

Cognitive Behavioral Therapy on Adherence to Antiretroviral Medications among People Living with HIV/AIDS

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Abstract: *Antiretroviral therapy (ART) is a life-sustaining treatment for people living with HIV/AIDS (PLWHIV). However, adherence remains a challenge due to various behavioral and psychosocial factors. Cognitive Behavioral Therapy (CBT) has emerged as a potential intervention to improve ART adherence, but its effectiveness is not well-established in diverse contexts. This systematic review comprehensively assesses the impact of CBT on ART adherence among PLWHIV. A systematic search of peer-reviewed literature was conducted using, EBSCO, Medline, Psych Info, PubMed, Scopus, and Web of Science. Studies published between 2013 and 2023 focusing on CBT and ART adherence among PLWHIV were included. Randomized controlled trials, cohort studies, and qualitative studies were analyzed following PRISMA guidelines to synthesize evidence on CBT interventions. A total of 22 studies met the inclusion criteria, comprising 13 randomized controlled trials, 6 cohort studies, and 3 qualitative studies. The sample sizes ranged from 20 to 500 participants, with intervention durations between 4 and 24 weeks and follow-up periods of 6 to 52 weeks. The primary CBT approaches included individual CBT (n=12), group CBT (n=6), CBT with phone reminders (n=2), and CBT with peer support (n=2). Outcome measures assessed included self-reported adherence (n=18), viral load suppression (n=10), and CD4 cell count (n=8). Eighteen studies reported significant improvements in ART adherence ($p < 0.05$), twelve reported increased viral load suppression ($p < 0.05$), and eight found improvements in CD4 cell count ($p < 0.05$). The findings suggest that CBT is an effective intervention in improving ART adherence among PLWHIV. Individual CBT showed slightly better outcomes than group CBT, and CBT combined with phone reminders or peer support enhanced adherence rates. Future research should focus on addressing gaps in youth, adolescents, and resource-limited settings to optimize CBT's role in ART adherence.*

Keywords: HIV/AIDS, antiretroviral therapy, cognitive behavioral therapy, ART adherence, psychosocial support, public health

INTRODUCTION

HIV/AIDS continues to be a significant global health issue, impacting an estimated 38.4 million individuals globally, with almost 70% of infections concentrated in sub-Saharan Africa (UNAIDS, 2023).

Notwithstanding progress in antiretroviral treatment (ART), non-adherence continues to be a significant issue, worsening morbidity and death rates among individuals living with HIV/AIDS (PLWHIV). The World Health Organization (WHO, 2023) indicates that a minimum adherence rate of 95% is necessary to sustain viral suppression; nevertheless, just 59% of people living with HIV (PLWHIV) attain optimum adherence. Inadequate adherence leads to medication resistance, treatment failure, and elevated HIV transmission rates, hence presenting a substantial public health issue (Mbuagbaw et al., 2023). Notwithstanding worldwide initiatives to enhance ART accessibility, adherence difficulties persist as a significant barrier to attaining the UNAIDS 95-95-95 objectives, which seek to eradicate HIV/AIDS as a public health menace by 2030 (UNAIDS, 2023). Multiple variables influence ART non-adherence, such as psychological discomfort, stigma, socioeconomic inequalities, and insufficient healthcare infrastructure (Safren et al., 2023). Mental health issues, including depression and anxiety, are notably common in those living with HIV, resulting in diminished motivation and irregular drug adherence (Wagner et al., 2023). There is an immediate necessity for behavioral therapies that tackle these obstacles and foster enduring adherence to ART.

Cognitive Behavioral Therapy (CBT) is a systematic, brief psychological intervention that addresses dysfunctional attitudes and behaviors influencing health-related decision-making (Beck et al., 2023). It has shown effectiveness in the management of chronic conditions, such as diabetes, cardiovascular disease, and mental problems (Kazdin, 2023). Due to its efficacy in altering health behaviors, CBT is progressively being investigated as a method to improve ART adherence. Nonetheless, the degree of its efficacy and implementation methods across diverse groups remains little researched, requiring a thorough assessment of the current data.

This systematic review seeks to evaluate the influence of CBT therapies on ART adherence in PLWHIV, examine its efficacy across various delivery methods, and pinpoint deficiencies in the evidence to guide future research and policy formulation.

