Original Article

Perceived Family Support And Patterns Of Medication Adherence Among Adult Patients Attending Antiretroviral Clinic Of A Tertiary Hospital Of Gusau, Northwest Nigeria

***Bello MB[1], Grema BA[2], Mohammed BA[3], Idris RI[1], Fatusin AJ[4], Fatusin BB[5], Akogwu HS[1], Daninna ZM[1], Umar A[6], Shehu A[7], Muhammad J[8].**

[1]*Department of Family Medicine, Federal Medical Centre,Gusau, Zamfara State, Nigeria.*
[2]*Department of Family Medicine, Aminu Kano Teaching Hospital, Kano, Kano State, Nigeria.*
[3]*Department of Obstetric and Gynaecology, Federal Medical Centre,Gusau, Zamfara State, Nigeria.*
[4]*Department of Family Medicine, University College Hospital, Ibadan, Oyo State, Nigeria.*
[5]*Department of Family Medicine, Federal Medical Centre, Abeokuta, Ogun State, Nigeria.*
[6]*Department of Internal Medicine, Federal Medical Centre, Gusau, Zamfara State, Nigeria.*
[7]*Department of Community medicine, Federal medical Centre, Gusau, Zamfara State, Nigeria.*
[8]*Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Federal University Birnin Kebbi, Kebbi State, Nigeria.*

Article History
Submitted: 01/04/2026, Accepted: 16/04/2026, Published: 25/04/2026

***Correspondence:** BELLO Mustapha Baura.
Email: baura01.mb@gmail.com

ABSTRACT

Human immunodeficiency virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) remain major global health concerns, with about 37.7 million people living with HIV and 28.2 million accessing antiretroviral therapy (ART). Increased ART use has significantly improved treatment outcomes, delayed disease progression, and enhanced survival. However, optimal adherence is essential for viral suppression, and this is influenced by patient-related, socioeconomic, therapy-related, disease-related, and healthcare provider factors. Family support, an important socioeconomic factor, plays a key role in improving adherence among patients with chronic conditions like HIV. This study determined the relationship between perceived family support and medication adherence among adult patients attending the ARV clinic of the Federal Medical Centre, Gusau. A hospital-based cross-sectional study was conducted among 239 patients aged 18 years and above, selected using systematic random sampling over 18 weeks. Data were collected using a self-administered questionnaire covering socio-demographic characteristics, the 20-item Perceived Family Support Scale, the 8-item Morisky Medication Adherence Scale, clinical variables, and viral load, with <1,000 copies defined as good suppression. The mean age of participants was 36.64 ± 10.52 years, with females constituting 64.4%. Most respondents (79.9%) had good medication adherence, while 86.6% reported good family support. A strong positive monotonic relationship was found between perceived family support and adherence (Spearman's rho = 0.737, p = 0.01). Lower adherence was associated with low education, being married, poverty, longer duration on ART, and poor family support. The findings indicate that family support significantly improves adherence; therefore, integrating family support assessment into routine care, strengthening family involvement, promoting positive healthcare provider attitudes, improving access to treatment, reducing out-of-pocket costs, and fostering community support to reduce stigma are recommended to enhance adherence and viral suppression.

Keywords: ARV Medication Adherence, HIV Viral Load, Human Immunodeficiency Virus (HIV), Perceived Family Support

INTRODUCTION

Human immunodeficiency virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) remain global concerns. An estimated 37.7 million people live with HIV/AIDS (PLWHA), with about 28.2 million accessing antiretroviral therapy as of June 30, 2021.[1] The HIV-related mortality in sub-Saharan Africa declined from 45–88 to 14–46 deaths per 1000 person-years following widespread ART programmes.[2] Increased ART use has improved treatment response, delayed AIDS onset, and enhanced survival, although effectiveness requires at least 95% adherence.[3] Adherence is defined as following prescribed treatment, predicts viral suppression, while poor adherence leads to drug resistance and higher mortality.[3,4] It is influenced by patient, provider, and clinical factors, including psychological vulnerability, unstable social conditions, religious beliefs, forgetfulness, work demands, perceived illness, and distance to clinics.[5] System-level factors such as counselling, support groups, and family support also improve adherence.[5]

