Factors Influencing Adherence to Antiretroviral Therapy among HIV-positive Youth Patients Attending ART Clinic in Kiryandongo General Hospital Kiryandongo District

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ABSTRACT

This research aimed to assess the factors influencing adherence to antiretroviral therapy (ART) among HIV-positive youth patients attending the ART Clinic in Kiryandongo General Hospital, Kiryandongo District. The study utilized a descriptive cross-sectional research design, with a sample of 355 respondents between the ages of 10 and 25 who were receiving antiretroviral treatment. The study found a low level of adherence to antiretroviral treatment (33%), significantly lower than the national target of 90%. Adherence was influenced by various individual, drug-related, and healthcare factors. Individual factors included gender, age, marital status, education, place of residence, family size, and religion. Drug-related factors included having all the required drugs, challenges with the drugs, the frequency of taking ARV pills, challenges during medication intake, and accessibility to ARV drugs. Health-related factors encompassed routine education and counseling, sources of information, proximity to healthcare facilities, distance from home to the facility, availability of ARVs on appointment days, availability of healthcare workers, frequency of ARV refill visits, and waiting time during appointments. The low adherence was attributed to missing doses due to stigma, forgetfulness, drug stockouts, lack of routine education about ART, long distances to healthcare facilities, inadequate information, and extended waiting times.

Keywords: HIV, Antiretroviral therapy, Adherence, Youths, Stigma.

INTRODUCTION

HIV is primarily transmitted through unprotected sexual intercourse, contaminated blood transfusions, and contaminated hypodermic needles[1-3]. It can also be transmitted from mother to child during pregnancy, delivery, or breastfeeding. However, certain body fluids, such as saliva and tears, do not transmit HIV [3, 4]. Adherence is defined as a patient's ability to follow a treatment protocol, take medications at prescribed times and frequencies, and adhere to restrictions regarding food and other medications [5-7]. Adhering to Antiretroviral Therapy (ART) results in successful HIV outcomes, ensuring optimal viral load and CD4 count control and the prevention of other complications [5, 8]. Nevertheless, adhering to ART often presents a unique challenge and requires commitment from both the patient and the healthcare team. Due to the rapid replication and mutation of HIV, poor adherence can lead to the development of drug-resistant strains [9]. To derive optimal benefits from such treatment, WHO recommends at least 95% adherence to ART for ideal CD4 count and long-term suppression of viral load in patients [10]. Inadequate adherence results in antiretroviral agents not being maintained at a sufficient concentration to suppress HIV replication in infected cells and lower the plasma viral load. In addition, suboptimal adherence can accelerate the development of drug-resistant HIV and diminish ART's role in reducing HIV incidence and transmission[10, 11].

A youth is defined as an individual between 15 to 25 years according to WHO's 2011 definition[12], but individuals in sub-Saharan Africa define youth as individuals aged 15 to 34. Adolescence typically describes the years between 13 and 19, which is the transitional stage from childhood to adulthood[13]. However, the physical and psychological changes that occur in adolescence can start earlier during the preteen or twenty years (ages 9 through 12) [14]. On the other hand, the World Health Organization defines young people as those aged between 10 and 24 years [15]. In this study, a youth was considered to be between 15 and 24 years of age.

Treatment adherence is one of the strongest predictors of virological failure, the development of drug resistance, disease progression, and death [16]. Poor adherence to combination antiretroviral therapy (CART) is common in both developing and developed nations. It was found in around 20% of HIV-infected patients in Africa and around 14% in the United States of America [17]. By the end of 2014, approximately 37 million people were living with the human immunodeficiency virus (HIV) globally, with nearly all of them in low- and middle-income countries. Of those, an estimated 15 million HIV-infected persons were receiving antiretroviral drug (ARV) therapy (ART), which is double the number from 2010 [18–20]. The use of ART has significantly reduced morbidity and mortality over time in individuals living with HIV[21]. Globally in 2014, 1.2 million individuals died from AIDS-related causes, representing a 42% reduction since the peak in AIDS deaths in 2004 [22]. Adolescents and young people represent a growing share of people living with HIV worldwide. In 2016 alone, 610,000 young people between the ages of 15 to 24 were newly infected with HIV, of whom 260,000 were adolescents between the ages of 15 and 19 [22]. Estimates of ART adherence among adolescents living with HIV (ALHIV) in Low and Middle-Income Countries (LMIC) vary substantially. Adherence rates ranged from 16% to 99% among adolescents globally [23]. Meta-analysis findings among adolescents and young adults (12-24 years) in 53 countries since 2014 found adherence based on either self-report or viral load measures at 84% in both Africa and Asia [24].

