

AFRICAN JOURNAL OF MEDICINE and medical sciences

Volume 37 Number 1

March 2008



**Editor-in-Chief
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ISSN 1116—4077

Adherence to Highly Active Antiretroviral Therapy (HAART) at a Federal Medical Centre

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Summary

Highly active antiretroviral therapy (HAART) has proved effective in prolonging survival and improving the quality of life of the people living with HIV/AIDS (PLWHA). For the successful treatment of HIV infection, at least 95% adherence to HAART is required. This study sought to assess adherence to HAART and to identify factors enhancing adherence within the study population. The study was a descriptive cross-sectional survey of 428 patients attending the antiretroviral (ARV) clinic of the Federal Medical Centre, Makurdi. Self-reported adherence and other data were collected using an interviewer-administered questionnaire. Data were analysed using SPSS 11.0 and Epi6; and were exported into Systat 11 for multivariate logistic regression. There were 151 (35.3%) males and 277 (64.7%) females. The mean age was 36.7 ± 9.6 years. Self-reported adherence rate was 268 (62.6%). The factor most predictive of adherence to HAART was availability of ARVs [OR = 5.2; 95% confidence interval 3.1-8.6; $p < 0.001$], followed by the ability to afford regular visits to the ARV clinic [OR = 1.7; 95% confidence interval 1.04-2.8; $p = 0.034$]. A recent diagnosis of HIV made less than 3 years prior to the study period was also significantly associated with adherence to HAART ($\chi^2 = 8.94$; $p = 0.003$). Availability of ARVs and ability to afford to regularly visit the clinic among other factors, positively influenced adherence to HAART among PLWHA. Efforts should be targeted at constant provision of free ARVs and early initiation of therapy for those requiring treatment, as well as ensuring regular adherence-education.

Keywords: Adherence, HAART, PLWHA, HIV, ARV

Résumé

La thérapie antiretrovirale très active (HAART) a prouvé effective dans la longévité et la l'amélioration de la qualité de vie des individus vivant avec le NIH/

SIDA (PLWHA). Pour le succès du traitement d'infection du VIH, au moins 95% d'adhérence au HAART est nécessaire. Cette étude évaluait l'adhérence au HAART et d'identifier les facteurs influençant l'adhérence de la population étudiée. Cette étude était descriptive sur 428 patients (151 (35.3%) males et 277 (64.7%) femelles) attendant la clinique antiretroviral (ARV) du Centre Fédéral Médical de Makurdi. L'adhérence personnelle et d'autres données étaient collectées utilisant un questionnaire par interview. Les données étaient analysées utilisant les programmes SPSS 11.0 et Epi6; et étaient exportées dans Systat 11 l'analyse de régression logistique multivariable. La moyenne d'age était de 36.7 ± 9.6 ans. Le taux d'adhérence personnel était de 268 (62.6%). Le facteur le plus prédictive d'adhérence au HAART était accessibilité au ARVs [OR = 5.2; 95% l'intervalle de confiance 3.1-8.6; $p < 0.001$], suivi par l'habilité aux visites régulières a la clinique ARV [OR = 1.7; 95% l'intervalle de confiance 1.04-2.8; $p = 0.034$]. Un diagnostic récent du VIH faisait moins de 3 ans de cette étude était significativement associé a l'adhérence au HAART ($\chi^2 = 8.94$; $p = 0.003$). Accessibilité aux ARVs et l'habilité d'aller a une visite régulièrement parmi autres facteurs influence positivement l'adhérence au HAART parmi les PLWHA. Des efforts doivent être visé a l'approvisionnement des antiretroviraux gratuit (ARVs gratuit) et d'une initiation précoce de la thérapie pour ceux nécessitant une traitement bien qu'une éducation régulière.

Introduction

In January 2002, the Federal Government of Nigeria commenced its highly active antiretroviral therapy (HAART) programme to provide antiretroviral (ARV) drugs to 10,000 adults and 5,000 children living with HIV/AIDS in Nigeria. Twenty five treatment centres including the Federal Medical Centre (FMC) Makurdi, in Benue State, were designated to run the programme nationwide [1]. Since the inception of the Federal Government treatment initiative, other international agencies, non-governmental organizations, faith-based organizations and civil societies have also become involved in providing

ARVs in both the public and private health sectors in Nigeria. These include the President's Emergency Plan for AIDS Relief (PEPFAR) which is a United States Government \$15 billion global initiative to combat the HIV/AIDS epidemic outside of the United States, over a five-year period [2]; the Global Fund to fight AIDS, Tuberculosis and Malaria [3] and the Global HIV/AIDS Initiative in Nigeria (GHAIN) [4].