Article Access
Website: www.wjmbs.org
10.5281/zenodo.19926996

How to cite this article
Bello MB, Grema BA, Mohammed BA, Idris RI, Fatusin AJ, Fatusin BB, Akogwu HS, Daninna ZM, Umar A, Shehu A, Muhammad J. Perceived Family Support And Patterns Of Medication Adherence Among Adult Patients Attending Antiretroviral Clinic Of A Tertiary Hospital Of Gusau, Northwest Nigeria, West J Med & Biomed Sci. 2026;7(2):165-171. DOI:10.5281/zenodo.19926996

Family is a social unit connected by birth, marriage, residence, or emotional bonds. Family support includes provision of basic needs and emotional care.[6] It significantly influences members' functioning and may be disrupted by illness. After HIV disclosure, adequate family support helps reduce depression, risky behaviours, and improves treatment-seeking and quality of life.[6] It also fosters cohesion and normalizes chronic conditions like HIV. Poor family support reduces adherence and may increase fear of stigma, even within households.[5,6]

A meta-analysis reported adherence rates of 57% in sub-Saharan Africa and 55% in North America, indicating suboptimal levels.[7] In Nigeria, adherence varies: 83.2% in Sokoto [8], 62.8% in Keffi [9], and 92.6% in Ilorin.[10] Strong family support enhances adherence and reduces loss to follow-up, though stigma continues to hinder care.[5,7] Studies in Uganda and Nigeria show that social and family support significantly improve ART adherence, while low perceived support is linked to unemployment and poorer outcomes.[11,12,13] Anecdotal evidence from the study centre suggests family support is an underutilized resource, highlighting the need to examine its relationship with medication adherence to improve outcomes

MATERIALS AND METHODS

Study Design, Population, and Area

This study was a hospital-based cross-sectional study conducted at the HIV clinic of the Federal Medical Centre, Gusau (FMC Gusau). Gusau is the capital of Zamfara State, Nigeria. The State was created on October 1, 1996, by the former military head of state. The State has fourteen local government areas. The State has a population of 4.52 million, and agriculture is the major occupation. The majority of people in Gusau are Hausa-Fulani, with a small number of Yorubas, Igbos, and members of other ethnic groups. They mostly practice Islam, and a few practice Christianity.[14]

All consenting 18-year and above patients who were accessing care at the HIV clinic of FMC, Gusau, and had been on HAART for the previous six months were included, while those who were too ill and required urgent or emergency care, those with cognitive impairment to avoid recall bias, and pregnant women were excluded.

The sample size was calculated using the Leslie Kish formula.

$n = Z^2pq / d^2$

Where:

n = desired sample size

z = z-score on the normal standard distribution, below which lies 95% of the distribution, 1.96

p= estimate of the population prevalence rate = 83.2% self-reported adherence, according to a study report done in Sokoto, Nigeria (0.832).[8]

n= 215 is the minimum sample size.

Using $n^* = n/(1 - r)$

Where r was the non-response rate.

Therefore, a 10% non-response rate was added, which resulted in a finite Sample size of 239.

The participants for the study were recruited using systematic random sampling. There were 10,230 registered patients. The clinic operates twice a week (Tuesdays and Wednesdays), and the average number of patients seen per clinic day was 22. Therefore, 44 patients were seen in a week, which made up the total population of 792 patients over 18 weeks.

The sampling interval was calculated using the formula K = N/n.

Where:

N = sample frame=792

n= sample size = 239

Hence, $K = 792/239 = 3.31 \approx 3$

The first participant was selected from the registration point using a simple balloting among the first 3 consenting patients who met the inclusion criteria. Three small opaque papers were marked with '1= YES' and '2 = NO'. The participants were invited to pick one of the marked ballot papers. The patient who chose 'yes' was the first participant of the day, and subsequently, every third consenting participant was recruited. An average of 7 participants was recruited per clinic day. This process was repeated daily at the clinic until a sample size of 239 was achieved. If the next participant declined consent, the next participant who gave consent was recruited.

A semi-structured, interviewer-administered questionnaire, drafted in the English language, was translated into Hausa by a certified interpreter and then back-translated into the English language for data collection.