Since the emergence of the first cases of AIDS in the early 1980s, the number of cases has increased significantly. The global estimate is that 35.3 (32.2-38.8) million people were living with AIDS in 2017. Despite the prevalence, there was a 33% decrease in incidence, lowering from 3.4 (3.1-3.7) million in 2001 to 2.3 (1.9-2.7) million in 2017 [25, 26]. Although HIV has now become a manageable chronic disease, treatment outcomes may be hampered by suboptimal adherence to ART [25]. Proper maintenance of ART adherence over time remains a challenging area, especially in resource-limited settings, including sub-Saharan African countries like Uganda [27–29]. Strict adherence to antiretroviral therapy (ART) is key to sustained HIV suppression, a reduced risk of drug resistance, improved overall health, quality of life, and survival [16], as well as a decreased risk of HIV transmission [25]. Conversely, poor adherence is the major cause of therapeutic failure. Achieving adherence to ART is a critical determinant of long-term outcomes in HIV-infected patients. In the case of HIV infection, loss of virologic control as a consequence of non-adherence to ART may lead to the emergence of drug resistance. Adherence should be assessed and routinely reinforced by everyone in the clinical team at each of the patient's clinic visits. Despite complete government funding of the medical service fees related to HIV (including ART) in Uganda, there is limited data on medication adherence at the national level. In a setting in which patients have very low barriers to treatment, there may be risk factors for low ART adherence that have not been previously reported. There is limited existing published work to date in the study area on the prevalence of and factors associated with ART adherence. It is upon this background that this study is designed.

METHODOLOGY

Study Design

A descriptive cross-sectional research design was used to conduct this study. It was descriptive because it provided detailed information about the factors associated with adherence to antiretroviral treatment among HIV-positive youths attending the ART clinic at Kiryandongo General Hospital in Kiryandongo District in a statistical manner. It was also cross-sectional because data was collected at one point in time over a short period, from January to March 2021. Quantitative data was collected using semi-structured closed and open-ended questions. This approach was advantageous for the researchers as it was affordable and suitable for obtaining answers within a short timeframe.

Sources of Data

Both primary and secondary data sources were utilized in this study. Primary data was obtained directly from respondents through self-administered questionnaires by the principal researcher and research assistants. Secondary data was collected from approved published studies, journals, reports, and other medical documents by various researchers, scholars, organizations, and entities. This data primarily comprised chapters one and two.

Area of Study

The study was carried out at the ART clinic of Kiryandongo General Hospital, located in Kiryandongo Town, a major town within Kiryandongo District in Western Uganda. Kiryandongo District is bordered by Nwoya District to the north, Oyam District to the northeast, Apac District to the east, and Masindi District to the south and west. Kiryandongo is situated approximately 225 kilometers (140 miles) by road northwest of Kampala, Uganda's capital and largest city, with coordinates of 02°00'N, 32°18'E. According to the national population and housing census of 2014, the population of Kiryandongo District was estimated at 266,197, with youths comprising 53,392, or 20.3% of the total population [30].

Study Population

The study population consisted of all youths living with HIV/AIDS in Kiryandongo District.

Target Population

The study targeted youths living with HIV who were attending the ART clinic at Kiryandongo General Hospital, provided they met the inclusion criteria.

Inclusion Criteria

The study population included all youths on antiretroviral treatment who attended the ART Clinic at Kiryandongo General Hospital. These were youths who had been on antiretroviral treatment for at least six months and had consented to participate in the study.

Exclusion Criteria

HIV/AIDS positive youths who attended Kiryandongo General Hospital but were not on antiretroviral treatment or had been on antiretroviral treatment for less than six months, as well as those who were deaf, dumb, mentally ill, or very ill, were excluded from the study

Sample Size Determination

The sample size of HIV-positive youths on antiretroviral treatment was determined using the Kish and Leslie sample size formula [31]:

$$n = (Z^2 * P * (1 - P)) / D^2$$

Where:

n = the minimum sample size

Z = the desired confidence level at 95%, which is equivalent to 1.96

P = the estimated proportion of HIV/AIDS-positive youths adhering to ARVs/ART, which is approximately 70% (UBOS, 2017)

D = Margin of error at 5% (0.05)

Calculating:

$$n = (1.96^2 * 0.30 * 0.70) / 0.05^2$$

$$n = (3.8416 * 0.21) / 0.0025$$

$$n = 0.806736 / 0.0025$$

$$n = 322.6944$$

To account for expected errors in data collection, a 10% increment was added to the calculated sample size:

$$n = 1.10 * 322.6944 = 355$$

Therefore, a sample size of 355 respondents was used in this study.