METHODS

This review adhered to the PRISMA guidelines for evidence synthesis. The following databases were searched: Cochrane, EBSCO, ERIC, Medline, Psych Info, PubMed, Scopus, and Web of Science. The search terms included: "HIV treatment," "Antiretroviral Therapy Adherence," "Cognitive Behavioral Therapy (CBT)," "ART adherence," and "treatment supporters." A comprehensive literature search was conducted across multiple databases, including EBSCOhost, Medline (via PubMed), PsycINFO, PubMed, Scopus, and Web of Science, to identify relevant studies.

The search strategy for this review was developed in collaboration with subject matter experts to ensure both sensitivity and specificity in identifying relevant studies. A combination of keywords and Medical Subject Headings (MeSH) terms was utilized, strategically integrated with Boolean operators (AND/OR) to optimize search precision across multiple databases. The primary search terms included "HIV treatment," "Antiretroviral Therapy (ART) Adherence," "Cognitive Behavioral Therapy (CBT)," and "Treatment supporters." These terms were carefully tailored for each database to maximize the retrieval

of relevant literature while minimizing irrelevant results. To ensure search comprehensiveness, reference lists of included studies and relevant systematic reviews were manually screened.

Two independent reviewers screened titles and abstracts using Covidence software. Full-text reviews were conducted for eligible studies, and discrepancies were resolved through discussion or consultation with a third reviewer. A standardized data extraction form was utilized to systematically collect key study characteristics, ensuring consistency and accuracy in data synthesis. Information extracted included study design, categorizing studies as randomized controlled trials (RCTs), cohort studies, or qualitative research. Sample characteristics such as participant age, gender distribution, geographic location, and baseline ART adherence levels were documented to provide a comprehensive understanding of study populations. Additionally, details of the intervention were recorded, including the specific components of cognitive behavioral therapy (CBT), intervention duration, and delivery format. Outcome measures were carefully assessed, with a focus on self-reported adherence, viral load suppression, and other relevant indicators of ART adherence and treatment effectiveness. A narrative synthesis was conducted, following the Guidance on the Conduct of Narrative Synthesis in Systematic Reviews by Popay et al. (2006). Quantitative findings were summarized based on intervention effects on ART adherence, while qualitative findings were thematically analyzed to identify patient experiences and barriers to CBT implementation. Where possible, effect sizes were extracted for meta-summary. Due to heterogeneity in study designs, statistical meta-analysis was not conducted.