The questionnaire consisted of five sections. Section I assessed socio-demographic characteristics, including; gender, age, occupation, ethnicity, marital status, level of education, type of family, family size, monthly income, and religion. Section II used a 20-item validated family support scale to measure perceived family support. Section III used the Morisky Medication Adherence Scale (MMAS-8) to assess medication adherence. Section IV assessed physical variables, including blood pressure, ARV name, duration of medication, other medications, weight, height, and calculated BMI. Participants were asked to remove shoes and heavy clothing, climb a Seca weighing and stadiometer instrument, and calculate their BMI. Section V assessed HIV viral load using a real-time PCR machine.

Data management and analysis

All data collected were sorted out and entered into a personal computer using the IBM Statistical Package for the Social Sciences version 25.0 software. Frequency tables were used to represent socio-demographic data, and descriptive statistics, including mean, mode, median, and standard deviation, were calculated. Bar charts were used to present respondents' levels of family support, and a pie chart was used for medication adherence. The relationship between family support and medication adherence was analysed with Spearman's rank correlation. The level of significance was set at $p < 0.05$. Logistic regression analysis was used to determine the predictors of medication adherence, which was dichotomized into two categories: good adherence (score of 8) and poor adherence (score ≤ 7).

Ethical considerations

Approval was obtained from the medical research and ethics committee of FMC, Gusau (Appendix IV).

Informed consent was obtained from respondents (Appendix I) prior to the administration of questionnaires (Appendix II). The participants were informed of their freedom to withdraw from the study at any time, should they wish to do so, without affecting their care or treatment. Maintaining privacy during interactions with each participant and anonymizing the data helped ensure the confidentiality and integrity of all information gathered during the study.

RESULTS

The age range of the respondents was 18–70 years, with a mean age of 36.64 ± 10.5 SD. The largest age group among the respondents was young adults, comprising 128 (53.5%), while the smallest group was the elderly, 3 (1.3%). The majority of respondents were female, 154 (64.4%), compared to males, 85 (35.6%). They were all Nigerians from different ethnic backgrounds, with the majority being Hausa 196 (82%), followed by Yoruba 24 (10%) and Igbo 7 (2.9%). Nearly half of the respondents were unemployed 112 (46.9%). A greater percentage had some level of education, with only 28 (11.7%) having no formal education. Additionally, the majority, 205 (85.8%), practiced Islam.(Table 1)

Young adults (18–39 years) constituted the majority of those with good medication adherence, 142 (74.4%), followed by 46 (24.1%) middle-aged respondents (40–59 years). Among those with weak medication adherence, 28 (77.8%) were young adults, 6 (16.7%) were middle-aged, and 2 (5.5%) were elderly. Among respondents with poor medication adherence, 10 (83.3%) were young adults and 2 (16.7%) were middle-aged. Among respondents with good medication adherence, 86 (45%) were unemployed, 62 (32.5%) were self-employed, and 43 (22.5%) were employed. Among those with poor medication adherence, 8 (66.7%) were unemployed. Of the 191 respondents with good medication adherence, 63 (33%) had secondary education, 51 (26.7%) had tertiary education, and 22 (11.5%) had no formal education. Among 36 respondents with weak medication adherence, 22 (61.1%) had secondary education and 4 (11.1%) had postgraduate education. Among 12 respondents with poor medication adherence, 6 (50%) had secondary education and 4 (33.3%) had tertiary education. Weak medication adherence was observed among 20 (55.6%) respondents below the poverty level, while 12 (100%) of those with poor medication adherence were below the poverty level.(Table 2)

Binary logistic regression analysis revealed that respondents with tertiary and postgraduate education had 5.97 and 5.92 times higher likelihood of having high medication adherence, respectively. Divorced respondents had twice the likelihood of high medication adherence compared to separated respondents and 7.5 times higher likelihood compared to single respondents. Respondents with good family support had a 3.38 times higher likelihood of having high medication adherence than those with weak and poor perceived family support.(Table 3)

Most respondents, 207 (86.6%), reported having good perceived family support, while 24 (10.1%) reported weak perceived family support, and 8 (3.3%) reported poor perceived family support. (Figure 1)

The majority of respondents, 191 (79.9%), had good medication adherence, while 24 (10.1%) had weak medication adherence and 8 (3.3%) had poor medication adherence. (Figure 2)

There was a direct monotonic correlation between perceived family support and medication adherence (rho = 0.737, p = 0.01), indicating a strong positive relationship.