Sampling

A non-probability convenient consecutive sampling technique was employed to recruit study participants.

Data Collection Methods and Tools

In this study, quantitative data was collected using researcher-administered questionnaires. An interview guide

containing both closed-ended (structured) and open-ended (semi-structured) questions on individual, drug-related, and healthcare factors associated with adherence to ARVs/ART among youths was used. This approach aimed to establish rapport between the researcher and the respondents and address all important issues the respondents had.

Data Processing and Analysis

Questionnaire tools were checked for accuracy and data completeness, and then data was coded and entered into EpiInfo version 7. Subsequently, the data was exported into SPSS version 22.0 for analysis. Descriptive statistics were used to summarize the variables. The descriptive part provided a univariate analysis of the study variables, while a detailed analytical approach was used to determine associations between independent and dependent variables. To reduce the items in the questionnaire and obtain scales for independent variables, a factor analysis using principal component analysis was conducted. Bivariate analysis was performed through cross-tabulation, with chi-square tests and correlations used to determine P-values and levels of significance. The results were compiled into a report in the form of quotes and narratives to supplement the quantitative data.

Quality Control

The questionnaire was pretested among selected youth attending the ART clinic at Kampala International University Teaching Hospital before actual data collection. Collected data was checked immediately after finalizing the questionnaire to ensure completeness and consistency of the information gathered.

Ethical Considerations

Ethical clearance was obtained from the Faculty of Clinical Medicine and Dentistry and the hospital administration of Kiryandongo General Hospital. All youths who participated in the study provided consent.

RESULTS
Distribution of the respondents by Individual factors Distribution of the respondents by Individual factors
**Table 1: Frequency distribution of the respondents by Individual factors**

Variable	Category	Frequency	Percentage
Gender	Males	150	42
	Females	205	58
Age	Less than 15 years	61	17
	16-18 years	95	27
	19-22 years	117	33
	23-25 years	82	23
Marital status	Singles	139	39
	Married	167	47
	Separated	39	11
	Widows/widower	10	03
Education	No formal education	30	08
	Primary	106	30
	Secondary	132	37
	Tertiary	87	25
Occupation	Housewives	73	20
	Self-employed/Business	50	14
	Unemployed	130	37
	Students	83	23
	Casual laborers	19	05
Place of residence	Urban	158	44
	Rural	197	56
Family size	Less than 3 people	95	27
	4-5 people	136	38
	6-8 people	71	20
	More than 9 people	53	15
Financial status	Earn less than 2,000/= a day	184	52
	Between 2,000/= to 5000 a week	100	28
	Between 5,001/= to 150,000 a months	71	20
Religion	Catholics	133	37
	Protestants	121	34
	Seventh day Adventists	70	20
	Moslems	05	01
	Born Again Christians	08	02
	Orthodox Christians	18	05

Out of 355 respondents who participated in the study, the majority 205 (58%) were females, 117(33%) were aged between 19 and 22 years, 167 (47%) were singles, 132 (37%) had secondary education, 130 (37%) were unemployed, 197 (56%) were from rural areas, 136 (38%) were from families with 4-6 people, 184 (52%) earned less than 2000/= a day and 133 (37%) were Catholics.

Adherence to ARV therapy among HIV-positive youth attending ART Clinic in Kiryandongo General Hospital
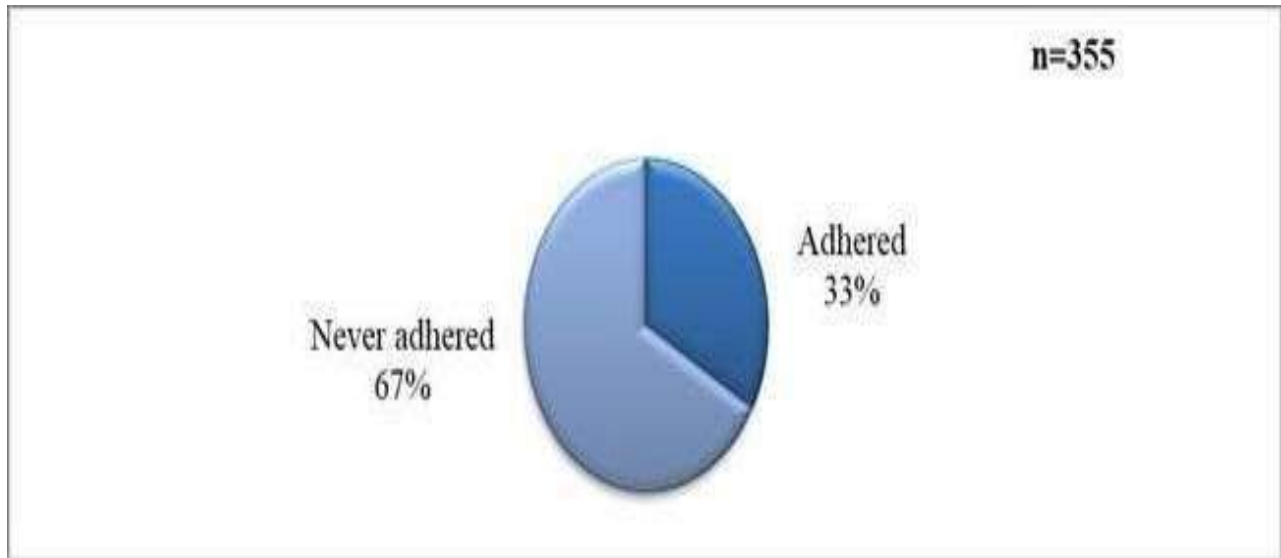
Source: Primary data

