



# Adherence Level and Determinants of Non-Adherence to Antiretroviral Therapy among People Living with HIV/AIDS Attending Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>1</sup>Abdulwasiu A. Busari, <sup>2</sup>Ibrahim Oreagba, <sup>3</sup>Musa Abdullahi, <sup>2</sup>Ismail Ishola, <sup>2</sup>Sikiru Usman and <sup>1,2</sup>Sunday Olayemi

Departments of <sup>1</sup>Medicine and <sup>2</sup>Pharmacology  
College of Medicine, University of Lagos, P.M.B 12003, Lagos, Nigeria.  
<sup>3</sup>Aminu Kano Teaching Hospital, Kano, Nigeria.

Author for correspondence

Abdulwasiu A. Busari

Phone: +2348033011555. Email: busarial@yahoo.com

## STRACT

**Background:** Highly active antiretroviral therapy (HAART) has dramatically reduced the morbidity and mortality among HIV-infected individuals. However, antiretroviral (ARV) drug requires strict adherence (> 95%) for attainment of optimal clinical and survival benefit in patients. This study aimed to assess the level of adherence to ARV, factors affecting adherence and relationship of ARV adherence to CD4 count.

**Method:** This is a cross sectional descriptive study of 200 HIV- infected individuals attending Aminu Kano Teaching Hospital HIV/ AIDS specialist clinic. Data was obtained using structured interviewer administered questionnaire. Patients were followed for a period of six month. A baseline CD4 count and post study count were retrieved from the patient's record all of which took place within 6 months period.

**Results:** The percentages of male and females were 53% and 47% respectively. The result showed 75.5% adherence level to ARV among the respondents. Reasons for non-adherence included: Forgetfulness, busy schedule, traveling, pill burden, drug exhaustion and drug adverse effect. Shorter duration of commencement of therapy <1 year

was significantly associated with improved adherence ( $p < 0.05$ ). Furthermore, there was a statistically significant improvement of the CD4 count among individuals who were adherent with their medication at six months ( $p < 0.05$ ).

**Conclusion:** This study has shown an improvement in adherence levels amongst HIV infected patients attending AKTH HIV/AIDS specialist clinic. The adherence levels were significantly associated with improved mean CD4 counts. However there is still room for improvement. Patients were more adherent during the early period of treatment (<1year). Furthermore, Psycho-social factors rather than sociodemographic factors were associated with non-adherence behaviour. Strategies to improve adherence is still much needed.

**Key Words:** Adherence, Non-adherence, antiretroviral (ARV) drug, HIV/AIDS, determinants.

## INTRODUCTION

The Human Immunodeficiency Virus (HIV) infection affects over 34 million people worldwide<sup>1</sup>. Sub-Saharan Africa, the epicenter of HIV infection has over two thirds of all people living with HIV and AIDS (PLWHA) globally<sup>1</sup>. Nigeria is in the second position worldwide behind South Africa with estimated population of 3.3 million of

PLWHA and overall national prevalence was put at 3.6%<sup>1,2</sup>.

Highly active antiretroviral therapy (HAART) has dramatically reduced the morbidity and mortality among people living with HIV and AIDS (PLWHA)<sup>3-5</sup>. In 2006, Nigeria began a programme that aimed to provide ARV drugs at no cost to about 250 000 HIV-positive residents. As of 2006, there were about 74 treatment sites for HIV/AIDS in Nigeria and ARVs are currently delivered free of charge to people living with HIV and AIDS (PLWHA) at these centres<sup>6</sup>. However, only about 15% of those with HIV/AIDS needing ARV drugs in Nigeria had access to them at the end of 2010<sup>7</sup>.

Antiretroviral (ARV) drug requires strict adherence > 95% for attainment of optimal clinical and survival benefit in patients<sup>3,5</sup>. Adherence to HIV treatment regimen is defined as taking pills in all the prescribed doses at the right time, in the right doses and in the right way<sup>9</sup>.

Non-adherence to ARV medication has been shown to lead to viral resistance, treatment failure, toxicities and waste of financial resources resulting in increased morbidity and mortality<sup>10-15</sup>. In earlier studies in Nigeria, varying level of adherence has been reported. For example, the level reported in studies conducted in Kano, Niger Delta



### Study Population

The study consisted of HIV infected patients attending AKTH HIV/AIDS specialist clinic who consented to the study. Inclusion criteria included HIV infected patients whose age was between 20 and 60 years and on ARV drugs for at least one month and above. Exclusion criteria included pregnant women, nursing mothers, patients with age < 18 years and age > 60 years, patients who were not on HAART, those who were less than one month on ARV drugs, patients with co-morbidities like tuberculosis and severe devastating illness that could serve as confounding factors and patients with no base line CD4 count in their folders.

