HTechJ Health and Technology Journal (HTechJ)

Volume 03 Number 02
April 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

The Effect of Mindfulness-Based Intervention on HIV-AIDS Immunity in Adolescents: A Systematic Review

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Abstract:
Human Immunodeficiency Virus (HIV) is an infection that attacks the body's immune system, especially white blood cells called CD4 cells. Human immunodeficiency virus (HIV) targets the immune system and weakens people's defenses against many infections and some types of cancer. The article was searched through several online databases, including PubMed, ProQuest, Scient Direct, Cochrane Library, and Google Scholar. A total of 8871 articles were obtained that matched the keywords; 259 articles were free of duplication, and 54 full-text articles. Eligibility was carried out to determine articles that met the inclusion criteria, and 10 articles that met the criteria for the age range of respondents were found, with the article being 10-24 years old. The study design used a prospective study and a retrospective study. The total sample was 1,793 HIV-AIDS sufferers. The main result of MBSR is that it can help improve immunity in HIV-infected people. Stress reduction can buffer CD4+ and T lymphocyte decline in diverse community samples of HIV-infected individuals. Mindfulness's positive impact on outcomes is meaningful and important, including improved emotional coping and regulation, increased life satisfaction, decreased aggression, and decreased disease activity.

Article info:
Submitted:
15-12-2024
Revised:
05-03-2025
Accepted:
06-03-2025

Keywords:
HIV-AIDS; immunity; mindfulness; CD4; mental health

DOI: https://doi.org/10.53713/htechj.v3i2.302

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a viral infection that specifically targets the immune system, mainly white blood cells known as CD4 cells, which play a critical role in defending the body against infections and diseases (Zaongo et al., 2022). As HIV progressively weakens the immune system by destroying these cells, individuals become increasingly vulnerable to opportunistic infections and certain cancers. If left untreated, HIV can advance to its most severe stage, acquired immunodeficiency syndrome (AIDS), which is characterized by a severely compromised immune system and the presence of specific opportunistic illnesses or a critically low CD4 count (Prabhu & van Wagoner, 2023). The progression from HIV to AIDS varies significantly among individuals and can take several years, depending on factors such as overall health, access to medical care, and lifestyle choices (Saden et al., 2023). However, with advancements in antiretroviral therapy (ART), HIV can now be managed as a chronic condition, allowing individuals to maintain their health and prevent the onset of AIDS with proper treatment and care.

Depression is associated with other important HIV-related outcomes for women in particular: lower CD4 counts, lower likelihood of using and continuing highly active antiretroviral therapy (HAART), and higher rates of disease mortality (Hunter-Jones et al., 2019). Mental health is a critical and overlooked global health challenge for HIV-infected youth. The prevalence of mental health and

Volume 03 Number 02
April 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

behavioral problems among HIV-infected adolescents may not be well understood or addressed as the world improves HIV prevention and treatment for adolescents (Onwuka, 2023; Vreeman et al., 2017). Approximately 20–40% of people living with HIV/AIDS (PLWHA) experience depression compared to 6–10% of the general population (Martins et al., 2023.).

Antiretroviral therapy (ART) has been instrumental in managing HIV by effectively inhibiting viral replication, thereby reducing viral load to undetectable levels and allowing individuals to live healthier lives (Bekker et al., 2023). However, ART is not curative, as the integrated HIV genome can persist indefinitely within CD4+ T cells and potentially other cellular reservoirs, even under consistent treatment (Cohn et al., 2020). This persistence of latent HIV reservoirs poses a significant challenge to achieving a complete cure, necessitating the exploration of additional interventions to complement ART. Researchers are increasingly investigating the potential of chemical compounds, herbal remedies, and complementary therapies to enhance the efficacy of ART or target latent reservoirs directly (Afrashteh et al., 2023; Golsoorat Pahlaviani et al., 2023; Teshome & Agezew, 2023). These approaches aim to either reactivate and eliminate latent HIV reservoirs or boost the immune system's ability to control the virus independently, offering hope for more effective long-term management or even a functional cure for HIV.

