Effect of Cognitive Behavioural Therapy on Adherence to Antiretroviral Drugs among People Living with HIV/AIDS in Lagos State, Nigeria

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Abstract: *The United Nations Sustainable Development Goal (SDG) 3.3 aims to end AIDS by 2030. This brief provides an update on the progress in relation to HIV prevention, testing and t: reatment. This study, therefore investigated the effect of cognitive behavioural therapy on adherence to anti-retroviral drugs among people living with HIV/AIDS in Lagos State. The population for the study was people living with HIV/AIDS in selected local government areas in Lagos State where two hundred participants participated in this study. The study utilizes two group pretest-posttest quasi-experimental research design. After administering a pre-test, the participants were taken through series of nurse-led psycho-educational programme of CBT on adherence to anti-retroviral drug among people living with HIV/AIDS, after which a post test was administered. Data collected were analyzed using descriptive statistics. T-test and ANOVA were used to test the hypotheses at the 0.05 level of significance. The findings revealed a significant difference in the mean level of adherence to antiretroviral drugs (mean difference = 10.77, $t_{(193)} = 9.437$, p = .000<.05) among people living with HIV/AIDS in the experimental and control groups. A significant difference was found in the effect of cognitive behavioural therapy and control on people living with HIV/AIDS anti-retroviral drug adherence ($F_{(1,144)} = 7.666$; p = .000<0.05). The study concluded that CBT is useful for a clinical diagnosis and clinical outcomes. It is therefore recommended among others that healthcare facilities and policymakers should incorporate CBT as a standard component of HIV/AIDS management to enhance adherence to antiretroviral therapy.*

Keywords*: Cognitive behaviour therapy, Anti-retroviral drug, Adherence, HIV/AIDS*

INTRODUCTION

HIV/AIDS remains an incurable global pandemic, affecting over 38 million people, with 70% residing in sub-Saharan Africa (UNAIDS, 2020). Interventions have significantly reduced the disease burden, but in Nigeria, 1.4% (1.9 million) of individuals aged 15–49 live with HIV and require lifelong antiretroviral therapy (ART) (FMOH, 2023). Despite advancements in ART, adherence remains a critical determinant of treatment success. Adherence, defined as taking 95% or more of prescribed antiretrovirals, is essential for viral load suppression (<50 copies/ml) (Imeri et al., 2022). Poor adherence results in viral replication, drug resistance, disease progression, and increased mortality (Usanga et al., 2023).

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 37.7 million people worldwide are living with HIV/AIDS, with Sub-Saharan Africa accounting for 67% of all cases (UNAIDS, 2021). Over the past three decades, HIV has claimed over 25 million lives, posing a significant public health challenge and economic burden. Despite the availability of effective treatments, poor adherence to antiretroviral therapy (ART) remains a major concern, leading to high viral loads, complications, and increased healthcare costs (Joska et al., 2020). Several factors contribute to poor adherence, including patient-related issues such as forgetfulness, inconvenient dosing, and side effects; financial constraints like poverty and insecurity; socio-cultural factors including stigma, discrimination, and inability to disclose status; and weak health systems marked by drug stockouts and poor services (Azia et al., 2021; Chijioke-Nwauche & Akani, 2021). In Lagos State, where HIV prevalence is 1.2%—slightly lower than the national average of 1.5%—44% of Nigeria's unmet HIV/AIDS intervention needs persist (PEPFAR, 2023). Existing adherence strategies, including SMS reminders, self-reporting, and pharmacy refill records, have not yielded optimal results (Asaolu et al., 2023; Badru et al., 2023).