HAART has proved to be effective by improving the quality of life of people living with HIV/AIDS (PLWHA) [5], prolonging survival [6] and reducing HIV-related morbidity and mortality [7]. For the successful treatment of HIV however, a level of at least 95% adherence to HAART is considered appropriate for achieving therapeutic success [8]; as this maintains optimal and durable viral suppression [9]. Adherence rates however are often lower than this [8] and rates from studies have ranged from 54% [10] to 94% [11]. This study therefore sought to determine the adherence rate and to identify the factors enhancing adherence to HAART among patients receiving treatment at the FMC Makurdi, Nigeria.

Materials and methods

Study design and scope

The study was a descriptive cross-sectional survey that was conducted between December 2004 and February 2005, at the ARV clinic of the FMC, Makurdi, in Benue State, Nigeria. All the patients who attended the clinic during the study period were enrolled into the study. Information on socio-demographic characteristics, self-reported adherence and factors influencing adherence to HAART were collected through interviewer-administered semi-structured questionnaires. For this study, adherence was defined as the consistent use of prescribed ARVs, and was measured over the period from the onset of treatment to the time of the study period for each respondent. Permission to carry out the study was sought from and granted by the Ethical Committee of the FMC, Makurdi.

Data analysis

Data collected were analyzed using SPSS version 11.0 and Epi-Info (Epi-6); and were then exported into Systat version 11 for multivariate logistic regression analysis. Associations were tested using chi-square for qualitative variables and student's t-tests for quantitative variables. Level of statistical significance was set at 5%.

Results

Socio-demographic characteristics

Of the 428 respondents, 151 (35.3%) were males and 277 (64.7%) were females. The mean age was 36.7 ± 9.6 years (range 15-74 years). The mean age of the males was 39.2 ± 8.6 years and females 35.3 ± 9.8 years ($t = 4.02$, $df = 426$, $p < 0.001$). Most, 302 (70.6%) were in unskilled and partially skilled occupations, 176 (41.1%) had post secondary education and 198 (46.3%) were married while 98 (22.9%) were widowed. Table 1 shows the socio-demographic characteristics of the respondents.

Table 1: Subject characteristics (N = 428)

	Number	%
<i>Age (years)</i>		
< 19	2	0.5
20-29	91	21.3
30-39	172	40.2
40-49	112	26.2
≥ 50	51	11.9
<i>Sex</i>		
Male	151	35.3
Female	277	64.7
<i>Occupation</i>		
High	77	18.0
Middle	49	11.4
Low	302	70.6
<i>Level of education</i>		
No formal	47	11.0
Primary	72	16.8
Secondary	133	31.1
Post secondary	176	41.1
<i>Marital status</i>		
Single (never married)	76	17.8
Married	198	46.3
Separated	31	7.2
Divorced	15	3.5
Widowed	98	22.9
Co-habiting	10	2.3
<i>Religion</i>		
Christianity	420	98.1
Islam	8	1.9
<i>Income/month (naira)</i>		
Seasonal	133	31.1
<5,000 naira	120	28.0
≥5,000 naira	175	40.9

Reported adherence and factors influencing adherence

Respondents that were adherent to HAART by self-report were 268 (62.6%), while 160 (37.4%) were non-adherent. Two hundred and nine respondents (48.8%) had been diagnosed HIV positive within one

to two years prior to the study while only 2 (0.5%) had been diagnosed for longer than seven years. At the time of the study, 192 (44.9%) had been on HAART for between six months and one year, while only 5 (1.2%) had been on HAART for longer than four years.

Table 2: Factors influencing adherence to HAART (n=428)

Treatment history	No.	%
<i>Time of HIV diagnosis (prior to study period)</i>		
<3 years	347	81.1
≥3 years	81	18.9
<i>Time on HAART (prior to study period)</i>		
<6 months	110	25.7
≥6 months	318	74.3
<i>Access to HAART</i>		
<i>Ever failed to keep clinic appointment</i>		
Yes	162	37.9
No	266	62.1
<i>Ability to afford regular ARV clinic visits</i>		
Yes	246	57.5
No	182	42.5
<i>ARVs always available on clinic appointment days</i>		
Yes	216	50.5
No	212	49.5
<i>Perception of health workers' attitude</i>		
Perceived to be non-judgemental	330	77.1
Perceived to be judgemental	98	22.9
<i>Other factors enhancing adherence*</i>		
Improved health	160	37.4
Desire to prolong life	49	11.4
Obedience to doctors' instructions	9	2.1
Desire to live for children/family	4	0.9
Hoping to be cured eventually	4	0.9
Ability to afford the drugs	3	0.7

