Improving Adherence to Anti-retroviral Therapy among Persons Living with HIV/AIDS in Enugu State, South East Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author CPI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author OHC managed the analyses of the study. Author CNO managed the literature searches. All authors read and approved the final manuscript.

Article Information

Original Research Article	*Received 13 August 2019* *Accepted 30 October 2019* *Published 06 November 2019*

ABSTRACT

HIV/AIDS continues to be a major global public health issue, having claimed more than 32 million lives so far. There were approximately 37.9 million people living with HIV/AIDS (PLHIV) at the end of 2018. Anti-retroviral therapy (ART) has significantly reduced morbidity and mortality and improved quality of life among people with HIV infection.
Aims: The study was conducted to improve the knowledge and adherence to anti-retroviral therapy among PLHIV in Enugu state, southeast Nigeria.
Study Design: Interventional study.
Place and Duration of Study: Anti-retroviral Therapy clinics within Enugu metropolis in Enugu state Nigeria between June to December 2018.
Methodology: A health education intervention was carried out among 312 PLHIV receiving ART in Enugu metropolis to improve their perception and adherence to antiretroviral therapy. A structured

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questionnaire was used to collect data from 312 PLHIV (156 each in the study and control groups), who were selected by multistage sampling. Subsequently, health education was conducted among the study group. Three months after this intervention its effects were assessed through a survey using the same structured questionnaires employed in the baseline survey.

Results: The most frequently occurring reason given by the respondents for poor adherence to ART was forgetfulness (65.4% for study and 69.9% for control groups). Knowledge of the factors and consequences of poor adherence to treatment was significantly higher among the study group than the controls post-interventions p<0.001. Adherence to ART improved from 42.3% pre-intervention to 81.4% post-intervention.

Conclusion: Intensive health education effectively improved adherence to ART among persons living with HIV/AIDS and this should be carried out regularly.

1. INTRODUCTION

HIV/AIDS continues to be a major global public health issue, having claimed more than 32 million lives so far. There were approximately 37.9 million people living with HIV/AIDS (PLHIV) at the end of 2018, with 1.7 million people becoming newly infected in 2018 globally [1]. According to the World Health Organization (WHO) sub-Saharan Africa is the most affected region with 25.7 million PLWHA in 2018, an approximate 70% of all PLHIV in the world [1]. The African region also accounts for almost two thirds of the global total of new HIV infections. Findings from 2019 National HIV/AIDS indicator and impact survey (NAIIS) shows that Nigeria, Africa's most populous nation with about two hundred million people has HIV prevalence of 1.5% [2]. Enugu State, one of the states with the highest prevalence in Nigeria has HIV prevalence of 2.0% [2].

Key populations including; men who have sex with men, people who inject drugs, people in prisons and other closed settings, sex workers and their clients, and transgender people and their sexual partners accounted for over half of all new infections (54%) for the first time in 2018 [1]. These groups of persons are at increased risk of HIV/AIDS irrespective of epidemic type or local context.

Antiretroviral (ARV) drugs are drugs used in the treatment of HIV/AIDS. The recommended treatment for HIV/AIDS involves the use of highly active antiretroviral therapy (HAART) to ensure effective reduction of viral replication [3]. It is a combination of drugs acting to inhibit various steps in the HIV replication process. Despite the overwhelming benefits of HAART, it is often associated with side effects. About 62% of adults and 52% of children living with HIV were receiving lifelong antiretroviral therapy (ART) in 2018 [1]. Global and international health initiatives in response to the pandemic have targeted several countries, including Nigeria, for the expansion of ART programs for the increasing number of affected persons with funding through programs such as the US President's Emergency plan for AIDS Relief (PEPFAR) and Global funds to fight AIDS, tuberculosis and malaria (GFATM) [4,5]. This has resulted in the expansion of treatment and prevention programs that have increased ART access to previously unreached and underserved population with resultant remarkable decrease in HIV-related morbidity and mortality in the past fifteen years. ART has been found to significantly improve the health, life expectancy and quality of life of PLHIV [6].