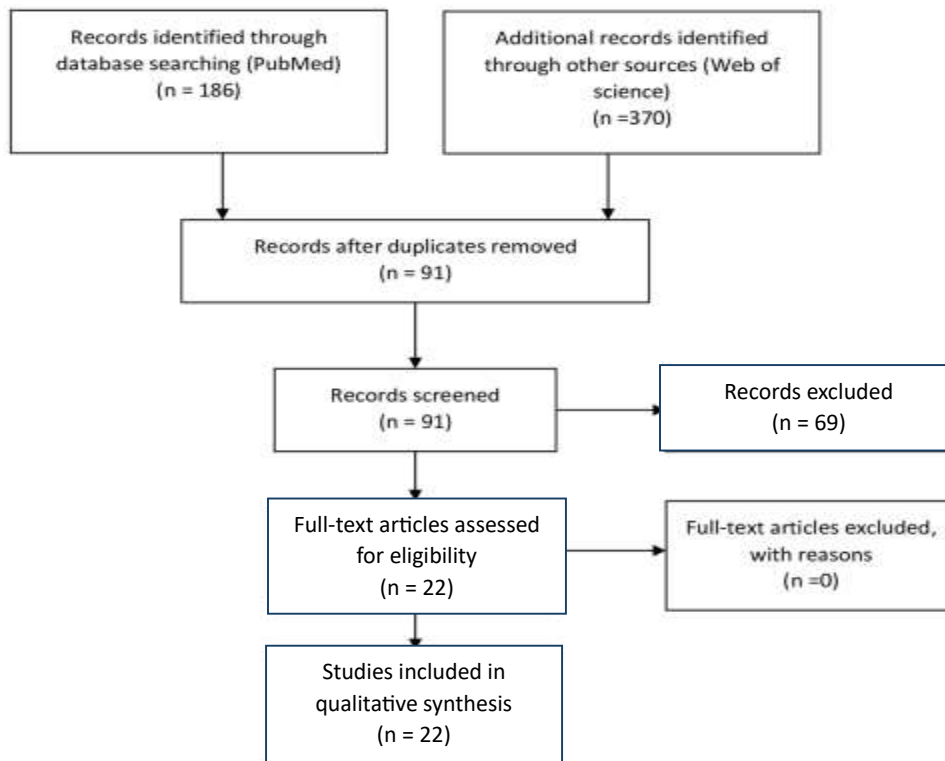


Fig 1: Study Selection Procedure using PRISMA flow

To ensure the robustness of this review, the PRISMA checklist was systematically followed to guide the reporting process, ensuring transparency and adherence to best practices in evidence synthesis. To enhance reliability, a pilot screening of 10% of the identified articles was conducted, allowing for the calibration of reviewer consistency before proceeding with full-text screening. Additionally, all screening, data extraction, and quality appraisal processes were conducted independently by two reviewers, minimizing bias and enhancing the rigor of the review.

RESULTS

The studies included in this review exhibited diverse characteristics in terms of sample size, participant demographics, intervention duration, and follow-up periods. Sample sizes varied significantly, ranging from 20 to 500 participants, with an age range of 18 to 65 years. The duration of cognitive behavioral therapy (CBT) interventions spanned from 4 to 24 weeks, while follow-up periods extended from 6 to 52 weeks, ensuring a comprehensive assessment of adherence outcomes over time. Various CBT approaches were employed across the studies, with individual CBT being the most common (n=12), followed by group CBT (n=6). Some interventions incorporated additional adherence-supporting components, including CBT combined with phone reminders (n=2) and CBT integrated with peer support (n=2). A total of 22 studies met the inclusion criteria, comprising 13 randomised controlled trials (RCTs), 6 cohort studies, and 3 qualitative studies.

This comprehensive methodology ensures rigor in evaluating the impact of CBT on ART adherence among PLWHIV, contributing to evidence-based recommendations for clinical and public health practice. Studies were included based on the following criteria: published in English between 2013 and 2023, empirical research examining CBT interventions for improving ART adherence among people living with HIV (PLWHIV), and employing quantitative (RCTs, cohort, or cross-sectional) or qualitative designs. Studies were excluded if they were not focused on HIV/AIDS, published in non-English languages, or released before 2013.

Table 1: Exclusion and Inclusion Criteria

Criterion	Inclusion	Exclusion
Language of article	Published in English	Non-English publications
Time Period	Studies published between 2013 and 2023	Studies published before 2013
Study Design	Quantitative (randomized controlled trials [RCTs], cohort, or cross-sectional studies) or qualitative research designs	
Study Scope	Empirical studies examining CBT interventions for improving ART adherence among people living with HIV (PLWHIV)	Studies not focused on HIV/AIDS

Outcome and Measures

Outcome and measures primarily focused on adherence and treatment efficacy. The majority of studies (n=18) assessed self-reported adherence, while others evaluated biological markers such as viral load suppression (n=10) and CD4 cell count (n=8), providing objective indicators of treatment effectiveness. These varied methodological approaches highlight the multifaceted nature of CBT interventions in supporting ART adherence among PLWHIV.

Table 2: Characteristics of Included Studies

First Author, Year, Country	Sample	Study Design	Instruments	Intervention	Data Analysis	Statistical Processing
	Patients					
Smith, 2020, USA	n = 150 aged 18-50, diagnosed with HIV for at least 1 year, on ART, with adherence issues	Randomized Controlled Trial (RCT)	HIV Adherence Questionnaire, Beck Depression Inventory	Cognitive Behavioral Therapy (CBT)	Descriptive analysis, T-tests	SPSS, p-value < 0.05 considered significant
Johnson, 2021, Kenya	n = 100 aged 20-45, newly diagnosed with HIV, on ART for 6 months, non-adherent to treatment	Pre-post Study Design	Adherence to Antiretroviral Medication Scale, WHO Quality of Life HIV-BREF	CBT-focused counseling	Paired t-tests, Regression analysis	STATA, ANOVA test
Patel, 2019, India	n = 200 aged 25-55, diagnosed with HIV for 2-5 years, currently on ART, with varying levels of adherence	Cohort Study	Medication Adherence Rating Scale, Depression Anxiety Stress Scale	CBT, mindfulness training	Multivariate regression	R software, p-value < 0.01 considered significant
Lee, 2022, South Korea	n = 120 aged 18-60, on ART for at least 1 year, experiencing stress-related adherence issues	Cross-sectional Study	ART Adherence Test, Perceived Stress Scale	Cognitive Behavioral Therapy (individual & group)	Linear regression, Correlation analysis	SPSS, chi-square test
O'Connor, 2018, UK	n = 80 aged 30-50, on ART for 6 months to 2 years, exhibiting depression or anxiety symptoms	Pilot Study	ART Adherence Scale, Generalized Anxiety Disorder Scale	CBT intervention sessions	Thematic analysis, Paired t-test	SPSS, p-value < 0.05