*Multiple response

Two hundred and sixty six (62.1%) respondents reported that they never failed to keep their clinic appointments while 162 (37.9%) reported that they sometimes failed to keep their clinic appointments. Respondents were asked if they could afford the total costs (drugs inclusive) of regular visits to the ARV clinic. More than half of the respondents 246 (57.5%) reported that they could afford to visit the clinic regularly. Those reporting that the ARVs were sometimes not available on their clinic appointment days 212 (49.5%) were only slightly

fewer than those reporting that the ARVs were always available on their clinic appointment days 216 (50.5%). Most of the respondents 330 (77.1%) perceived health workers' attitude to be non-judgemental. Only one hundred and sixty persons (37.4%) reported having factors that enhanced their adherence to treatment, while 268 (62.6%) did not report any enhancers (Table 2).

Association between adherence and subject characteristics

Table 3 shows the association between adherence and subject characteristics. Persons aged ≥ 40 years 111 (68.1%) were adherent compared to the younger respondents aged < 40 years, though the association did not reach statistical significance ($P = 0.066$). A higher proportion of males 98 (64.9%) were adherent when compared to 170 (61.4%) females, though there was no statistically significant pattern by gender ($\chi^2 = 0.52$; $df = 1$; $p = 0.471$).

Association between adherence and factors influencing adherence

Table 4 shows association between adherence and other factors influencing adherence. More respondents 229 (66.0%) with a recent diagnosis of HIV (< 3 years) were significantly adherent when compared with those who were diagnosed for ≥ 3 years prior to the study period ($p = 0.003$). Being on HAART for < 6 months 78 (70.9%) was significantly associated with adherence compared with being on treatment for ≥ 6 months ($p = 0.037$). Never failing to keep ARV clinic appointments 186 (69.9%) was significantly associated with adherence to HAART ($\chi^2 = 16.03$; $df = 1$; $p < 0.001$). Being able to afford the costs (drugs inclusive) of regular visits to the ARV clinic 168 (68.3%) was significantly associated with adherence to HAART ($\chi^2 = 7.96$; $df = 1$; $p = 0.005$). Respondents who had ARVs always available on their clinic visit days 169 (78.2%) were significantly more adherent to HAART than those who did not always have ARVs available on their clinic visit days ($\chi^2 = 45.48$; $df = 1$; $p < 0.001$). More 219 (66.4%) of the respondents who perceived health workers' attitude to be non-judgemental were adherent when compared with those who perceived their attitude to be judgemental ($\chi^2 = 8.64$; $df = 1$; $p = 0.003$).

Multivariate logistic regression predicting adherence to HAART

Table 5 shows the results of the multivariate logistic regression predicting adherence to HAART among the study population. The factor most predictive of

Table 3: Association between adherence and subject characteristics (n=428)

Subject characteristics	Adherent n (%)	Non-adherent n (%)	Chi-square	P-value
<i>Age (years)</i>				
<40	157 (59.2)	108 (40.8)	3.379	0.066
≥40	111 (68.1)	52 (31.9)		
<i>Sex</i>				
Male	98 (64.9)	53 (35.1)	0.520	0.471
Female	170 (61.4)	107 (38.6)		
<i>Occupation</i>				
High	84 (66.7)	42 (33.3)	1.251	0.263
Low	184 (60.9)	118 (39.1)		
<i>Level of Education</i>				
Lower	152 (60.3)	100 (39.7)	1.384	0.239
Higher	116 (65.9)	60 (34.1)		
<i>Marital status</i>				
Currently married	124 (62.6)	74 (37.4)	0.000	0.997
Not currently married*	144 (62.6)	86 (37.4)		
<i>Income/month (naira)</i>				
Seasonal	76 (57.1)	57 (42.9)	4.704	0.095
<5,000	72 (60.0)	48 (40.0)		
≥5,000	120 (68.6)	55 (31.4)		

*Divorced, widowed, separated, single, co-habiting

adherence to HAART was availability of ARVs [OR

Table 4: Association between adherence and factors influencing adherence (n=428)