Figure 1: Level of adherence to ARV treatment among HIV-positive youth attending ARTClinic in Kiryandongo General Hospital

The level of adherence to ART among adolescents was 33%. Out of the 355 of the respondents that participated in the study, majority 263 (74%) knew their HIV status the first time they visited the health facility for testing and counseling, 327 (92%) started taking ARVs the moment they knew were HIV positive, 237 (67%) had ever missed taking ARV drugs in any day since they were initiated on ART where majority 107 (45%) missed once. In the last three months 171 (72%) had missed taking ARV drugs in any day where 94 (55%) missed one dose mainly because they felt stigma (86; 50%) as shown in Table 2.

Table 2: Adherence to ARV treatment among HIV positive youth attending ART Clinic in Kiryandongo General Hospital, Kiryandongo district

Variable	Category	Frequency	Percentage
Time when respondents knew were	Early childhood	39	11
HIV positive	The time when they visited the health	263	74
	facility for testing and counseling		
	Rumors from Relative and neighbors	53	15
Started taking ARVs the moment	Yes	327	92
they knew were HIV positive	No	28	08
Ever missed taking ARV drugs in	Yes	237	67
any day	No	118	33
Frequency of missing taking ARV	Once	107	45
	Twice	85	36
	Thrice	28	12
	Four times and more	17	07
In last three months, missed taking	Yes	171	72
ARV drugs in any day	No	66	28
Number of doses missed	One	94	55
	Two	55	32
	Three	14	08
	More than four doses	09	05
Reasons for missing treatment	Stigma	86	50
	Drug stock out	38	22
	Forgot to take the drug	29	17
	Was misled	19	11

Bivariate analysis of the socio-demographic factors

Most of the social demographic factors were significantly associated with adherence to ARV treatment among HIV positive youth attending ART Clinic in Kiryandongo General Hospital. These were; gender ($\chi2 = 4.04$ P=0.044), age ($\chi2 = 33.83$ P=0.001), marital status ($\chi2 = 8.10$ P=0.001), Education ($\chi2 = 10.56$ P=0.014), occupation ($\chi2 = 27.13$ P=0.001), place of residence ($\chi2 = 50.94$ P=0.001), family size ($\chi2 = 11.02$, P=0.012) and religion ($\chi2 = 12.68$, P=0.027). However financial status was not significantly associated with adherence to antiretroviral treatment (P>0.005) as shown in Table 3.

Table 3: Bivariate analysis of the socio-demographic factors associated with adherence to antiretroviral treatment among HIV positive youth attending ART Clinic in Kiryandongo General Hospital