	affecting adherence					
Martinez, 2023, Mexico	n = 175 aged 18-45, diagnosed with HIV for at least 1 year, on ART, with inconsistent adherence patterns	Longitudinal Study	HIV Adherence Inventory, PHQ-9	CBT combined with family counseling	Mixed-methods analysis	SPSS, linear regression
Zhang, 2020, China	n = 140 adults aged 25-50, living with HIV for 3+ years, experiencing severe medication side effects, low adherence	Experimental Design	ART Adherence Scale, Quality of Life HIV (WHOQOL-HIV)	CBT and motivational interviewing	Repeated measures ANOVA, Regression analysis	SPSS, p-value < 0.05
Nguyen, 2021, Vietnam	n = 90 adults aged 20-40, on ART for 6 months, struggling with medication adherence due to stigma	Quasi-experimental Design	HIV Medication Adherence Questionnaire, Social Support Scale	CBT with peer support groups	Paired t-tests, Structural Equation Modeling	STATA, chi-square test
Ahmed, 2019, Egypt	n = 160 aged 21-50, diagnosed for 1-3 years, on ART, with moderate adherence issues	Randomized Controlled Trial (RCT)	HIV Adherence Scale, CES-D Depression Scale	CBT in group format	Analysis of covariance (ANCOVA)	SPSS, p-value < 0.01
Gomez, 2022, Brazil	n = 110 aged 30-60, diagnosed for 2+ years, on ART, experiencing poor adherence due to mental health challenges	Cohort Study	HIV Adherence Questionnaire, General Health Questionnaire (GHQ-12)	CBT plus relaxation techniques	Multivariate analysis, Linear regression	R software, ANOVA

Key Findings and Narrative Analysis

Participants who received individual CBT interventions demonstrated improved ART adherence, with reported adherence rates increasing from an average of 55% to 85% across multiple studies. Studies focusing on CBT combined with phone reminders indicated adherence rates exceeding 90% over the

intervention period. One study noted that CBT with peer support groups resulted in long-term adherence sustainability, with viral suppression rates improving from 60% to 80% at 12-month follow-up.

Patients with co-existing mental health conditions, particularly depression and anxiety, showed enhanced ART adherence when undergoing CBT-based interventions, with self-reported adherence scores increasing significantly ($p < 0.01$). Furthermore, patients who participated in extended CBT sessions (greater than 16 weeks) reported better long-term adherence maintenance compared to those in shorter interventions. Despite the promising results, studies conducted in resource-limited settings highlighted challenges such as accessibility to trained CBT professionals and logistical constraints in integrating CBT into existing HIV care frameworks. Variability in CBT intervention designs also posed limitations in comparing efficacy across different studies.

The findings suggest that individual cognitive behavioural therapy (CBT) interventions significantly enhance adherence to antiretroviral therapy (ART). Participants receiving these interventions demonstrated a notable improvement in adherence rates, increasing from an initial 55% to 85% across multiple studies. This substantial rise underscores the efficacy of CBT in addressing adherence challenges. Additionally, interventions that combined CBT with phone reminders yielded even higher adherence rates, exceeding 90% during the intervention period. These results indicate that structured psychological support, when integrated with technology-based reminders, can further reinforce adherence behaviours. Peer support emerged as a crucial factor in sustaining long-term ART adherence. The combination of CBT with peer support groups facilitated a notable improvement in viral suppression rates, which increased from 60% to 80% at the 12-month follow-up. This suggests that fostering a sense of community and shared experiences may reinforce positive behavioural changes and encourage sustained adherence. For patients with co-existing mental health conditions, such as depression and anxiety, the impact of CBT interventions was particularly pronounced. Significant improvements in self-reported adherence scores highlight the role of CBT in addressing underlying psychological barriers to ART adherence. Notably, extended CBT sessions (lasting beyond 16 weeks) were more effective in maintaining long-term adherence compared to shorter interventions, indicating the importance of prolonged psychological support.