ART efficacy is heavily dependent on patient compliance with prescribed dosages and intervals (Beccaria et al., 2020). Non-adherence increases the risk of transmission, worsens health outcomes, and leads to more hospitalisations and deaths (Aberg et al., 2020). Effective ART adherence improves survival, reduces morbidity, and lowers transmission rates (Damulak et al., 2021; Byrd et al., 2020). Between 2019 and 2021, viral suppression among HIV-positive individuals increased by 18%, though only 59% achieved suppression in 2019, missing the 90-90-90 target (UNAIDS, 2020). Despite ART advancements, sub-Saharan Africa bears 70% of the global HIV burden. In 2018, 1.7 million new infections occurred globally, with 1.1 million in Africa. AIDS-related deaths reached 770,000, with 470,000 in Africa (WHO, 2020). Poor adherence limits ART's public health benefits (Adekambi, 2022). Studies show interventions like diary cards, observed therapy, food rations, and SMS reminders improve adherence, though effectiveness varies (Adekambi, 2022). However, interventions from developed nations may be less relevant in Africa due to healthcare and demographic differences. Tailored interventions, addressing specific populations and settings, are crucial for improving ART adherence in Africa.

Cognitive Behavioural Therapy (CBT), or cognitive restructuring, identifies and challenges negative thoughts, replacing them with adaptive ones. It is an evidence-based approach used to address unhelpful behaviours, including non-adherence to health management (Ayodele, 2023; Richford et al., 2022). CBT modifies thought patterns that lead to risky health behaviours, including sexual health attitudes (Olatunji et al., 2020). Studies show CBT's effectiveness in reducing substance abuse, suggesting its potential for improving medication adherence in HIV/AIDS patients. By altering cognitive distortions about treatment, CBT may enhance adherence, though research in this area remains limited (Olatunji et al., 2020).

Abadiga et al. (2020) conducted a cross-sectional study among 311 HIV/AIDS patients, revealing that 73.1% (95% CI = 68.2, 78.0) of 305 participants adhered to their medication. Using structured questionnaires and logistic regression analysis, the study identified predictors of adherence at a p-value < 0.05. Chukwuma et al. (2023) assessed adherence among 550 PLWHA in Ilorin, Nigeria, reporting a high adherence rate of 92.6%. However, barriers included transportation costs (75%), travel (68.8%), forgetfulness (66.7%), side effects (66.7%), and stigma (63.6%), suggesting suboptimal adherence despite treatment advancements. Aderemi-Williams et al. (2021) examined knowledge and adherence among 34 adolescents and young adults (AYAs) on ART in Lagos, Nigeria. The study found an overall ART knowledge score of 73.6%, but 73.5% lacked knowledge of HIV resistance due to non-adherence. Only 58.8% of AYAs achieved optimal adherence (≥95%), highlighting the need for targeted interventions.

In Limpopo Province, South Africa, Nhlongolwane and Shonisani (2023) studied ART non-adherence predictors among 18+ HIV patients. Findings showed that 65% had been on ART for <5 years, while financial barriers, long distances, and forgetfulness hindered adherence. Education was suggested as a key strategy to improve adherence. Asaolu and Agbede (2022) investigated adherence among 208 young HIV patients in Niger State, Nigeria. The study reported a low adherence rate of 20%, with uneven distribution across four healthcare facilities, indicating the need for tailored adherence support.

Several studies linked cognitive behavioural therapy (CBT) to improved medication adherence. Inwanna et al. (2022) found that CBT and motivational interviewing (MI) enhanced adherence among Thai schizophrenia patients, with significant improvements at 3- and 6-month follow-ups (p<0.01). Joska et al. (2020) demonstrated that nurse-delivered CBT-AD improved adherence and depressive symptoms among 160 HIV patients in South Africa. Miri et al. (2021) examined CBT-MI effects on diabetes patients and found that adherence improved significantly post-intervention (5.54 ± 1.05 vs. 4.87 ± 1.01, $P = 0.002$). Qin et al. (2022) confirmed CBT's long-term effectiveness (>6 months) in reducing depressive symptoms in PLWH, though its effect on ART adherence was not statistically significant. Sevinç and Funda (2024) reported that CBT-based psycho-education increased schizophrenia patients' adherence (3.57 ± 0.66 vs. 2.17 ± 1.36) and reduced aggression (73.12 ± 15.28 vs. 85.60 ± 11.72, p=0.001). Onyedibe et al. (2020) demonstrated that 12-week group CBT significantly reduced anxiety and depression in Nigerian breast cancer patients.