Adherence to HIV treatment refers to the process of choosing, starting, managing and maintaining a given therapeutic medication regimen to control HIV viral replication and improve function of the immune system. Lack of strict adherence to HAART is considered to be one of the key challenges to AIDS care worldwide [7]. Inability to cope effectively with the side effects of ARV results in non-adherence to medication. To be most effective, HIV therapy requires a near perfect level of adherence [8]. Less than 95% adherence to regimen can lead to viral resistance and ultimately treatment failure. Non adherence to medications is characterized by increased morbidity, mortality and great economic loss [9].

In resource-constrained settings where healthcare services are not well developed, poor adherence to treatment and defaulting from treatment are the two major challenges faced by ART programmes. Poor adherence compromises treatment effectiveness, making this a critical public health issue [10]. If adherence falters,

resistance to ARV may develop, thus rendering the treatment regimen ineffective and possibly requiring a more costly and potentially more toxic regimen change. This is one of the strongest predictors of progression to AIDS and death among PLHIVs and is also associated with the development of drug-resistant viral strains [11]. The resulting virological failure diminishes the potential for long-term clinical success. This is a potential hazard to the community because ARV-resistant strains of HIV could then be transmitted to HIV naïve individuals [12,13].

The magnitude of HIV epidemic and the complexity of its chronicity represent major challenges to healthcare delivery systems in developed and developing countries. The large-scale effect of the AIDS epidemic in Nigeria transcends the healthcare sector and impact upon virtually all aspects of the society [14]. The epidemic has further weakened the already overwhelmed Nigerian health care system, by increasing the number of orphans and vulnerable children and the cost of achieving set developmental goals. This study was conducted to improve the knowledge and adherence to antiretroviral therapy among PLHIV receiving ART in Enugu State, South East Nigeria.

2. MATERIALS AND METHODS

Enugu State is one of the five States in the Southeast geopolitical zone of Nigeria. The State has seventeen local government areas and is bounded in the east by Ebonyi State, in the West by Anambra State, the North by Kogi and Benue States and in the South by Abia State. The population of the State is about 3.32 million according to the last national population census in 2006; with a growth rate of 2.83% and an estimated population of 3.8 million in 2012 [15]. The inhabitants are mainly of Igbo tribe and are predominantly Christians. Most of the urban dwellers are civil servants, traders or artisans while rural dwellers are mainly farmers.

2.1 Sample Size Estimation

The sample size was estimated using the formula below.

$$n/group = \frac{(Z\alpha + Z\beta)^2}{\delta^2}\left\{(\Pi_1 (1 - \Pi_1) + \Pi_2 (1 - \Pi_2)\right\}$$

n/group = desired sample size per group.

$Z\alpha$ and $Z\beta$=are ordinates for the normal deviation.

Π_1 = response rate in the control group (77% patients from previous study attained 95% adherence) [16].

Π_2 = anticipated adherence rate from patients who receive health education put at 90%

$\delta = \Pi_2 - \Pi_1$

With 80% power at 5% significance level, the patients required at each group was calculated as follows:

$$n = \frac{(0.842 + 1.960)^2\left\{(0.77 \times 0.23 + 0.90 \times 0.10)\right\}}{(0.90 - 0.77)^2}$$

=7.849 x 0.2671/0.0169

=124

n/group =124

With 80% estimate response rate, each group sample size was:

124/0.8=155, giving a total of 310 for both groups. However 156 respondents were selected for each group to avoid sample fractions. Thus a total of 312 respondents were studied.

2.2 Sampling Technique

The study was an interventional study involving a before and after comparison of the knowledge and ART adherence pattern of PLHIVs subjected to a 3 day intensive health education training and adherence counseling on ART with those not trained. A total of 312 patients participated in the study; 156 in the study group and 156 in the control group. There is a total of 21 comprehensive ART sites in Enugu state; out of which six are within Enugu metropolis. Out of these, 4 facilities offering ART services were selected for this study through balloting; University of Nigeria Teaching Hospital, Enugu State University Teaching Hospital, Annunciation Specialist Hospital and Mother of Christ Specialist Hospital. Out of the 4 selected ART hospitals in Enugu metropolis, 2 served as the intervention centers while the other 2 served as the control centers. The study centers also were located on the out sketch of Enugu metropolis while the control centers were at the heart of the town again limiting the possibility of cross-interference.