Mindfulness meditation is increasingly being incorporated into mental health interventions, and the theoretical concepts associated with it have influenced basic research on psychopathology (Creswell, 2017). Mindfulness interventions foster greater attention and awareness of current experiences (Campbell et al., 2019; Ewetola et al., 2023). Intervention is effective in reducing depression, anxiety, and chronic pain (Relf et al., 2013). Furthermore, it has been used for groups living with chronic diseases, particularly HIV/AIDS (Scott-Sheldon et al., 2019). It has helped improve mental and behavioral health, as well as increasing CD4 counts and reducing viral load for some samples of people living with HIV/AIDS (Hunter-Jones et al., 2019). The literature supports that mindfulness-based therapy may be a promising avenue for intervention with comorbid HIV/AIDS diagnoses and mental health disorders. (Addington et al., 2020). MBSR, which combines strategies for increasing attention and awareness with the incorporation of yoga, has demonstrated treatment efficacy in a variety of populations experiencing chronic physical conditions (Hammond et al., 2023; Hunter-Jones et al., 2021; Ortblad et al., 2023).

HIV-AIDS is a chronic condition that profoundly impacts both the immune system and mental health of those affected, necessitating a combination of pharmacological treatments, such as antiretroviral therapy (ART), and complementary interventions to address its multifaceted challenges (Obeagu, 2025). Among complementary approaches, mindfulness-based interventions have emerged as a promising tool to enhance mental well-being, reduce stress, and potentially influence immune function in individuals living with HIV-AIDS. However, despite the growing interest in mindfulness as a supportive strategy, there remains a significant gap in the literature regarding its application and effects on adolescents, a particularly vulnerable population facing unique physical, emotional, and social challenges during their developmental years. Notably, in the last decade, no systematic reviews have specifically explored the relationship between mindfulness and its impact on the immunity and mental health of adolescents living with HIV-AIDS. Therefore, this systematic review aims to fill this critical gap by synthesizing available evidence to determine the efficacy of mindfulness interventions in improving both the psychological well-being and immune outcomes of adolescents affected by HIV-AIDS, thereby contributing to more holistic and age-appropriate care strategies.

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e-ISSN: 2985-959X

METHOD

This research is a systematic review. The study was prepared following the PICO methodology. PRISMA Declaration recommendations were followed for the literature review (Domínguez-Solís et al., 2021). The articles used in this research were obtained from several online databases, namely Pubmed, Science Direct, Proquest, Elsevier, and other sources, namely Google Scholar, between 2020-2022. Keywords to search for articles are "HIV-AIDS," "Mindfulness," AND "Young."

The inclusion criteria for this study were Full-text articles in English. Original research article. Population of young adolescents and early adults infected with HIV-AIDS. Articles with a randomized control trial, a clinical trial, a prospective study, and a retrospective study design.

The exclusion criteria for this study were: population aged over 24 years and under 10 years, case studies and reviews, outcomes that did not discuss immune and psychological responses, and articles in Chinese, Arabic, and European.

The variables in this study are the immunity and psychology of adolescents with HIV-AIDS. Immunity is the body's mechanism for fighting pathogens. The indicators in the operational definition are teenagers' immunity and psychology, as obtained from journal reviews.