Based on the foregoing, the study investigated the effect of cognitive behavioural therapy on adherence to anti-retroviral drugs among people living with HIV/AIDS in Lagos State, Nigeria.

The specific objectives are to:

1. assess the level of anti-retroviral drug adherence among people living with HIV/AIDS at pre and post intervention levels, and

2. assess the effect of pre and post intervention cognitive behavioural therapy on people liing with HIV/AIDS anti-retroviral drug adherence in the experimental and control groups in, Lagos State, Nigeria,

Two hypotheses were formulated for the study

Ho1: There is no significant difference in the level of adherence to antiretroviral drugs among people living with HIV/AIDS receiving CBT between the experimental and control groups.

Ho2: There is no significant effect of pre and post intervention cognitive behavioural therapy on people living with HIV/AIDS anti-retroviral drug adherence in experimental and control groups.

METHODOLOGY

The study adopted a pre-test, post-test, quasi-experimental research design, involving treatment packages with two levels of cognitive behavioural therapy (CBT) and a control group. The research focused on patients receiving HIV treatment in selected primary health centres in Lagos State, Nigeria. Inclusion criteria required participants to be HIV-positive, enrolled in antiretroviral therapy for at least three months, aged 18 or older, and mentally stable without comorbidities. Patients who declined consent, had been on therapy for less than three months, or were critically ill were excluded.

The sample size was determined using the normal approximation to the hypergeometric distribution, given that the study population was below 300. Based on a prevalence rate of 58% for self-reported adherence in Nigeria and a 0.05 margin of error, the estimated sample size was 167. To account for a 20% non-response or attrition rate, the final sample size was adjusted to 200 participants. A multi-stage sampling technique was employed. Lagos State was stratified into three senatorial districts, from which two (Lagos Central and Lagos West) were randomly selected. Within these, the local government areas (LGAs) with the highest number of primary healthcare centres (PHCs) serving people living with HIV/AIDS (PLWHIV/AIDS) were chosen: Alimosho in Lagos West and Surulere in Lagos Central. Convenience sampling was used to select the LGAs, and simple random sampling was applied to choose participants within each PHC. Participants were further randomly assigned to either the treatment groups (CBT intervention) or the control group using a lottery system.

Data collection instruments included a biographical data sheet capturing demographic information, the General Medication Adherence Scale (GMAS), and the CBT Medication Adherence Scale (CBT-MAS). The GMAS, an 11-item scale, measured patient behaviour-related non-adherence, additional disease and pill burden-related non-adherence, and cost-related non-adherence, with responses recorded on a four-point Likert scale. The CBT-MAS, a tool used in health psychology, assessed the effectiveness of CBT in improving medication adherence.

Validity and reliability of the instruments were ensured through expert review (face validity) and consistency checks. Content validity was established through reviews by professionals in nursing and mental health. Reliability was tested using Cronbach's Alpha, with results of 0.813 for the Medication Adherence Rating Scale and 0.811 for the CBT Medication Adherence Scale, indicating strong internal consistency. A pre-test was conducted with 20 PLWHIV/AIDS patients outside the study population at Olabisi Onabanjo University Teaching Hospital to verify the reliability of the instrument.

The data collection process involved three phases: pre-intervention, intervention, and post-intervention. In the pre-intervention phase, an introductory letter was obtained from Babcock University's Department of Nursing to secure approval from the Lagos State Ministry of Health and selected PHCs. Research assistants were recruited and trained, and pre-test assessments were conducted to establish baseline adherence levels. Participants were briefed on the study's objectives, and schedules for treatment sessions were established. The intervention phase involved six CBT sessions designed to improve medication adherence among participants in the treatment groups. The control group did not receive any intervention. The post-intervention phase assessed the impact of the CBT interventions using the same instruments as in the pre-test, evaluating changes in adherence behaviour among participants. The data retrieved from the experimental and control groups were coded and analyzed using the Statistical Package for Social Sciences version 27. The demographic data of participants were analysed using frequency counts and percentages, while the study's hypotheses were tested using ANCOVA at a 0.05 significance level.