	Adherent	Non-adherent	Chi-square	P-value
<i>Treatment history</i>				
<i>Time of HIV diagnosis (yrs)</i>				
<3	229 (66.0)	118 (43.0)	8.94	0.003
≥3	39 (48.1)	42 (51.9)		
<i>Time on HAART</i>				
< 6 months	78 (70.9)	32 (29.1)	4.35	0.037
≥ 6 months	190 (59.7)	128 (40.3)		
<i>Access to HAART</i>				
<i>Ever failed to keep clinic appointment</i>				
Yes	82 (50.6)	80 (49.4)	16.03	<0.001
No	186 (69.9)	80 (30.1)		
<i>Ability to afford regular clinic visits</i>				
Yes	168 (68.3)	78 (31.7)	7.96	0.005
No	100 (54.9)	82 (45.1)		
<i>ARVs always available</i>				
Yes	169 (78.2)	47 (21.8)	45.48	<0.001
No	99 (46.7)	113 (53.3)		
<i>Perception of health workers' attitude</i>				
Non-judgemental	219 (66.4)	111 (34.2)	8.64	0.003
Judgemental	49 (50.0)	49 (50.0)		

= 5.2; 95% confidence interval 3.1-8.6; $p < 0.001$], followed by the ability to afford regular visits to the ARV clinic [OR = 1.7; 95% confidence interval 1.04-2.8; $p = 0.034$].

Table 5: Adjusted odds ratio of factors influencing adherence to HAART among PLWHA in Makurdi, Benue State.

Variable	Adjusted OR	95% CI	P-value
<i>Age (yrs)</i>			
15 - 29	0.96	0.4 - 2.1	0.919
30 - 39	0.72	0.6 - 0.95	0.020
≥40	1.0		
<i>Occupation</i>			
Higher	0.88	0.4 - 1.8	0.720
Lower	1.0		
<i>Education level</i>			
Lower	0.6	0.3 - 1.09	0.095
Higher	1.0		
<i>Income/month (naira)</i>			
Seasonal (irregular)	0.5	0.3 - 1.04	0.065
<5,000	0.9	0.6 - 1.2	0.354
≥5,000	1.0		
<i>Time of HIV diagnosis (prior to study period)</i>			
< 3 years	1.69	0.9 - 3.02	0.079
≥ 3 years	1.0		
<i>Time on HAART (prior to study period)</i>			
< 6 month	1.3	0.7 - 2.3	0.442
≥ 6 months	1.0		
<i>Ever failed to keep clinic appointment</i>			
Yes	0.5	0.3 - 0.7	0.001
No	1.0		
<i>ARVs always available</i>			
Yes	5.2	3.1 - 8.6	<0.001
No	1.0		
<i>Ability to afford regular visits to ARV clinic</i>			
Yes	1.7	1.04 - 2.8	0.034
No.	1.0		

Discussion

There is no established gold standard by which to measure adherence to antiretroviral therapy [12] – how to measure, what specific measure to use and when to measure [12]. Studies have measured 2-day [7], 3-day [13], 4-day [14], 7-day [10,15] and 1-month [16,17], adherence to HAART. In this study however, adherence was measured over the period from the time of initiating HAART to the time of the study period for each respondent. It was felt that

assessing individual adherence from onset of treatment to the time of the study period was more likely to reflect the distribution of causes for non-adherence, notably non-availability of drugs experienced due to financial constraints and during stock-out periods. In their study, Becker and colleagues [18] had also estimated adherence to nucleoside reverse transcriptase inhibitors (NRTIs) during the first 365 days of therapy for treatment naïve individuals. Their study however was a retrospective analysis of pharmacy claims data regarding ARV prescription refills.

The HAART adherence rate in this study was found to be 62.6%. This adherence rate was higher than the 54% found in a similar study in Kano State, Nigeria [10], but much lower than the 95.5% found in Abuja, Nigeria [17]. The differences in these rates may be due to the different socio-cultural factors that are influenced by the different geographic locations.