Table 1: Socio–demographic characteristics of the respondents

Variable		Frequency (N=239)	Percentage (%)
Age			
	Young Adult	128	53.5
	Middle-Aged Adult	108	45.2
	Elderly	3	1.3
	Mean ± SD	36.64±10.5	
	Range	18-70	
Gender			
	Male	85	35.6
	Female	154	64.4
Ethnicity			
	Hausa	196	82
	Yoruba	24	10
	Ibo	7	2.9
	Others	12	5.1
Occupation			
	Not employed	112	46.9
	Self-employed	78	32.6
	Gainfully employed	49	20.5
Education			
	None	28	11.7
	Primary	48	20.1
	Secondary	91	38.1
	Tertiary	59	24.7
	Postgraduate	13	5.4
Religion			
	Islam	205	85.8
	Christianity	30	12.6
	Traditional	2	0.8
	Others	2	0.8
Income			
	Below Poverty Line	165	69
	Above Poverty Line	74	31
Marital Status			
	Single	62	25.9
	Married	142	59.4
	Divorced	13	5.5
	Separated	6	2.5
	Widow	16	6.7
Family Type			
	Monogamy	91	38.1
	Polygamy	49	20.5
	Single parent	16	6.7
	Others	83	34.7
Family size			
	1-3	62	25.9
	4-6	128	53.6
	7 &above	49	20.5

Table 2: Relationship between socio-demographic characteristics of respondents and medication adherence

	Medication Adherence	Medication Adherence		
Variable	Good Adherence N= 191 (%)	Weak Adherence N= 36 (%)	Poor Adherence N= 12 (%)	P Value
Age	Age			0.455†
Young Adult	142 (74.4)	28 (77.8)	10 (83.3)	
Middle-Aged Adult	46 (24.1)	6 (16.7)	2 (16.7)	
Elderly	3 (1.5)	2 (5.5)	0 (0.0)	
Occupation				0.364†
Not employed	86 (45.0)	18 (50.0)	8 (66.7)	
Self-employed	62 (32.5)	12 (33.3)	4 (33.3)	
Gainfully employed	43 (22.5)	6 (16.7)	0 (0.0)	
Educational level				0.026†
None	22 (11.5)	6 (16.7)	0 (0.0)	
Primary	42 (22.0)	4 (11.1)	2 (16.7)	
Secondary	63 (33.0)	22 (61.1)	6 (50.0)	
Tertiary	51 (26.7)	4 (11.1)	4 (33.3)	
Postgraduate	13 (6.8)	0 (0.0)	0 (0.0)	
Ethnicity				0.418†
Hausa	154 (80.6)	32 (89.0)	10 (83.3)	
Yoruba	19 (10.0)	2 (5.5)	2 (16.7)	
Ibo	5 (2.6)	2 (5.5)	0 (0.0)	
Others	13 (6.8)	0 (0.0)	0 (0.0)	
Religion				0.775†
Islam	160(83.8)	32 (88.9)	10 (83.3)	
Christianity	27 (14)	4 (11.1)	2 (16.7)	
Traditional	2 (1.1)	0 (0.0)	0 (0.0)	
Others	2 (1.1)	0 (0.0)	0 (0.0)	
Marital status				0.000†
Single	49 (25.7)	8 (22.2)	6 (49.9)	
Married	123 (64.4)	18 (50.0)	2 (16.7)	
Divorced	6 (3.1)	6 (16.7)	0 (0.0)	
Separated	0 (0.0)	4 (11.1)	2 (16.7)	
Widow	13 (6.8)	0 (0.0)	2 (16.7)	
Income				0.014†
Below Poverty Line	133 (69.6)	20 (55.6)	12 (100.0)	
Above Poverty Line	58 (30.4)	16 (44.4)	0 (0.0)	
Family Type				0.002†
Monogamy	82 (42.9)	8 (22.2)	2 (16.7)	
Polygamy	39 (20.4)	10 (27.8)	0 (0.0)	
Single parent	8 (4.2)	6 (16.7)	2 (16.7)	
Others	62 (32.5)	12 (33.3)	8 (66.6)	
Family Size				0.057†
1-3	9 (4.7)	6 (16.7)	0 (0.0)	
4-6	76 (39.8)	10 (27.8)	4 (33.3)	
7 & above	106 (55.5)	20 (55.5)	8 (66.7)	