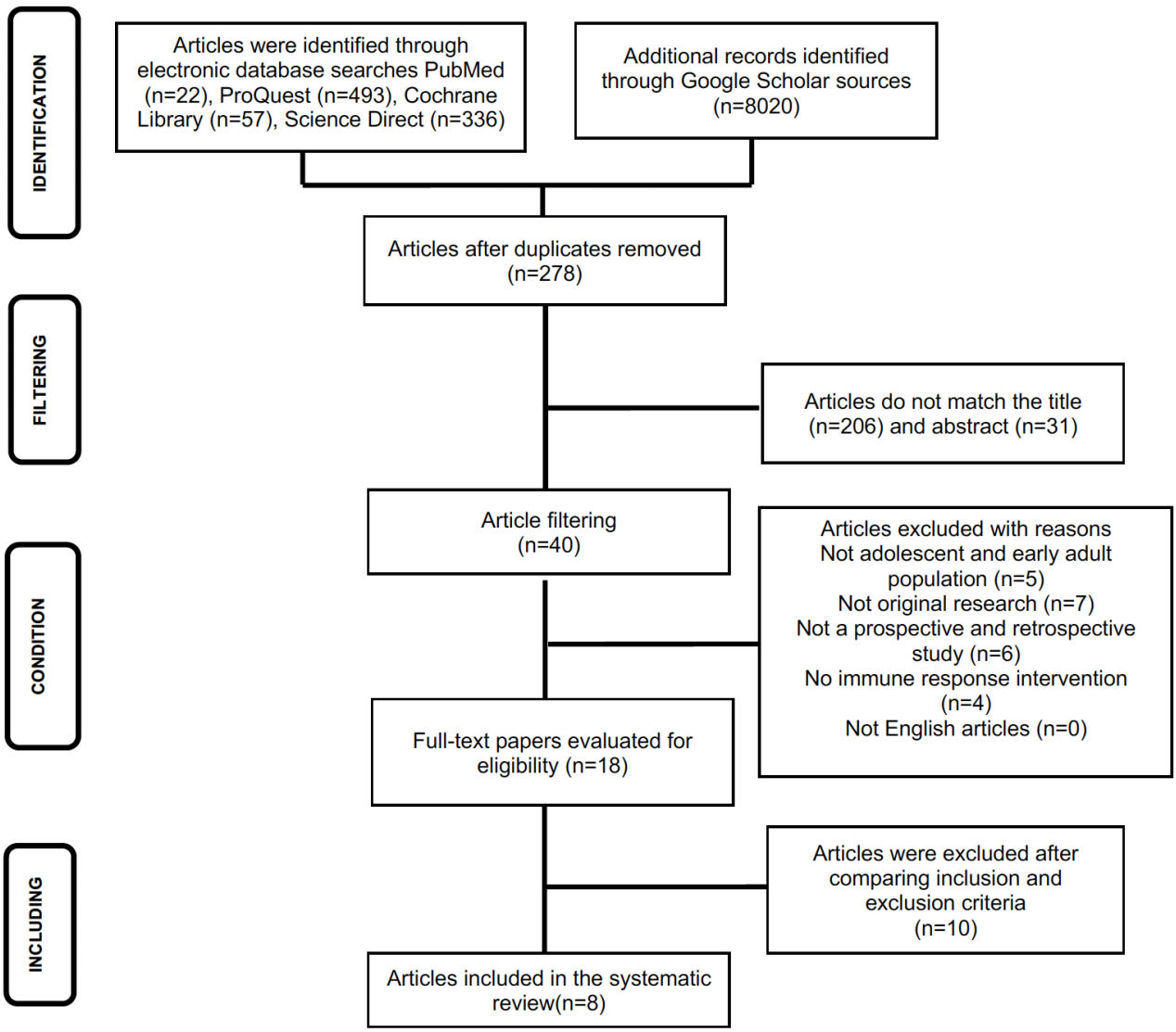

Figure 1. Prisma Flowchart

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p-ISSN: 2986-5662
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RESULT

