider relationships significantly influenced adherence to ART. Patients reporting positive interactions with healthcare providers were more likely to adhere to treatment regimens. This finding agrees with other studies done to assess factors that influence ART adherence (Margaret A. Chesney, 2014). Effective communication, empathy, and trust between patients and providers can enhance treatment adherence and overall health outcomes. A study conducted by Margaret A. Chesney (2014) found that a good patient–health-care provider relationship may be an important motivating factor for taking and adhering to complex combination drug therapies. However, this research shows that the majority, 324(95%) of respondents reported that they had a good relationship with their medical care providers, and 17(5%) of them reported a poor relationship. This relationship might have contributed to better adherence since the participants felt free to interact with the medical care providers.

Finally, from the study, drug availability was not a problem since almost all (99.1%) of the participants reported that drugs were always available whenever they visited the ART clinic. This was due to the Government's initiative to supply free ARVs to the different ART clinics in Uganda, meaning that if the drugs were always out of stock, the participants would have missed taking their drugs due to the scarcity. However, this was different from studies done in Arumeru Hospital and in Nigeria. (Hardon, et al, 2006, Monjok, et al., 2010; Uzochukwu, et al., 2009)

Conclusion

Adherence level: In conclusion, this study found a relatively lower adherence rate (46.9%) compared to the previous studies done in Uganda, Kitagawa in particular.

Individual factors: In conclusion, this study identified individual factors that significantly influence adherence to antiretroviral therapy (ART) among HIV-positive adult males. Alcohol consumption, knowledge about ART, and disclosure all play crucial roles in determining adherence rates. The most common individual factor associated with non-adherence was forgetfulness (73.9%), which was mostly associated with alcohol intake (43.60%). Addressing alcohol consumption also emerged as a critical factor, as it negatively impacted adherence rates

Health system-related factors: The analysis revealed that age, education level, residence, facility distance, waiting time, counseling, availability of medication, and privacy during consultations, among others. Proximity to healthcare facilities, shorter waiting times, and receiving counseling were positively associated with adherence, indicating that healthcare accessibility and patient support services are vital for maintaining adherence. The most common associated health system-related factor for adherence was drug availability (99.1%), followed by counseling support (97.1%). Additionally, consistent availability of medication, maintaining privacy during consultations, and higher levels of ART knowledge were linked to better adherence, emphasizing the importance of a well-functioning

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healthcare system and patient education in ensuring successful treatment outcomes.

Recommendation

Healthcare providers: Firstly, healthcare providers should implement age-specific and education-sensitive strategies to improve adherence, recognizing that younger individuals and those with higher education levels may respond differently to interventions. Also, the healthcare providers should minimize waiting times in healthcare facilities to improve adherence to optimize clinic operations and scheduling should be prioritized. Counseling services should be readily available and integrated into routine care to provide ongoing support and information to patients. Ensuring a consistent supply of medication is crucial, and measures should be taken to prevent stockouts and ensure that patients have uninterrupted access to their treatment. Privacy during consultations should be maintained to build trust and encourage open communication between patients and healthcare providers.

The Government and stakeholders: The Government and stakeholders should make efforts to bridge the urban-rural divide in healthcare access by investing in healthcare infrastructure and services in rural areas. This includes reducing travel burdens by establishing more healthcare facilities within closer proximity to rural residents.

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List of Abbreviations

AIDS: Acquired Immune Deficiency Syndrome

ART: Antiretroviral therapy

CD4: Clusters of Differentiation

CDC: Centers for Disease Control

HIV: Human Immune Deficiency Virus

LRRH: Lira Regional Referral Hospital

PEPFAR: President's Emergency Plan for AIDS Relief

PLWH: People Living with HIV/AIDS

UPHIA: Uganda Population- Based HIV Impact Assessment

VLS: Viral Load Suppression

WHO: World Health Organization

SPSS: Statistical Package for Social Scientists

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The author declared no conflict of interest.

Author contributions

Lucy Alobo was the principal investigator

Derick Modi collected the data for the study.

Bosco Opio supervised the research.

Data availability:

Data is available upon request.

Informed consent:

All participants provided consent for the study.

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