### Sample size calculation

A hundred (200) HIV positive patients who met the inclusion criteria and were attending the HIV clinic were recruited into the study. Sample size of 200 was calculated using the fisher's formula<sup>33</sup>. However this was increased to 200 to accommodate for attrition and allow more patients to benefit in the study.

### Data Collection

Through a structured interviewer administered questionnaire, information on socio-demographic variables was obtained. Duration of treatment and dosage regimen were documented. Patients self-report about the number of doses missed, starting with a day prior to the interview, then one week and 30 days. Patient taking 95% or more of the prescribed drugs in the three day period preceding the interview were considered adherent<sup>34</sup>. The reasons for not taking their drugs as prescribed were obtained. Patients were followed up for a period of six months. A base line CD4 count and post study count were collected from the patient's folder all of which took place within 6 months. The machine for measuring CD4 count was available at the HIV/AIDS center at no cost to the respondents.

### Data Analysis

The generated data was analyzed using statistical package for social science (SPSS<sup>®</sup>) version 12. Absolute numbers

and simple percentages were used to describe categorical variables while continuous variables was presented as mean  $\pm$  standard deviation (SD). The student's t-test was used to compare means while chi-square was used to compare proportions. A p-value of less than 0.05 was considered statistically significant.

### RESULT

A total of 200 subjects participated in the study with 53% males and 47% females. The mean age of the respondents was 32.8 years. Majority (44.5%) were within the age range between 31 - 40 years (Table 1). Older age group between 50 - 60 years was least represented (5.5%) with 11 respondents in that group. Sixty nine (34.5%) and 31 (15.5%) were within the age ranges of 20-30 years and 41 - 50 years respectively. Majority of the respondents (63.5%) were married and 38.5% of them were self employed. The rest were civil servants and unemployed. Most of the respondents were educated, with majority (37%) attaining post secondary educational status.

**Table 1:** Socio-demographic characteristics of HIV/AIDS patients in A.K.T.H

Variables	N (%)	AG n (%)	NAG n (%)	df	X <sup>2</sup>	P value
<b>Age (years)</b>						
20-30	69 (34.5)	49 (71.0)	20 (29.0)	3	1.471	0.689
31-40	89 (44.5)	68 (76.4)	21 (23.6)			
41-50	31 (15.5)	25 (80.6)	6 (19.4)			
51-60	11 (5.5)	9 (81.8)	2 (18.2)			
<b>Gender</b>						
Male	106 (53)	81 (76.4)	25 (23.6)	1	1.102	0.749
Female	94 (47)	70 (74.5)	24 (25.6)			
<b>Marital status</b>						
Married	127 (63.5)	97 (76.3)	30 (23.7)	3	1.014	0.798
Widowed	29 (14.5)	23 (79.3)	6 (20.7)			
Divorced	12 (6.0)	8 (66.6)	4 (33.4)			
Single	32 (16.0)	23 (71.8)	9 (28.2)			
<b>Employment</b>						
Employed	60 (30.5)	45 (76.6)	14 (23.4)	2	0.307	0.858
Unemployed	63 (31.5)	46 (73.0)	17 (27.0)			
Self employed	77 (38.5)	59 (76.6)	18 (23.4)			
<b>Education</b>						
Primary	24 (12.0)	20 (83.3)	4 (16.7)	3	4.078	0.253
Secondary	73 (36.5)	59 (80.8)	14 (19.2)			
Post secondary	74 (37.0)	53 (71.6)	21 (28.4)			
Non-formal	29 (14.5)	19 (65.5)	10 (34.5)			



N = Frequency of participants in a category, n = Sub frequency in level of adherence / non adherence, % = Percentage distribution, AG = Adherence group ( $\geq 95\%$ ), NAG = Non-adherence group ( $\leq 95\%$ ), df = Degree of freedom p value\* = Significant at  $< 0.05$

Overall adherence level was 75.5% indicating that 24.5 % of the respondents were not adhering fully to their drug regimen. The socio-demographic variables such as age, gender, marital status, employment status and educational background

were not significantly associated with the level of adherence, each having a p-value  $> 0.05$  (Table 1).

Major reasons for non-adherence among the respondents included forgetfulness 30 (61.2%), busy schedule 8 (16.3%), travelling 6 (12.2%) and pill burden 2 (4.4 %), (Table 2). Shorter duration of commencement of therapy  $< 1$  year was significantly associated with better adherence level ( $p < 0.041$ ), (Table 3).

The overall mean base line CD4 count of the respondents at the beginning of the study was 315.42 cell/microlitre.