† Fisher's exact test applied

Table 3: Logistic regression model for predictors of medication adherence

	Medication Adherence	Medication Adherence	Medication Adherence	Medication Adherence	
		95% CI	95% CI		
Variable	OR	Lower	Upper	p value	
Educational level					
None	1.0 (RC)				
Primary	2.31	0.97	7.56	0.034	
Secondary	4.84	0.19	10.29	0.027	
Tertiary	5.97	0.88	7.62	0.016	
Postgraduate	5.92	0.58	7.50	0.001	
Marital status					
Single	1.0(R.C)				
Married	0.51	0.181	1.432	0.201	
Divorced	7.53	0.65	17.20	<0.001	
Separated	3.21	0.11	7.40	<0.001	
Widow	0.92	0.51	1.35	0.052	
Income					
Below Poverty Line	0.54	0.06	1.32	0.004	
Above Poverty Line	1.0 (RC)				
Family Type					
Monogamy	15.06	0.99	21.01	<0.001	
Polygamy	3.42	0.21	13.28	<0.001	
Single parent	2.13	0.87	6.82	<0.001	
Others	1.0 (RC)				
Duration on drugs					
< 5 years	3.46	0.78	9.10	<0.001	
5-9 years	2.22	0.62	7.91	<0.001	
10 and above	1.0 (RC)				
Perceived Family Support					
Good	3.38	0.46	10.89	0.004	
Weak	1.11	0.23	3.29	0.031	
Poor	1.0(R.C)				

Model variance R2: 0.7368, OR =Odds Ratio, CI =Confidence Interval, RC = Reference category.

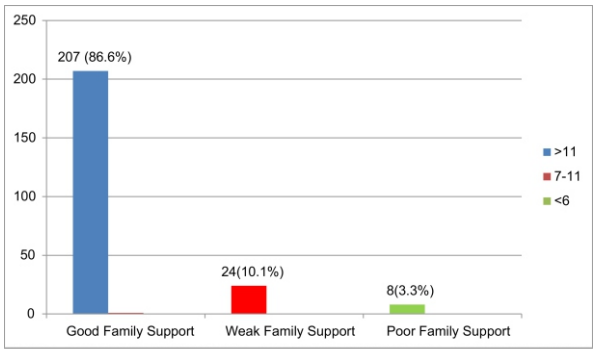

Figure 1: Level of Perceived Family Support among the respondents on HAART

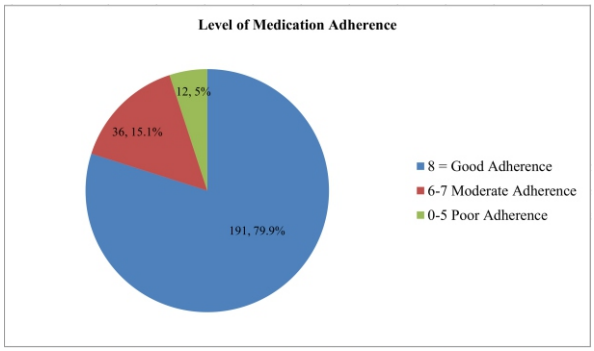

Figure 2: Pattern of medication adherence among the respondents on HAART

DISCUSSION

The study assessed the relationship between perceived family support and medication adherence among patients attending the ART clinic of the Federal Medical Centre, Gusau, Northwest Nigeria. The study showed a model age range of 18-70 years with a mean age of 36.64 ± 10.5 SD. More than half (53.6%) of the respondents were young adults less than 40 years old, with a female preponderance (64.4%), which could be because younger age groups are the most sexually active, with a higher rate of unprotected sexual intercourse, drug abuse, and females are the recipients during intercourse, which predisposes them to HIV infection. The majority of the respondents were Hausa by tribe (82%) and identified as Muslims (85.8%). This signifies the predominant characteristics of the study area.