RESULTS

Table 1: Percentage Analysis of Socio-demographic Data of Participants

SN		Variable	Control (N = 50)		Experimental (N = 150)	
			Frequency	Percent	Frequency	Percent
1	Age	18-25yrs	14	28.0	12	8.0
		26-33yrs	14	28.0	30	20.0
		34-41yrs	10	20.0	30	20.0
		42-49yrs	12	24.0	48	32.0
		50-57yrs	-	-	18	12.0
		58yrs and above	-	-	12	8.0
2	Gender	Male	44	88.0	42	28.0
		Female	6	12.0	102	68.0
		Married	16	32.0	72	48.0
		Widowed	2	4.0	12	8.0

		separated/divorced	18	36.0	12	8.0
3	Educational level	No formal education	-	-	12	8.0
		primary education	-	-	6	4.0
		secondary education	20	40.0	72	48.0
		Tertiary education	30	60.0	54	36.0
4	Occupation	Unemployed	2	4.0	-	-
		Farming	12	24.0	16	32.7
		self employed	18	36.0	18	36.7
		Housewife	2	4.0	2	4.1
		private employee	2	4.0	2	4.1
		Govt employee	14	28.0	11	22.4
5	Ethnicity	Igbo	40	80.0	66	44.0
		Hausa	4	8.0	6	4.0
		Yoruba	6	12.0	60	40.0
		Others	-	-	18	12.0
6	Religion	Christianity	20	40.0	114	76.0
		Islam	12	24.0	24	16.0
		Traditional	18	36.0	6	4.0
		with family	26	52.0	108	72.0
7	Phase of Treatment	Intensive phase	6	12.0	12	8.0
		Continuation phase	44	88.0	126	84.0

The socio-demographic data reveal notable differences between the control and experimental groups. The experimental group had a higher proportion of older participants, with 32% aged 42-49 years compared to 24% in the control group, and included individuals aged 50 and above, unlike the control group. Gender distribution showed a stark contrast, with males dominating the control group (88%) while females were predominant in the experimental group (68%). Educational attainment varied, as 60% of the control group had tertiary education compared to 36% in the experimental group, which had more participants with no formal or primary education. Occupationally, self-employment was the most common in both groups, but the control group had a higher percentage of government employees. Ethnically, the control group was predominantly Igbo (80%), whereas the experimental group was more diverse, with a significant Yoruba representation (40%). Christianity was the dominant religion in both groups but was significantly higher in the experimental group (76%). Most participants were in the continuation phase of treatment, with 88% in the control group and 84% in the experimental group.

Table 2: Pre and post intervention drug adherence mean score of participants on anti-retroviral drug adherence in the control and experimental group

| Extent of Adherence to Medication | Pre-intervention | | | | Post-intervention | | | |
| | Control | | Experimental | | Control | | Experimental | |
	F	%	F	%	F	%	F	%
Below average	4	8.0	17	11.3	5	10.0	-	1
Average	44	88.0	123	82.0	42	84.0	21	14.5
Above average	2	4.0	10	6.7	3	6.0	124	85.5
Total	50	100.0	150	100.0	50	100.0	145	100.0
Mean ± SD (%)	28.144 ± 1.851 (64.0%)		28.036 ± 1.798 (63.7%)		28.156 ± 1.854 (64.0%)		38.927 ± 1.615 (88.5%)	
			0.11				10.77	