Socio-demographic characteristics

A higher proportion of the patients in this study population were aged 30-39 years. They were also found to be less likely to adhere to treatment. This finding is similar to that by Kleeberger and colleagues [14] where age <40 years was significantly associated with non-adherence. The majority of the patients were females, probably because women in the study area usually utilize health facilities more frequently than men do, and also because women are anatomically more susceptible to acquiring HIV infection. This however, was not the finding in Kano, Nigeria [10] where the majority of the patients were males who had economic advantage over women. Surprisingly, persons of higher occupations were less likely to adhere to treatment than were those of lower occupations. Possibly they were more likely to forget to take their drugs as a result of their busier schedules. Though the majority of the respondents had higher education, those with lower education were less likely to adhere to treatment. This is similar to the findings of Kalichman and colleagues [19], where persons with low health literacy and lower education (< 12 years of education or functionally illiterate) were less likely to adhere to HIV medications. Persons not currently married were less likely to adhere to treatment than were married persons. They probably lacked the stabilizing effect and support (financial and otherwise) of marriage, and the responsibility to spouses and/or children that may have motivated them to desire to remain healthy and prolong their lives. Cheever [20] had demonstrated the significant

association between marriage and adherence. The unusually large proportion of widows/widowers also suggests that their spouses may have died from AIDS.

Though the association did not reach statistical significance, persons earning a seasonal (irregular) income were less likely to adhere to treatment than those with lower incomes. They were mostly farmers and their income was dependent on the seasons and on how good their harvest was. Since their income was irregular, they could hardly afford the total costs incurred for each visit to the ARV clinic. Income has been shown in another study, to be significantly associated with adherence [20] though Kalichman and colleagues [7] and Orrell and colleagues [21] disputed this in their own studies.

Paradoxically, respondents who needed to be reminded to take their drugs were significantly less likely to adhere to treatment. Either that they simply forgot to take their drugs or that they probably relied so much on their reminders that they made no effort whatsoever on their own to ensure that they took their drugs as prescribed and on time. These findings are in contrast to the findings of Rabkin and Chesney [22] where social support was associated with adherence; and to the findings of Malcolm and colleagues [23] who demonstrated that the excellent adherers in their studies received substantial support from their family members and friends who were constantly reminding them to take their drugs.

Factors influencing HAART adherence

On bivariate analysis, respondents with a diagnosis of HIV made less than 3 years prior to the study period were found to be significantly more likely to adhere to treatment than were those diagnosed for longer. This association however, failed to reach statistical significance on multivariate analysis and therefore, length of HIV diagnosis was not predictive of adherence in this study. However, those diagnosed for less than 3 years were more likely to have been adherent probably because as the diagnosis was recent, they were more anxious about the outcome of the disease and would do whatever it would take to stay healthy and prolong their lives. Other studies have also found no association between adherence and length of HIV infection [24,25] though Kleeberger and colleagues found that persons who had tested HIV positive within the last year (prior to the study period) were significantly less likely to miss doses than those who had tested HIV positive for more than one year [14]. Those who were on HAART for less than 6 months were more likely to adhere to treatment than those who were on HAART

for longer. Drug fatigue might not have set in yet and they were probably still impressed with the remarkable improvement in their health and therefore wished to maintain it. Other studies however, have not shown an association between adherence and length of time on HAART [26,27].

On bivariate analysis, never failing to keep clinic appointments was significantly associated with adherence. However, multivariate analysis revealed that those who sometimes missed their clinic appointments were significantly less likely to adhere to treatment. Kleeberger and colleagues also demonstrated that no recent outpatient visits were predictive of non-adherence [26]. Respondents that were able to afford regular visits to the clinic were significantly more likely to adhere to treatment than those who could not afford it. This is in support of the findings of Carballo and colleagues [28] and Kleeberger and colleagues [26], where low financial status was found to be significantly predictive of non-adherence. Availability of ARVs was also found to be significantly associated with adherence. This is in support of other findings where non-availability of ARVs [10] and problems with getting medicines resupplied was associated with non-adherence [29]. On bivariate analysis, perceiving health workers' attitude as being non-judgemental was found to be significantly associated with adherence. This supports the findings of other studies where it was demonstrated that good patient-provider relationships positively influence adherence [23,30]. However, this association failed to reach statistical significance on multivariate analysis.

Conclusion

The most important factor enhancing HAART adherence in this study population was the availability of drugs, followed by the ability of the patients to afford the costs of regular visits to the clinic. Other factors enhancing adherence included a recent diagnosis of HIV, improved health and the desire to prolong life. The findings of this study suggest that providing free and uninterrupted ARV drug supplies would improve adherence to HAART. There is also the need for regular adherence-education and early initiation of therapy for patients requiring treatment.

Acknowledgements

The authors would like to thank the management of the Federal Medical Centre Makurdi, Benue State, for granting us the permission to conduct this study. We would also like to thank the staff of the ARV clinic of the Federal Medical Centre for their support

and assistance. Special thanks go especially to all the patients who volunteered to participate in this study.

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Received: 04/10/07

Accepted: 18/02/08