This study found respondents with tertiary and postgraduate education had about six times higher odds of optimal medication adherence when compared to those with no formal education, corroborating Chinweokwu NU et al.[13] It is important to note that marital status alone does not accurately reflect the level or quality of social and family support an individual receives. Social support refers to the network of relationships through which people obtain both tangible assistance (such as financial or physical help) and intangible support (such as encouragement and guidance) from family, friends, and the wider community.[13,16] In this study, divorced respondents were twice as likely to adhere to medication as separated and about eight times as likely as single respondents, suggesting that support from extended family or social networks may be more important than marital status itself.[13,16] This implies that even married individuals may have poor adherence if family dynamics are weak, while divorced individuals may still achieve satisfactory adherence through strong extended family social support systems. These findings are consistent with existing evidence that family social support plays a crucial role in improving adherence to antiretroviral therapy among people living with HIV.[13,16] Similarly, respondents who were above the poverty line had good perceived family support and high adherence to treatment, highlighting the importance of a financially supportive environment.[13,16]

The respondents' family support was found to be high (86.6%), as measured using the Perceived Social Support Family Scale (PSS-Fa). Those with weak and poor support constitute 10.1% and 3.3% respectively. This finding is similar to that of Yekini et al. in Kogi State, Nigeria, who found that most respondents (62.1%) had good family support.[16] The similarity may be because they are both hospital-based cross-sectional studies, and the same scale (perceived social support family-scale (PSS-Fa) was used to assess the family support. On the contrary, Desalegn et al. in western Ethiopia, found that 66.4% of the respondents had poor family support. This is probably due to the different socio-cultural status of the study respondents and the different scales (Multi-Dimensional Scale of Social Support- MDSS) used in both studies to assess the family and social support status of PLWHA on ART patients [17]

The level of medication adherence was found to be high among respondents (79.9%). This finding is consistent with results from a study done in 2023 by Inoue Y, et al. on medication adherence of people living with HIV in Japan, where they found 64.6% medication adherence.[18] The similarity may be due to the fact that they were both cross-sectional studies with the same methodology, and the same Morisky Medication Adherence Scale-8 was used to assess medication adherence. In the same vein, Afolabi et al. in a study on the roles of family dynamics on adherence to highly active antiretroviral therapy among people living with HIV/AIDS at a tertiary hospital in Oshogbo, south-west Nigeria, found that a majority of the study respondents, 95.5% had good medication adherence.[19] However, medication adherence was measured using patients' pill counting. Conversely, Jackson IL, et al in 2020, reported 11.7% medication adherence in their study on medication adherence and health status in HIV-positive patients in Akwa-Ibom State, Nigeria .[20] This is probably due to the different medication adherence scales (7-item Adherence to Refills and Medication Scale (ARMS)) used. Additionally, poor medication adherence may reflect the patient's poor understanding of the illness. Furthermore, adherence rates across different locations and time intervals between the studies could be the result of a variety of factors, including actual variations or the use of alternative standards when measuring these statistics.

The study found a significant relationship between family support and adherence to ARV medication, with a Spearman's *rho of* 0.737 ($P < 0.01$). This finding is in keeping with other studies, which showed that patients who had good family support had a higher likelihood of adherence to their ARV medication. For instance, in a study by Li XM, et al. in Beijing, China, PLWHA received