Variable Category		Adherence		χ^2	P-values
		Adhered	**Never adhered**		
Gender	Females	75(63.6%)	124 (52.3%)	**4.04**	**0.044**
	Males	43 (6.4%)	113 (47.7%)		
Age	Less than 15 years	14(11.9%)	85(35.9%)	**33.83**	**0.001**
	16-18 years	28(23.7%)	69(29.1%)		
	19-22 years	40(33.9%)	36(15.2%)		
	23-25 years	36(30.5%)	47(19.8%)		
Marital status	Singles	34(28.8%)	133 (56.1%)	**8.10**	**0.004**
	Married	73(61.9%)	51(21.5%)		
	Separated	8 (6.8%)	28(11.8%)		
	Widows/widower	3 (2.5%)	25 (10.5%)		
Education	No formal education	13 (11.0%)	30 (12.7%)	**10.56**	**0.014**
	Primary	24 (20.3%)	82 (34.6%)		
	Secondary	51 (43.2%)	68 (28.7%)		
	Tertiary	30 (25.4%)	57 (24.1%)		
Occupation	Civil servant	11 (9.3%)	4 (1.7%)	**27.13**	**0.001**
	unemployed	27(22.9%)	82(34.6%)		
	students	51(43.2%)	79(33.3%)		
	self employed	14(11.9%)	58(24.5%)		
	Self-employed/Business	15(12.7%)	14 (5.9%)		
Place residence	Urban	84(71.2%)	74(31.2%)	**50.94**	**0.001**
	Rural	34 (28.8%)	163 (68.8%)		
Family size	Less than 3 people	44(37.3%)	51(21.5%)	**11.02**	**0.012**
	4-5 people	40(33.9%)	96(40.5%)		
	6-8 people	17(14.4%)	54(22.8%)		
	More than 9 people	17(14.4%)	36(15.2%)		
Financial status	Earn less than 2,000/= a Day	67(56.8%)	117 (49.4%)	**3.63**	**0.163**
	Btn 2,000/= to 5000 a week	34 (28.8%	66(27.8%)		
	Btn 5,001/= to 150,000 a months	17 (14.4%)	54 (22.8%)		
Religion	Catholics	52(44.1%)	81(34.2%)	**12.68**	**0.027**
	Protestants	34(28.8%)	87(36.7%)		
	Seventh day Adventists	17(14.4%)	53(22.4%)		
	Moslems	2 (1.7%)	3 (1.3%)		
	Born Again Christians	6 (5.1%)	2 (0.8%)		
	Orthodox Christians	7 (5.9%)	11 (4.6%)		

Bivariate analysis of the individual factors associated with adherence to antiretroviral therapy
Table 4: Bivariate analysis of the individual factors associated with adherence to antiretroviral treatment among HIV positive youth attending ART clinic in Kiryandongo General Hospital

Variable	Category	Adherence		χ^2	P-values
		Adhered	Never adhered		
Persons respondents stayed with	Relatives	13 (11.0%)	30 (12.7%)	**8.16**	**0.043**
	Brothers/Sisters	24 (20.3%)	71 (30.0%)		
	Biological parents	51 (43.2%)	68 (28.7%)		
	1 Biological parent	30 (25.4%)	68 (28.7%)		
Were given adequate support to access ART	Yes	86 (72.9%)	87 (36.7%)	**18.58**	**0.001**
	No	32 (27.1%)	150 (63.3%)		
Cultural values acknowledge ARV treatment	Yes	39 (33.1%)	113 (47.7%)	**6.89**	**0.009**
	No	79 (66.9%)	124 (52.3%)		
Took illicit drugs	Yes	14 (11.9%)	62 (26.2%)	**9.57**	**0.002**
	No	104 (88.1%)	175 (73.8%)		
Believed that taking ARV treatment everyday makes health better	Yes	104 (88.1%)	154 (65.0%)	**21.27**	**0.001**
	No	14 (11.9%)	83 (35.0%)		
Carried beliefs that their health can be better on other treatments other than ARVs	Yes	17 (14.4%)	99 (41.8%)	**26.82**	**0.130**
	No	101 (85.6%)	138 (58.2%)		

Individual factors were significantly associated with adherence to ARV therapy among HIV positive youth attending ART Clinic Kiryandongo General Hospital. These included; relationship where persons' respondents stayed with (χ^2 = 8.16, P=0.043), were given adequate support to access ART (χ^2 = 18.58, P=0.001), cultural values acknowledge ARV therapy (χ^2 = 6.89, P=0.009), took illicit drugs (χ^2 = 9.57, P=0.002), and believed that taking ARV treatment everyday makes health better (χ^2 = 21.27, P=0.001).

Drug related factors associated with adherence to ARV therapy
Table 5: Drug related factors associated with adherence to ARV treatment among HIV positive youthattending ART clinic in Kiryandongo General Hospital

Variable	Category	Adherence		χ^2	P-values
Had all the drugs they were supposed to take	Yes	105 (89.0%)	161 (67.9%)	18.58	0.001
	No	13(11.0%)	76 (32.1%)		
Number of pills	One	68(57.6%)	79 (33.3%)	3.92	0.141
	Two	50(42.4%)	158 (66.7%)		
Frequency of taking ARV pills in a day	Once	42(35.6%)	111 (46.8%)	4.06	0.044
	Twice	76(64.4%)	126 (53.2%)		
Faced challenges when taking these drugs	Yes	45(38.1%)	121 (51.1%)	5.28	0.022
	No	73(61.9%)	116 (48.9%)		
Challenges Pill burden	(Irritations, taking every day)	27(61.4%)	60 (50.0%)	19.16	0.001
	Stigma	16(36.4%)	46 (38.3%)		
	Forgetting	1(2.3%)	14 (11.7%)		
Easy access to Drugs	Yes	69(58.5%)	69(58.5%)	4.27	0.039
	No	49(41.5%)	126 (53.2%)		