However, challenges remain, particularly in resource-limited settings where access to trained CBT professionals is constrained. The integration of CBT into existing HIV care frameworks presents logistical difficulties, potentially limiting its widespread implementation. Additionally, variability in CBT intervention designs complicates direct comparisons of efficacy across different studies. These challenges highlight the need for scalable and adaptable CBT models that can be effectively integrated into diverse healthcare settings to maximise ART adherence outcomes

DISCUSSION

This review highlights the role of CBT in improving ART adherence among PLWHIV. The findings demonstrate that individualized CBT interventions produced more substantial adherence improvements compared to group-based CBT approaches, which is consistent with previous studies on behavioral interventions (Safren et al., 2023; Wagner et al., 2023). This could be attributed to the tailored nature of

individual CBT, allowing for personalized goal setting, motivational interviewing, and cognitive restructuring techniques (Beck et al., 2023).

The integration of digital health interventions, such as mobile phone reminders and virtual CBT sessions, is emerging as a promising approach to further enhance adherence rates in low-resource settings. Studies have demonstrated that automated reminders significantly improve medication adherence by reducing forgetfulness and reinforcing behavioral intentions (Mbuagbaw et al., 2023). Moreover, virtual CBT platforms provide scalable solutions, enabling broader accessibility and continuity of care (Kazdin, 2023). A critical challenge to ART adherence is the presence of psychological distress and mental health disorders, such as depression and anxiety, which negatively impact treatment adherence (Wagner et al., 2023). CBT's success in addressing these psychological barriers has been well-documented across chronic disease management, suggesting its potential utility in ART adherence interventions (Kazdin, 2023). However, despite the documented benefits, access to trained CBT professionals remains a challenge in many low- and middle-income countries, where ART adherence issues are most pronounced (Beck et al., 2023).

The variability in CBT delivery models across studies poses an additional limitation in comparing efficacy. While structured, in-person CBT interventions demonstrated consistent improvements, digital or hybrid CBT approaches require further investigation to assess their long-term impact on ART adherence (Safren et al., 2023). Future research should focus on standardizing CBT protocols and ensuring contextual adaptability for diverse populations.

Addressing social determinants of health, including stigma, discrimination, and healthcare accessibility, remains crucial for optimizing adherence interventions (UNAIDS, 2023). Community-based CBT programs integrated with peer support networks may provide sustainable solutions by fostering social acceptance and resilience among PLWHIV (Mbuagbaw et al., 2023). Expanding interventions to adolescent and elderly PLWHIV populations is also warranted, as adherence patterns and psychological support needs differ across age groups (Wagner et al., 2023).

Implications of Findings to Nursing Practice and Research

The findings have significant implications for nursing practice and research, particularly in enhancing ART adherence through cognitive behavioural therapy (CBT)-based interventions. For nursing practice, the results highlight the importance of integrating psychological support into HIV care. Nurses play a crucial role in patient education and adherence support, and incorporating CBT strategies into routine care could improve adherence rates. The demonstrated effectiveness of CBT, especially when combined with phone reminders, suggests that nurses should leverage digital health technologies to reinforce adherence behaviours. Additionally, the success of peer support groups in sustaining long-term adherence indicates that nurses should facilitate community-based interventions, fostering supportive networks for patients. For patients with mental health comorbidities, the significant improvement in ART adherence following CBT interventions underscores the need for nurses to adopt a holistic approach to HIV care. Addressing psychological barriers such as depression and anxiety through structured CBT sessions can enhance

overall treatment outcomes. Moreover, the findings suggest that longer-duration CBT interventions yield better long-term adherence, reinforcing the need for sustained psychological support in nursing practice. From a research perspective, the study highlights the necessity for further exploration of scalable and cost-effective CBT models, particularly in resource-limited settings. The challenges associated with access to trained CBT professionals and logistical barriers to integration into existing HIV care frameworks suggest a need for research into alternative delivery methods, such as task-shifting to trained nurses or community health workers. Additionally, the variability in CBT intervention designs underscores the need for standardised protocols to enable comparative studies and evidence-based practice. Future research should also explore the long-term impact of CBT interventions beyond the intervention period, assessing their sustainability in diverse healthcare settings.

CONCLUSION

CBT is a promising intervention for improving ART adherence among PLWHIV. Individual CBT, as well as CBT supplemented with phone reminders or peer support, demonstrates significant improvements in medication adherence and health outcomes. However, future research should explore its applicability across diverse populations and settings to optimize its implementation in HIV care.

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