A multistage sampling technique was applied. The sample size was proportionally allocated to the facilities based on the patient's load. A

systematic sampling technique was then used to select participants as they presented for their clinic visits using the clinic, attendance register. The questionnaire was pretested in a health facility which was not selected for the main study. Ambiguities or deficiencies in the study instruments were then revised.

Quantitative data was collected using interviewer administered semi-structured questionnaires. Responses were elicited on the socio-demographic characteristics, knowledge of HIV manifestations, benefits and side effects of ART, knowledge and practice of adherence to ART.

The research was conducted in 3 phases. The first phase was a baseline data collection. The second phase was a 3 day intensive health education intervention on ART and adherence counseling which involved only the study group. The third phase was the post health education intervention evaluation which took place after three months of the intervention. The effects were assessed using the same interviewer- administered questionnaires employed in the baseline study. However, at the end of the post-intervention assessment, health education on HIV/AIDS transmission and adherence was provided to the control group.

Data entry and analysis were done using statistical package for social sciences (SPSS) version 22. Frequency tables and cross-tabulations were also generated. Descriptive statistics, frequencies and proportions were derived for categorical variables. Chi square test of statistical significance and student t-test were used in the analysis. Level of statistical significance was set at predetermined P-value of < 0.05.

3. RESULTS

3.1 Socio-demographic Characteristics of the Study Population

A total of 312 PLHIV were studied, one hundred and fifty six (156) each in the study and control groups.

The age range of the respondents was 25-44years. Majority of them were married and had

secondary school education. The mean age of the group was 34.1 ± 6.5 years while that of the control group was 36.8 ± 9.6 years. Both the study and control groups at baseline were statistically comparable (P< 0.05) in marital status, religion and occupational characteristics. The difference observed in the age structure, sex distribution and educational level between the study and control groups at baseline were statistically significant (P<0.05); Table 1.

3.2 Knowledge of Nature of HIV/AIDS Disease

At baseline, over 80% of the study and control groups identified AIDS as a serious disease, that persons with HIV can still live active life and demonstrated the need for routine HIV screening during pregnancy. This was not statistically significant. However, knowledge of availability of drugs for HIV treatment was statistically significant among PLHIV in study group than those in the control group at baseline (P=0.042).

Post-intervention, there was increased knowledge of the nature of HIV/AIDS disease among the study when compared with the control group. The difference in knowledge among all variables was statistically significant (Table 2).

3.3 Knowledge of ART Adherence among the Respondents

At baseline between 70%-91% of the study and control groups knew about adherence and its importance. One hundred and two (65.4%) and 109(69.9%) in the intervention and control groups respectively identified forgetfulness as the major cause of poor adherence. Also drug resistance was identified as the major consequence of poor adherence by 75 (48.1%) and 89(57.1%) of the study and control groups.

The difference in the baseline knowledge between the two groups was not statistically significant unlike post-intervention where the study group demonstrated a highly statistical significant difference (P<0.01) in knowledge when compared with the control group (Table 3).

3.4 Prevalence of ART Adherence among the Respondents

At baseline, 66 (42.3%) and 58(37.1%) of the study and control groups respectively took their