Most of the drug related factors were significantly associated with adherence to ARV treatment among adolescents attending Kiryandongo General Hospital. These included; having all the drugs they were supposed to take (χ^2 = 18.58, P=0.001), challenges faced with the drugs (χ^2 = 19.16, P=0.001), Frequency of taking ARV pills in a day (χ^2 = 4.06, P=0.044), challenges faced when taking ARVs (χ^2 = 5.28, P=0.022) and accessibility to ARV drugs (χ^2 = 4.27, P=0.039). However, the number of pills taken a day was not significantly associated with adherence to antiretroviral treatment (P>0.005).

Health related factors associated with adherence to ARV therapy among HIV positive youths attending ART Clinic in Kiryandongo General Hospital

All the health care related factors were significantly associated with adherence to ARV treatment among HIV positive youth attending ART Clinic in Kiryandongo General Hospital as shown in Table 6.

Table 6: Bivariate analysis of the health related factors associated with adherence to ARV therapy

Variable	Category	Adherence		χ2	P-values
		Adhered	**Never adhered**		
Got routine education and counseling about adherence to ARVs	Yes	84 (71.2%)	58 (24.5%)	**71.63**	**0.001**
	No	34 (28.8%)	179 (75.5%)		
Sources	Healthcare facility	55 (46.6%)	31 (13.1%)	**62.03**	**0.000**
	School	22 (18.6%)	120 (50.6%)		
	Humanitarian	10 (8.5%)	22 (9.3%)		
	Friends	14 (11.9%)	38 (16.0%)		
	Media	12 (10.2%)	11(4.6%)		
	Family members	5 (4.2%)	15(6.3%)		
Had nearby healthcare facility to ARV drugs	Yes	71 (60.2%)	40 (16.9%)	**68.70**	**0.0001**
	No	47 (39.8%)	197(83.1%)		
Distance between health facility and respondents home	Less than 500 meters	50 (42.4%)	33 (13.9%)	**45.45**	**0.001**
	Between 501 and 1000m	24 (20.3%)	117(49.4%)		
	Between 1-3 km	13 (11.0%)	26 (11.0%)		
	Between 4-6 km	10 (8.5%)	26 (11.0%)		
	Between 7-10 km	14 (11.9%)	20 (8.4%)		
	More than 10 km	7 (5.9%)	15 (6.3%)		
ARV were always available on appointment day	Yes	109 (92.4%)	179 (75.5%)	**14.60**	**0.001**
	No	9 (7.6%)	58 (24.5%)		
How often have you been coming for ARVs refill at the clinic	Bi-weekly	35 (29.7%)	5(2.1%)	**60.25**	**0.001**
	Monthly	61 (51.7%)	163(68.8%)		
	Bi-monthly	17 (14.4%)	50(21.1%)		
	More than 2 months	5 (4.2%)	19(8.0%)		

DISCUSSION

Adherence to Antiretroviral Therapy among HIV-Positive Youth Attending ART Clinic in Kiryandongo General Hospital

The level of adherence to antiretroviral therapy among the HIV-positive youths attending the ART clinic in Kiryandongo General Hospital was low at 33%. It was found that the majority of the respondents knew their HIV status the first time they visited the health facility for testing and counseling, started taking ARVs the moment they knew they were HIV positive, had never missed taking

ARV drugs on any day since they were initiated on ART, where the majority missed once. In the last three months, almost three-quarters had missed at least a day to take their ARV drugs mainly because they felt stigma. Given the fact that the majority of the respondents knew their HIV status at the time they first visited the health facility for testing and counseling, this could have been attributed to poor adherence because it was quite hard to instill a behavior of taking drugs daily into an adolescent who felt stigma. Despite the fact that nine out of ten respondents started taking their ART treatment the moment they knew they were HIV positive, adherence was hampered by missing the drug dosages. Similar results were reported in a study carried out in Togo [32] and Kenya [33], which showed that 33.7% of the respondents had optimal adherence to the clinicians' appointments while 33 (33.7%) missed at least one scheduled appointment in the six months before the study. It was further noted that 66.7% and 33.3% of the respondents had missed their clinicians' appointments by more than three days once and twice, respectively, in the six months before the survey. These similarities could have resulted from both studies being carried out in rural areas among adolescents who could have lacked adequate information about ART to reduce stigma among them. Results showed that almost seven out of ten respondents had ever missed drugs, whereas the majority had never missed one. Also, seven out of ten respondents had missed drugs in the last months before the study. The major reasons given were stigma, drug stock-outs, and forgetfulness. These findings were in relation to a study carried out in Nigeria where adolescents who missed doses of ARV drugs were mainly due to forgetfulness as it accounted for 70.2% of the respondents [34]. Despite these findings being similar in the present study, stigma was the major cause of non-adherence.