a one-year social support programme intervention. The difference in medication adherence scores before and after the social support intervention was assessed. The finding demonstrated a statistically significant difference in medication adherence between the pre-intervention and post-intervention periods. [21] It showed that post-social support intervention improved the respondents' medication adherence. The finding in the index study was also similar to a hospital-based cross-sectional study by Yekini et al. in Kogi State, Nigeria, where they used the same scales to assess both perceived family support and medication adherence. They found a statistically significant association between perceived family support and adherence to ARV medication.[16] Similarly, Knight L, et al., in Urban South Africa found that family members provide PLWHA with the majority of their support, which can help with ART adherence and care retention.[22] In another study by Dalmida et al. in the Southeastern USA, it was found that family social support was associated with medication adherence among HIV-infected adolescents.[23] This study used a self-administered questionnaire for assessing the respondents' family support and medication adherence. A rare observation was made in a 2018 study conducted by Chinweokwu et al. in Asaba, Nigeria, where they found that the adherence rate among participants was 24%. Additionally, 55% of the respondents reported having high family support, but a weak relationship was found between family support and adherence to HAART.[13] The reason for this rare finding could have been due to the scales used: the Rational Pharmaceutical Management (RPM) and the Perceived Social Support Family Scale by Procidiano and Heller, to measure medication adherence and family support, respectively.

CONCLUSION

In this study, family support was high among the study respondents. The study also found high medication adherence among the respondents. Furthermore, family support was found to have a significant positive association with medication adherence, as indicated by a Spearman rank correlation of $rho = 0.737$ ($P < 0.01$).

It is essential for clinicians to incorporate perceived family support assessment into their clinical practice when managing PLWHA, given the positive association between family support and ARV medication adherence, as supported by this study.

RECOMMENDATIONS

This study found that high medication adherence is linked to higher levels of family support. It is therefore recommended that healthcare providers focus on assessing, improving, and maintaining high family support among this group of patients, fostering positive staff attitudes, patient empathy, and cooperation. Healthcare facilities should focus on improving peer support group counseling, providing reminders, and subsidizing point-of-care investigations for patients with comorbidity. Furthermore, the government and policymakers should increase screening for HIV and treatment coverage through community-based surveys, increase fixed ARV and convenient medications with low side effects, reduce out-of-pocket costs at the point of care, and encourage social support from the community to reduce stigmatization.

LIMITATIONS

i. This was a hospital based study and may not be the true reflection of the general population.
ii. The study was a cross-sectional and one cannot ascribe causation to any of the factors as being responsible for the outcome.
iii. The study was based on patients self-report that may be limited by recall bias.

REFERENCES

1. UNAIDS: Nigerians living with HIV/AIDS 2019. https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2019/march/20190314_nigeria (accessed 20 March 2022).
2. Kibuuka H, Musingye E, Mwesigwa B, Semwogerere M, Iroezindu M, Bahemana E, et al. Predictors of All-Cause Mortality Among People With Human Immunodeficiency Virus (HIV) in a Prospective Cohort Study in East Africa and Nigeria. Clinical Infectious Diseases. 2022;75(4):657-64.
3. Bezabhe WM, Chalmers L, Bereznicki LR, Peterson GM. Adherence to Antiretroviral Therapy and Virologic Failure: A Meta-Analysis. Medicine (Baltimore). 2016;95(15):e3361. doi: 10.1097/MD.0000000000003361 (accessed 20 March 2024).
4. Dorcélus L, Bernard JJ, Georgery C, Vanessa C. Factors associated with antiretroviral therapy adherence among people living with HIV in Haiti: a cross-sectional study. AIDS Res Ther. 2021; 18(1):81. doi:10.1186/s12981-021-00405-4. (accessed 20 March 2024).
5. Adejumo OA, Malee KM, Ryscavage P, Hunter SJ, Taiwo BO. Contemporary issues on the epidemiology and antiretroviral adherence of HIV-infected adolescents in sub-Saharan Africa: A narrative review. J Int AIDS Soc. 2015;18(1):20049. doi:10.7448/IAS.18.1.20049 (accessed 20 March 2024).
6. Ammon N, Mason S, Corkery JM. Factors impacting antiretroviral therapy adherence among human immunodeficiency virus–positive adolescents in sub-Saharan Africa: a systematic review. Public Health. 2018;157:20-31. doi:10.1016/j.puhe.2017.12.010. (accessed 20 March 2024).
7. AKharsany AB, Karim QA. HIV infection and AIDS in sub-Saharan Africa: current status, challenges and opportunities. The Open AIDS Journal. 2016; 10:34-48.
8. Abdulsamad H, Oche OM, Raji MO, Mohammed Y. Prevalence and factors associated with treatment adherence among patients on highly active antiretroviral therapy (HAART) in Specialist Hospital, Sokoto, Nigeria. International Archives of Medical and Health Research 2019; 1(2):22-28 .
9. Pennap GR, Abdullahi U, Bako IA. Adherence to highly active antiretroviral therapy and its challenges in people living with human immunodeficiency virus (HIV) infection in Keffi, Nigeria. Journal of AIDS and HIV Research. 2013; 5(2):52-59