For the adherent group, a mean base line CD4 count of 330.14 cell/microlitre was recorded while the non adherent group had mean base line CD4 count of 300.69 cell/microlitre. (Table 4). The 6-month outcome mean CD4 count in adherent group and non-adherent group were 388.13 and 329.83 cell/microlitre respectively. Furthermore, there was a statistically significant improvement of the CD4 count among individuals who were adherent with their medication at six months outcome ( $p = 0.005$ ).

**Table 2:** Reasons for Non-Adherence among HIV/AIDS patients in AKTH

Variables	NAG <sub>n</sub>	(%)
Lack of transport money	1	2.0
Pill burden	2	4.1
Adverse effects	1	2.0
Travelling	6	12.2
Forgetfulness	30	61.2
Busy schedule	8	16.3
Exhaustion of drugs	1	2.0
<b>Total</b>	<b>49</b>	<b>100</b>

n = Frequency of participants in a category, NAG = Non - adherence group

**Table 3:** Association between Adherence level and duration of therapy among HIV/AIDS patients

Duration on therapy	N (%)	AG <sub>n</sub> (%)	NAG <sub>n</sub> (%)	df	X <sup>2</sup>	P
Less 1 year	94(47.0)	73(77.66)	21(22.34)	3	8.240	0.041*
1 year and above	106(53.0)	78(73.58)	28(26.42)			
<b>Total</b>	<b>200(100)</b>	<b>151(100)</b>	<b>49(100)</b>			

N = Frequency of participants in a category, n = Sub frequency in level of adherence / non adherence, % = Percentage distribution, AG = Adherence group ( $\geq 95\%$ ), NAG = Non - adherence group ( $\leq 95\%$ ), df = Degree of freedom, X<sup>2</sup> = chi-square, p value\* = Significant at  $< 0.05$



Table 4: Relationship between adherence and mean CD4 count in HIV/AIDS patients.

Variables	Baseline Value CD4	6-month Outcome CD4	df	t	P
AG					
(n = 151)	330.14	388.13	150	2.835	0.005*
NAG					
(n = 49)	300.69	329.83	48	0.951	0.347

n = Sub frequency in level of adherence / non adherence, % = Percentage distribution, AG = Adherence group ( $\geq 95\%$ ), NAG = Non - adherence group ( $\leq 95$ ), df = Degree of freedom, p value\* = Significant at < 0.05

## DISCUSSION

availability of HAART in Nigeria *the initiation of* programmes that led to provide ARV drugs at no cost to individuals infected with HIV have undoubtedly boosted the adherence level with resultant reduction in the morbidity and mortality.

About 75% of individuals in this study achieved the required adherence level. However, one-quarter of them did not adhere to their drug regimen and therefore did not attain the target adherence level.

The overall adherence level in this study is similar to those reported in the Enugu, South-East Nigeria (75.3%) and in Abuja-South-West Nigeria (85%)<sup>18,38</sup>.

This is also comparable to the average adherence of 77% reported in most African countries<sup>35</sup>. However, it is of higher value than the 54% adherence level reported in a previous retrospective study conducted in AKTH three years earlier<sup>16</sup>.

The higher adherence level in this study may be explained by the fact that factors such as shortages of adherence staff, non-conducive office accommodation for the staff and non-availability of pill boxes identified to be responsible for low adherence in the previous study had been addressed. Improvement in the awareness level

about HIV and drug adherence as well as the establishment of the adherence /counseling unit of AKTH / PEPFAR ACTION PROJECT in May 2005 in the hospital were additional factors for improved adherence level.

Factors such as forgetfulness, busy schedule and pill burden were similarly reported as determinants of poor adherence among AIDS patient in Lagos<sup>36</sup>. Lack of partners or guardians who could remind or encourage patients on ARVs to take their drugs may have contributed to their forgetfulness to take the medicine at home and during the travel period. Presence of adverse drug reactions was identified as a determinant of non-adherence in this study and this finding is consistent with other studies reported in the literature [36,37].

Although drugs were given free of charge, some indigent patients who could not afford transport fare to the centre found it difficult to attend clinic regularly and this contributed to their non-adherence. Low economic status has been reported to be associated with poor adherence in other studies<sup>37,38</sup>.

Non availability of drugs at the centre was not a reason for non-adherence because the drugs were free and no

stock out was experienced during the period of study. This finding was in contrast to a study from Enugu (Nigeria) where one of the most common reasons for non-adherence was non availability drugs which were not free at the treatment centre at that period<sup>38</sup>.

Shorter duration of commencement of therapy <1 year was significantly associated with better adherence ( $p < 0.05$ ). This finding may be explained by the fact that clinical improvement and better quality of life experienced in the first year of commencement of ARV therapy by infected individuals may have encouraged them to be more compliant with the treatment during this period. Duration greater than one year was however associated with poorer adherence.