Individual Factors Associated with Adherence to Antiretroviral Therapy among HIV-Positive Youths Attending the ART Clinic in Kiryandongo General Hospital

Most of the individual factors were significantly associated with adherence to ARV treatment among youths attending Kiryandongo General Hospital. These were gender ($\chi2 = 59.13$, P = 0.001), age ($\chi2 = 9.74$, P = 0.021), marital status ($\chi2 = 8.10$, P = 0.044), education ($\chi2 = 12.88$, P = 0.005), place of residence ($\chi2 = 50.94$, P = 0.001), family size ($\chi2 = 11.02$, P = 0.012), and religion ($\chi2 = 12.68$, P = 0.027). However, respondents' occupation and financial status were not significantly associated with adherence to antiretroviral treatment (P > 0.005). Other individual factors were significantly associated with adherence to ARV treatment among youths attending Kiryandongo General Hospital. These included relationships with the person respondents stayed with ($\chi2 = 8.16$, P = 0.043), were given adequate support to access ART ($\chi2 = 18.58$, P = 0.001), cultural values acknowledging ARV treatment ($\chi2 = 6.89$, P = 0.009), took illicit drugs ($\chi2 = 9.57$, P = 0.002), believed that taking ARV treatment every day makes health better ($\chi2 = 21.27$, P = 0.001), and carried beliefs that their health can be better on other treatment other than ARVs ($\chi2 = 26.82$, P = 0.000).

Drug-Related Factors Associated with Adherence to ARV Therapy Among Youth Attending ART Clinic in Kiryandongo General Hospital

Most of the drug-related factors were significantly associated with adherence to ARV treatment for youths attending Kiryandongo General Hospital. These included having all the drugs they were supposed to take ($\chi2 = 18.58$, P = 0.001), challenges faced with the drugs ($\chi2 = 19.16$, P = 0.001), frequency of taking ARV pills in a day ($\chi2 = 4.06$, P = 0.044), challenges faced when taking ARVs ($\chi2 = 5.28$, P = 0.022), and accessibility to ARV drugs ($\chi2 = 4.27$, P = 0.039). However, the number of pills taken a day was not significantly associated with adherence to antiretroviral treatment (P > 0.005).

Having all the drugs they were supposed to take was significantly associated with

adherence to antiretroviral treatment ($\chi2$ = 18.58, P = 0.001). Adherence was higher among respondents who had all the drugs they needed as compared to those who never had all the drugs. Those who always had the drugs could hardly miss the dose as compared to those who never had all the drugs.

Higher adherence was among respondents who never had challenges with the drugs ($\chi2$ = 19.16, P = 0.001). Respondents who never felt the pill burden, stigma, and nausea, among others, were more likely to adhere to antiretroviral treatment as compared to those who had challenges. The frequency of taking ARV pills in a day was associated with adherence to antiretroviral treatment, where the majority of the respondents took the drugs once a day. Respondents who took drugs once were more likely to adhere to antiretroviral treatment as compared to those who took them twice. Accessibility to ARV drugs also influenced adherence to antiretroviral treatment. Respondents who had easy access to drugs were more likely to adhere to antiretroviral treatment as compared to those who never accessed drugs. Respondents who had poor access missed doses, thus showing poor adherence.

Health-Related Factors Associated with Adherence to ARV Treatment Among Youths Attending ART Clinic in Kiryandongo General Hospital

Most of the health-related factors were significantly associated with adherence to ARV treatment among youths attending Kiryandongo General Hospital. These were getting routine education and counseling about adherence to ARVs ($\chi2$ = 71.63, P = 0.001), sources of information ($\chi2$ = 62.03, P = 0.001), having nearby healthcare facilities to pick ARV drugs ($\chi2$ = 68.70, P = 0.001), distance between the health facility and respondents' homes ($\chi2$ = 45.45, P = 0.001), availability of ARV on the appointment day ($\chi2$ = 14.60, P = 0.001