Table 2 shows the pre and post intervention medication adherence mean score of participants on the anti-retroviral drug adherence in the control and experimental group. At the pre-intervention stage, 4 (8%) participants in the control group had below average score, 44 (88%) and 2 (4%) had medication adherence mean scores at average and above average respectively. In the experimental group, 17 (11.3%) had below average score on medication adherence, 123 (82%) had average score while 10 (6.7%) had above average medication adherence score. The pre-intervention medication adherence mean score of anti-retroviral drug adherence among people living with HIV/AIDS in the control group was 28.144 ± 1.851 (64.0%) and 28.036 ± 1.798 (63.7%) in the experimental group with a mean difference of 0.11. At the post-intervention stage, 5 (1%) participants in the control group had below average score, 42 (84%) and 3 (3%) had medication adherence mean scores at average and above average respectively. In the experimental group, 21 (14.5%) had average score on medication adherence and the remaining 124 (85.5%) had above average score. The post-intervention medication adherence mean score of anti-retroviral drug adherence among people living with HIV/AIDS in the control group was 28.156 ± 1.854 (64.0%) and 38.927 ± 1.615 (88.5%) in the experimental group with a mean difference of 10.77.

Testing of Hypotheses

Hypothesis 1: There is no significant difference in the level of adherence to antiretroviral drugs among people living with HIV/AIDS receiving CBT between the experimental and control groups

Table 3: T-test showing the difference in the mean level of adherence to anti-retroviral drug adherence among people living with HIV/AIDS in the experimental and control groups

Group	N	Mean	Std. dev	Df	t-value	p-value	Mean diff	Remark
Control	50	28.156	1.854	193	9.437	.000	10.77	S**
Experimental	145	38.927	1.615					

S** = Significant

Table 3 presents the result of hypothesis two postulated in this study, which stated that there is no significant difference in the mean level of medication adherence of anti-retroviral drug adherence among people living with HIV/AIDS in the experimental and control groups (mean difference = 10.77, $t_{(193)}$ = 9.437, p = .000 < .05). Based on this, the earlier set hypothesis cannot be accepted. Therefore, there is a significant difference in the post intervention mean score of participants on the medication adherence of anti-retroviral drug adherence in the control and experimental groups.

Hypothesis 2: There is no significant effect of cognitive behavioural therapy on people living with HIV/AIDS anti-retroviral drug adherence in experimental and control groups

Table 4: Univariates Test of the Effects of cognitive behavioural therapy and control on people living with HIV/AIDS anti-retroviral drug adherence

	Sum of Squares	Df	Mean Square	F	Sig.
Contrast	588.401	1	588.401	7.666	.000
Error	11052.720	144	76.755		

The F tests the effect of Treatment Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

The results in Table 4. revealed that there is a significant difference in the effect of cognitive behaviour therapy (CBT) and control ($F_{(1,144)}$ = 7.666; p = .000 < 0.05) on people living with HIV/AIDS anti-retroviral drug adherence. In effect the null hypothesis was rejected by this finding. The implication of this finding is that participants' medication adherence differs with regards to the treatment given to them.

DISCUSSION OF THE FINDINGS

The findings revealed moderate medication adherence anti-retroviral drug among people living with HIV/AIDS in control and experimental group. This implies that the adherence level of people

living with HIV/AIDS is not as good as expected. This corroborates the findings of Chukwuma et al. (2023) in a study that assessed the treatment adherence rate among People Living With HIV/AIDS (PLWHA) receiving treatment in a Nigerian tertiary Hospital in Ilorin, Kwara State, Nigeria revealed that the adherence rate was less than optimal despite advancements in treatment programmes. The study of Nhlongolwane and Shonisani (2023) on predictors and barriers associated with non-adherence to ART by people living with HIV and AIDS in a selected local municipality of Limpopo Province, South Africa, lend a support for the findings from research question two. Their study concluded that non-adherence to ART poses a significant challenge in the study area while lack of knowledge regarding the urgency of follow-up and financial constraints were contributing to ART non-adherence. In another study from Nigeria. Asaolu and Agbede (2022) studied factors influencing medication adherence among young people living with HIV in Niger State, Nigeria was found to be below expectation.