The implication of this is that; as patients start to see the resolution of symptoms, they tend to relax on the adherence behaviour and this could bring about the emergence of drug resistance leading to poor clinical outcome.

In this study, socio-demographic variables such as age, gender, marital status and educational background were not significantly associated with



the level of adherence consistent with other studies<sup>37</sup>.

The findings of this study also showed a statistically significant improvement of the CD4 count among the adherent group at six months ( $P < 0.05$ ) this may support the claim of the participants being adherent to their medication. This finding is similar to other reported works where adherence has been clearly associated with increase in CD4 count<sup>18,20,24</sup>.

Although level of adherence in this study could be considered high but still fall short of desired target level for attainment of optimal clinical and survival benefit and prevention of viral resistance, treatment failure, toxicities and waste of financial resources. Since Nigeria has a high percentage of PLWHA and HIV/AIDS being a significant cause of morbidity and mortality, it is imperative that the Nigerian ART program be strengthened. This can be done with better management, increased access to free or heavily subsidized ARV drugs, more evidenced based research into the biosocial factors affecting adherence to ART, and the implementation of continuous monitoring and evaluation mechanisms for adherence which hold the key to the success of the ART programs and the prevention of treatment failures<sup>39</sup>.

### CONCLUSION

This study has shown an improvement in adherence levels amongst HIV infected patients attending AKTH HIV/AIDS specialist clinic. The adherence levels were significantly associated with improved mean CD4 counts. However there is still room for improvement. Patients were more adherent during the early period of treatment furthermore, Psycho- social factors rather than sociodemographic

factors were associated with non-adherence behaviour. Hence, it is important that policy makers and programme managers continue to address the factors responsible for non-adherence with a view to developing strategies for improving it.

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### REFERENCES

1. WHO Progress report (2011): Global HIV/AIDS response. [www.who.int/gho/data/22100](http://www.who.int/gho/data/22100) (accessed on 18/12/12).
2. UNAIDS: (2012) Data on the size of the epidemic: Prevalence of HIV among adults aged 15 to 49. December 2012, available at <http://apps.who.int/gho/data/2012>, (accessed on 18/12/12)
3. Mannheimer SB, Matts J, Telzak E, Chesney M, Child C, Wu AW, Friedland G (2005). Quality of life in HIV-infected individuals receiving antiretroviral therapy is related to adherence. *AIDS Care*;17:10–22.
4. Thompson MA, Aberg JA, Cahn P, Montaner JS, Rizzardini G, et al. (2010) Antiretroviral treatment of adult HIV infection: 2010 recommendations of the International AIDS Society-USA panel. *JAMA*. 304:321–333.
5. Tadios Y, Davey G. (2006). Antiretroviral treatment adherence and its correlates among people living with HIV/AIDS on highly active antiretroviral therapy in Addis Ababa, Ethiopia. *EMJ*. 44:237–244.
6. Lambo E. (2006) Nigeria has established 74 ARV treatment centres nationwide. *HIV/AIDS News*. 2006, March 15.
7. World health statistics (2010). World Health Organization. W.H.O Geneva 2010. Available at <http://apps.who.int/gho/data> 2010. (Accessed on 18/12/12.)
8. Amico K, Rivet J, Harman J, Johnson B T. (2006) Efficacy of Antiretroviral Therapy Adherence Interventions A Research Synthesis of Trials, 1996 to 2004. *J Acquir Immune Defic Syndr*. 41:285–297.
9. Carter M. (2005). Adherence – information series for HIV-positive people. London, available at <http://www.aidsmap.com>, accessed on 18/12/12.
10. Hogg RS, Heath K, Bangsberg D, Yip B, Press N, O'Shaughnessy MV, Montaner JS. (2002) Intermittent use of triple-combination therapy is predictive of mortality at baseline and after 1 year of follow-up. *AIDS*. 16:1051–8.
11. Nachege JB, Hislop M, Dowdy DW, Melanie L, Omer SB, Regensberg L et al. Adherence to Highly Active Antiretroviral Therapy Assessed by Pharmacy Claims Predicts Survival in HIV-Infected South African Adults. *J Acquir Immune Defic Syndr*. 2006;43:1–7.
12. Berg Karina M, Demas PA, Howard A A, Schoenbaum EE, Gourevitch MN, Arnsten J H. (2004) Gender Differences in Factors Associated with Adherence to Antiretroviral Therapy. *J Gen Intern Med*. 19:1111–1117.
13. Bangsberg DR, Perry S, Charlebois ED, Clark RA, Roberston M, Zolopa AR, Moss A.