Table 1. Socio-demographic characteristics of the respondents at baseline

Characteristics	Study group n = 156 N (%)	Control group n = 156 N (%)	χ^2	P-value
Age				
Mean ± SD	34.1±6.5	36.8±9.6	0.063*	0.950
Age in groups				
15 – 19	0(0.0)	3(1.9)	6.542	0.001
20 – 24	1(0.6)	7(4.5)		
25 – 29	33(212)	24(15.4)		
30 – 34	51(32.7)	40(25.6)		
35 – 39	40(25.6)	29(18.6)		
40 – 44	22(14.1)	17(10.9)		
45 – 49	7(4.5)	9(5.8)		
50 – 54	0(0.0)	16(10.3)		
55 – 60	0(0.0)	11(7.0)		
60 & above	2(1.3)	0(0.0)		
Sex				
Male	33(21.2)	57(36.5)	8.99	0.003
Female	123(78.9)	99(63.5)		
Marital status				
Single	40(25.6)	59(37.8)	0.195	0.846
Married	88(56.4)	71(45.5)		
Widowed	17(10.9)	20(12.8)		
Divorced	11(7.1)	6(3.8)		
Educational level				
Primary	19(12.2)	24(15.4)	4.942	0.001
Secondary	68(43.6)	69(44.2)		
Post secondary	67(42.9)	56(35.9)		
No formal education	2(1.3)	7(4.5)		
Religion				
Anglican	51(32.7)	14(9.0)	1.298	0.206
Catholic	48(30.8)	102(65.4)		
Pentecostal	43(27.6)	34(21.8)		
Others	14(8.9)	6(3.8)		
Occupation				
Civil servants	49(31.4)	56(35.9)	1.268	0.206
Trader/Business	39(25.0)	41(26.3)		
Farmers	14(9.0)	8(5.1)		
Artisan	54(34.6)	51(32.7)		

Student t-test

ART daily as prescribed with no statistically significant difference (P-0.355). Post intervention, the number of respondents that took their ART daily for 30 days (a month) as prescribed improved significantly (P<0.001) for the study group (81.2%) when compared with the control group (32.1%) (Table 4).

4. DISCUSSION

At baseline the study and control groups differed in their mean age, educational level and sex distribution. The most frequent age range in the study group was 25-44 years corresponding to the sexually active age group mostly affected by HIV/AIDS.

The female respondents largely out-numbered the male respondents. This finding is in line with the WHO survey study which showed that HIV/AIDS infection among females in sub-Sahara Africa outnumbered that of males, were the national prevalence values are estimated using women on antenatal clinic [17,18,19]. The finding may also be an indication that women are assessing ART services more than men and are becoming more open about the disease than men [20,21]. Also men are not frequent users of health facilities; they go when illness is

Table 2. Respondents' knowledge of the nature of HIV/AIDS disease at baseline and post intervention

Knowledge	Baseline				Post Intervention			
	N = 156		X2	P	N = 156		X2	P
	Study (%)	Control (%)			Study (%)	Control (%)		
AID is a serious disease	136(87.2)	139(89.1)	0.28	0.599	156(100.0)	140(89.7)	16.86	<0.001*
Drugs available for treatment of people with HIV	88(56.4)	70(44.9)	4.15	0.042	154(98.7)	65(41.7)	121.34	<0.001*
If a person is HIV positive, he has AIDS	46(29.5)	43(27.6)	0.14	0.707	24(15.4)	46(29.5)	8.91	0.003*
All antenatal patients should be routinely tested for HIV	125(80.1)	131(84.0)	0.78	0.376	152(97.4)	120(76.9)	29.36	<0.001*
HIV person can still live active/fulfilling life	147(94.7)	150(96.2)	0.427	0.427	156(100.0)	144(92.3)	12.48	<0.001

Table 3. Knowledge of ART adherence among the respondents

Knowledge	Baseline				Post Intervention			
	Study b/f (%) N=156	Control b/f (%)N=156	X^2	P	Study after (%)N=156	Control after (%)N=156	X^2	P
Adherence is taking drug as agreed with doctor	128(82.1)	130(83.3)	0.09	0.764	156(100.0)	129(82.7)	29.56	<0.001
Excess alcohol in-take can affect ART adherence	135(86.5)	142(91.0)	1.58	0.209	156(100.0)	140(89.7)	16.86	<0.001
Adherence determine success of ART	122(78.2)	132(84.6)	2.12	0.146	154(98.7)	132(84.6)	20.31	<0.001
Adherence counseling is necessary before starting ART	142(91.0)	139(78.8)	0.32	0.570	156(100.0)	139(78.8)	17.98	<0.001
Patient is at risk of dying from HIV/AIDS if no adherence to ART	118(75.6)	109(69.9)	1.31	0.252	155(99.4)	104(66.7)	59.12	0.001
Identify causes of poor adherence								
Forgetfulness	102(65.4)	109(69.9)	0.72	0.397	153(98.1)	102(65.4)	55.83	0.001
Away from home	9(5.8)	16(10.3)	2.13	0.144	148(94.9)	30(19.2)	182.14	0.001
Medication exhausted	14(9.0)	20(12.8)	1.19	0.276	118.(75.8)	21(13.5)	122.08	0.001
Too many pills	17(10.9)	17(10.9)	0.00	1.000	105(67.8)	35(22.4)	63.49	0.001
Drug side effects	19(12.2)	28(17.9)	2.03	0.154	108(69.2)	42(26.9)	55.93	0.001
Knowledge of consequences of poor adherence								
Drug resistance	75(48.1)	89(57.1)	2.52	0.112	140(89.7)	101(64.7)	27.73	0.001
Treatment failure	34(21.8)	40(25.6)	0.64	0.425	152(97.4)	39(25.0)	172.38	0.001
Increased risk of death	55(35.3)	57(36.5)	0.06	0.813	154(97.4)	63(40.4)	118.50	0.001
Risk of wanderer infections	43(27.6)	49(31.4)	0.55	0.456	143(91.7)	52(33.3)	113.24	0.001
Illness may worsen	67(42.9)	63(40.4)	0.21	0.646	147(94.2)	67(42.9)	95.21	0.001