At the post-intervention stage, it was observed that the medication adherence mean score of anti-retroviral drug adherence among people living with HIV/AIDS in the experimental group was better than the control group. This implies that through the educational intervention there was an improvement. Thus, nurses played an important role in guiding the patient and their family members regarding different ways to be adherent to medication. Though, adherence is often perceived as the patients' responsibility, but they can be supported by informal caregivers and primary care professionals, such as professionals from the general practice for example, the clinical nurse specialist, practice nurse, and general practitioner (Lelie-vander, 2020)

It was found that there is a significant difference in the post intervention mean score of participants on the medication adherence of anti-retroviral drug adherence in the control and experimental groups. It was not by accident that the experimental group's post-intervention mean score on medication adherence for antiretroviral drugs improved; rather, it was because of the educational intervention (CBT). This result contradicts the findings of Qin et al. (2022) who evaluated the effect of cognitive behavioral therapy on improving depressive symptoms and increasing adherence to antiretroviral therapy (ART) in people living with HIV (Human Immunodeficiency Virus). Their results showed that CBT did not improve ART medication adherence in the CBT group compared to the control group.

However, the findings of Sevinç and Funda (2024) on how cognitive behavioral therapy (CBT)-based psycho-education affects medication adherence and aggression in individuals diagnosed with schizophrenia lend credence to this study. Sevinç and Funda (2024)'s revealed that the level of medication adherence of individuals diagnosed with schizophrenia in the experimental group after CBT-based psycho-education elevated compared to the level of medication adherence of schizophrenic patients in the control group. Therefore, the psycho-education based on CBT caused a statistically significant difference in medication adherence and aggression levels in the experimental group. Also, Onyedibe et al (2020)'s study on the effectiveness of group cognitive-behavioral therapy on anxiety and depression in Nigerian breast cancer patients showed that participants in the CBT Group had decreased in anxiety and depression significantly at post-test

and 2-month follow-up compared to the participants in the Control Group. This is equally supported by this study.

This study revealed that there is a significant difference in the effect of cognitive behaviour therapy (CBT) and control on people living with HIV/AIDS anti-retroviral drug adherence. It could be said that the experimental group's improved post-intervention mean score on antiretroviral medicine adherence was not the result of chance; rather, it was brought about by exposure to CBT. CBT as a therapeutic approach, focuses on altering negative thought patterns and beliefs by promoting healthier and more adaptive thinking processes (Olatunji et al.,2020). This is in line with the study by Olatunji et al (2020) who applied CBT to reduce substance abuse among adolescents in Nigeria and reported significant improvements in behaviour. This is also similar to the findings of Inwanna et al (2022) on the effectiveness of interventions to promote medication adherence in schizophrenic populations in Thailand, and reported that incorporating CBT into clinical practice can enhance medication adherence behaviour.

CONCLUSION

The findings of this study indicate that cognitive behavioural therapy (CBT) significantly improves adherence to antiretroviral drugs among people living with HIV/AIDS. The post-intervention adherence level was notably higher in the experimental group compared to the control group, demonstrating the effectiveness of CBT in enhancing medication compliance. The significant difference observed between the two groups suggests that CBT provides meaningful support in addressing adherence challenges, reinforcing its potential as an intervention for improving health outcomes among individuals undergoing antiretroviral therapy.

Recommendations

1. Healthcare facilities and policymakers should incorporate CBT as a standard component of HIV/AIDS management to enhance adherence to antiretroviral therapy. Regular counselling sessions can help individuals address psychological barriers to medication adherence.

2. Healthcare professionals should receive specialised training on the implementation of CBT techniques to support patients in maintaining consistent medication adherence. This will improve patient engagement and long-term treatment outcomes.

3. Community health initiatives should include educational and psychosocial support programs that promote awareness of the benefits of medication adherence and address stigma-related barriers. Engaging peer support groups and community health workers can further reinforce positive adherence behaviours

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