10. Anyaike C, Atoyebi OA, Musa OI, Bolarinwa OA, Durowade KA, Ogundiran A, et al. Adherence to combined Antiretroviral therapy (cART) among people living with HIV/AIDS in a Tertiary Hospital in Ilorin, Nigeria. Pan African Medical Journal. 2019; 32(1):10-17.
11. Damulira C, Mukasa MN, Byansi W, Nabunya P, Kivumbi A, Namatovu P, et al. Examining the relationship of social support and family cohesion on ART adherence among HIV-positive adolescents in southern Uganda: baseline findings. Vulnerable Child Youth Stud. 2019;14(2):181-190.
12. Folasire OF, Akinyemi O, Owoaje E. Perceived social support among HIV positive and HIV negative people in Ibadan, Nigeria. World Journal of AIDS. 2014;4(1)15-26.
13. Chinweokwu NU, Onuoha FM, Alabi AN, Nwajei AI, Owolabi AO, Achigbu KI, et al. The relationship between perceived family support and adherence to highly active anti-retroviral therapy among people living with human immunodeficiency virus in a tertiary health facility in Nigeria. International research journal of medicine and medical science 2018; 6(3):79-84
14. Nigeria Bureau of Statistics. Population Statistics. https://nigerianstat.gov.ng (accessed 10 July 2024).
15. Wikipedia. Federal Medical Centre Gusau. Doi: Doi:en.wikipedia.org/wiki/Federal_Medical_Centre, _Gusau, Gusau (accessed 5 September 2025).
16. Yekini IA, Benjamin AA, Kayode FI, Adekola AI. Medication adherence and social support in people living with HIV/AIDS (PLWH) in Kogi State, Nigeria. Journal of AIDS and HIV Research. 2023:15(1):26-40.
17. Desalegn M, Gutama T, Merdassa E, Kejela G, Benti W. Family and Social Support Among Patients on Anti-Retroviral Therapy in West Wollega Zone Public Hospitals, Western Ethiopia: A Facility-Based Cross-Sectional Study. HIV AIDS (Auckland). 2022;14:167-179.
18. Inoue Y, Oka S, Yokoyama S, Hasegawa K, Mahlich J, Schaede U, et al. Medication Adherence of People Living with HIV in Japan—A Cross-Sectional Study. InHealthcare 2023:11(4):451.
19. Afolabi BA, Afolabi MO, Afolabi AA, Odewale MA, Olowookere SA. Roles of family dynamics on adherence to highly active antiretroviral therapy among people living with HIV/AIDS at a tertiary hospital in Osogbo, south-west Nigeria. African health sciences 2013; 13(4):920-926
20. Jackson IL, Umoh SS, Erah PO. Medication adherence and health status in HIV positive patients in Akwa-Ibom State, Nigeria. Tropical Journal of Pharmaceutical Research. 2020;19(10):451-459.
21. Li XM, Yuan XQ, Rasooly A, Bussell S, Wang JJ, Zhang WY. An evaluation of the impact of social support and caregiving on medication adherence of people living with HIV/AIDS: A nonrandomized community intervention study. Medicine (Baltimore). 2018;97(28):e11488. doi: 10.1097/MD.0000000000011488. (accessed 20 March 2024).
22. Knight L, Schatz E. Social Support for Improved ART Adherence and Retention in Care among Older People Living with HIV in Urban South Africa: A Complex Balance between Disclosure and Stigma. Int J Environ Res Public Health. 2022;19(18):11473. doi: 10.3390/ijerph191811473. (accessed 20 March 2024).
23. Dalmida SG, McCoy K, Koenig HG, Miller A, Holstad MM, Thomas T, et al. Examination of the role of religious and psychosocial factors in HIV medication adherence rates. Journal of religion and health. 2017;56(6):2144-2161.