Table 4. Prevalence of ART adherence among the respondents

Number of days ARVs were taken per month	Pre-intervention (N=156)				Post-intervention (N = 156)			
	Study group (%)	Control group (%)	X^2	P-value	Study group (%)	Control group (%)	X^2	P-value
30 days	66(42.3)	58(37.1)	0.86	0.355	127(81.2)	50(32.1)	77.43	0.001
10 days	20(12.8)	23(14.7)	13.56	0.000	9(5.8)	20(12.8)	4.60	0.032
4 days	34(21.8)	30(19.2)	0.315	0.576	8(5.2)	33(21.2)	17.50	0.001
2 days	23(14.8)	6(3.8)	10.99	0.001	6(3.8)	30(19.2)	18.09	0.001
1 day	13(8.3)	19(12.2)	1.25	0.263	6(3.8)	23(14.7)	10.99	0.001

at terminal stage. This is quite different with women, as they consult health providers whether conventional or traditional for any ailment.

The study group improved significantly in their knowledge and awareness of nature of HIV/AIDS, post-intervention unlike the control group. This could be because the study group received intensive training and health education intervention on the nature of HIV/AIDS disease, ART and adherence counseling unlike the control group. Approximately 45% and 37% of the respondents in the study and control groups respectively attained 100% adherence pre-intervention. This is in contrast to the finding among AIDS patients receiving HAART in Botswana where about 77% of the respondents attained 95% adherence rate [22].

The adherence level required to ensure effective HIV/AIDS therapy is 95% as levels lower than this are associated with poor viral suppression, therapeutic failure and rapid disease progression [23]. Post-intervention, the study group had a great improvement in adherence as 81.4% attained 100% adherence as against 32%.1% in the control group. This finding is an indication that appropriate health education intervention is capable of improving adherence to ARV drugs among HIV/AIDS patients. This is similar to previous finding were there was significant higher adherence in the group that received health education [24].

The factors identified by both groups that supported their adherence were attendance at counseling sessions, effectiveness of ART and membership of HIV/AIDS support group. The finding of this study supports previous study where health education, membership of a support group, fixed drug combination and less adverse effects were found to improve adherence [16]. The groups also identified long hospital waiting period, multiple ARV drugs, side effects, finance and forgetfulness as the

limiting factors to their adherence to therapy. Other research studies similarly reported these factors as among those limiting adherence to ART [25].

The major source of adherence support identified by the respondents in this study is the doctor or primary physician. This is not unexpected as doctors are the closest allies for the patients. Other social supporters including the family members were less utilized. Studies have shown that involvement of relatives, friends, family and community members in supporting the patients are beneficial in improving and maintaining adherence [26,27].

5. CONCLUSIONS AND RECOMMENDATIONS

This study has demonstrated that intensive health education to PLHIV on the nature of the disease, its management and the benefits of ART is the most appropriate means to ensure and improve treatment adherence.

It is therefore recommended that all PLHIV receive regular intensive health education training, and that relatives and friends are involved in patient's treatment.

CONSENT

As per international standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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