However, health workers gave enough information about adherence, but it was not significantly associated with adherence to antiretroviral treatment (P > 0.005). Getting routine education and counseling about adherence to ARVs ($\chi2$ = 71.63, P = 0.001). Respondents who had

regular education and counseling about adherence to ARVs were more likely to adhere to antiretroviral therapy. Regular education and sensitization equipped respondents with adequate information about the importance of adherence to antiretroviral treatment. In relation, a study carried out in Nigeria found that adolescents who had routine education and sensitization about ART were more adherent to ART as compared to those who were not health-educated [35, 36]. This was because both studies were carried out in rural settings where the social demographic characteristics of the respondents were similar. The source of information about antiretroviral treatment was associated with adherence to antiretroviral treatment ($\chi2$ = 62.03, P = 0.001). Respondents who got information from healthcare facilities were more likely to adhere to antiretroviral treatment as compared to those who didn't. Similar results were reported in a study carried out in the USA where respondents who never got advice from healthcare providers had lower adherence as compared to ones who got advice from healthcare providers [37, 38].

The majority of the respondents stayed at a distance of more than three kilometers, which could have made it difficult for the respondents to access ART clinics. Respondents who stayed near healthcare facilities to pick up ARV drugs adhered to antiretroviral treatment ($\chi2$ = 68.70, P = 0.001). Staying nearer healthcare facilities eased transportation to pick up the drugs, which increased adherence to antiretroviral treatment. Respondents who stayed less than a kilometer from the healthcare facility were more likely to adhere to treatment as compared to those who stayed far away. Similarly, a study carried out in Nepal and Kenya found that long distances traveled to healthcare facilities negatively influence adherence to ART because most of adolescents could not afford transport fares to drug collection centers [39, 40].

Availability of ARV on the appointment day and healthcare workers for ARV services were associated with adherence to antiretroviral treatment ($\chi2$ = 14.60, P = 0.001) and ($\chi2$ = 31.41, P = 0.001) respectively. This meant that respondents

had the chance to get the drugs and information about how to take them. On the contrary, a study carried out on bullying and violence during routine ART refill visits hindered adherence to ARVs. The frequency of coming for ARV refill at the clinic was associated with adherence to antiretroviral treatment ($\chi2$ = 60.25, P = 0.001). The majority of the respondents had to collect their drugs on a monthly basis, and these were more likely to adhere to antiretroviral treatment as compared to those who didn't. Having drugs on a monthly basis saved adolescents from transport expenses they would incur if they were to collect the drugs on a bi-weekly basis. Similar results were reported in the Ministry of Health report where adolescents who had timely drug refills were more adherent to ART as compared to those who never had timely drug refills[41]. Waiting time on the appointment day to pick the drugs was associated with adherence to

antiretroviral treatment ($\chi2$ = 75.71, P = 0.011). Respondents who waited for less than an hour were more likely to adhere as compared to those who waited for longer. Similarly, a study carried out in Zimbabwe on the contextual and psychological influence on antiretroviral therapy adherence in rural Zimbabwe revealed that ensuring privacy at clinics and waiting areas gave great courage to adolescents to freely seek ART services [42]. Patients are less likely to miss appointments if they are attended to within a reasonable time. Skovdal's [43] study revealed that patients who experienced long waiting hours were discouraged from going to the clinics for their monthly reviews and refills. Waiting for long hours is stressful, and sometimes it can be worsened by poor interpersonal communication between patients and healthcare providers, where patients are sometimes asked to sit down on the floor when benches are all occupied.

CONCLUSION

The study concludes that there is a substantial issue with adherence to antiretroviral therapy among HIV-positive youth patients in Kiryandongo District, with only 33% adhering to the treatment regimen. Factors influencing adherence are multifaceted and encompass individual, drug-related, and healthcare factors. The findings suggest a need for targeted interventions to improve adherence rates, including addressing stigma, enhancing education and counseling, improving drug accessibility, and reducing waiting times.

RECOMMENDATIONS

The research suggests several recommendations to improve adherence to antiretroviral therapy (ART) among HIV-positive youth in Kiryandongo District. These include implementing adherence promotion programs that address individual factors like age, gender, and education level, ensuring consistent drug supply, strengthening healthcare infrastructure, offering education and counseling sessions, reducing waiting times, and reducing stigma. Additionally, healthcare facilities should focus on establishing more rural facilities and reducing the distance between patients' homes and clinics. Healthcare providers should also offer routine education and counseling sessions on ART adherence to reduce misconceptions and improve knowledge about HIV treatment. Stigma reduction programs and campaigns should be developed to combat the stigma associated with HIV. Regular monitoring and follow-up of patients should be implemented to track adherence and provide timely interventions for those at risk of non-adherence. These recommendations aim to improve health outcomes and quality of life for HIV-positive youth in Kiryandongo District.

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