Table 1. Articles Analysis

Study	Design	Settings	Population	Tools	Interventions	**Results**
(Mon et al., 2016) Myanmar	RCT	In Myanmar. Before randomization, four cities were selected purposively based on the criterion of having a large number of adolescents with parental HIV infection	80 teenagers aged 10-16 through the Myanmar Positive Group, a community-based organization.	SDQ23 factor analysis produces three domains, namely, emotional (9 items), behavior (6 items), and social behavior (10 items). The SDQ is a behavioral screening tool for children and adolescents between the ages of 4 and 16.	Group intervention sessions were given to adolescents from 2 intervention cities every month for three consecutive months. A total of 8 sessions were conducted, and approximately 15 to 20 youth participated in each session, which lasted approximately 2 hours. The intervention process was facilitated by an experienced mindfulness trainer and two researchers. Mindfulness meditation took approximately 10 minutes in the first session of the intervention and increased to 15 minutes in subsequent sessions. They were asked to do mindfulness exercises at least 3 to 4 times per week and were asked to record their practices at home in a small notebook distributed to them.	Adolescents from the intervention group had significantly lower emotional scores than the control group. Adolescents from the intervention group had significantly lower behavioral behavior scores than the control group.
(Batchelder et al., 2020) United States	Cross-sectional and correlational nature of the present research design	These participants were initially recruited through AIDS Service Organizations (ASOs), Comprehensive Care Clinics, advertisements in local newspapers, and word of mouth in the	Participants totaling 98 people infected with HIV/AIDS were recruited through AIDS Service Organizations (ASOs) and Comprehensive Care Clinics.	HIV/AIDS Stress-Stigma Questionnaire(Compas et al., 2001). The DE-Coping subscale consists of 9 items that assess avoidance. MAAS (Brown & Ryan, 2003) is an is15-item questionnaire on	Eight 2-hour weekly sessions and one 3-hour retreat led by MBSR instructors trained and experienced with personal mindfulness practices are conducted.	Adults with HIV/AIDS are at relatively greater risk for symptoms of anxiety and depression based on individual variations in coping styles of release for HIV/AIDS-related stigma and stigma.

Study	Design	Settings	Population	Tools	Interventions	**Results**
		Vermont, New Hampshire, Massachusetts , and Maine areas and agreed to be contacted for future studies.		which participants indicate, on a 6-point Likert-type scale, BDI-II; (Brown & Ryan, 2003) is a 21-item Questionnaire that assesses the level of severity of depressive symptoms.		
(Kerrigan et al., 2018), United States	RCT	Participants were recruited from two academic clinics in Baltimore, Maryland (Johns Hopkins Hospital and University of Maryland Medical Center).	Adolescents and young adults (13–24 years) living with HIV (n=74) were recruited from two academic clinics in Baltimore, Maryland (Johns Hopkins Hospital and University of Maryland Medical Center).	Iterative, semi-structured, in-depth interviews	The adapted MBSR intervention consists of eight 2-hour weekly sessions and one 3-hour retreat led by a trained MBSR instructor experienced with personal mindfulness practice.	The findings from this study were generated through the trusting and nonjudgmental environment in which the MBSR sessions took place, helping to strengthen this learning process to accept their HIV diagnosis better.
(Aghaie et al., 2021), iran	A Clinical Trial	HIV-positive women presenting with Behavioral Diseases Teaching Hospital Counseling Center	Conducted on 90 HIV-positive women at the Behavioral Disease Counseling Center at a teaching hospital affiliated with Tehran University of Medical Sciences in Tehran, Iran.	The Connor-Davidson resilience scale (CD-RISC) was applied to collect data on stress resilience. The scale contains 25 items were evaluated on a Likert scale	Participate in eight 60-minute sessions (one session per week). The Connor-Davidson resilience scale was again completed by participants in both groups immediately and, 4 weeks and 8 weeks after the intervention.	The results of this study indicate that mindfulness-based stress reduction training has a positive effect on resilience in HIV-positive women.
(Musanje, Kamya, et al., 2023), Uganda	A Qualitative Study	Participants must be counselors who work in it ART clinics or direct contact with AWH at both study sites	Five hundred people with HIV were conducted at two urban public health service centers in the Kampala district in	The Acceptability Theoretical Framework guides this research (TFA) (Sekhon et al., 2017)	Mindfulness and acceptance-based intervention The training is divided into three sessions with an interview schedule: perceived effectiveness, affective attitude,	More frequent use of group therapy alongside individual sessions reduces the workload and time commitment when DNA-v is used, leverages

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e-ISSN: 2985-959X

Study	Design	Settings	Population	Tools	Interventions	**Results**
			central Uganda under the administration of the Kampala Capital City Authority.		self-efficacy, intervention coherence, costs, opportunities, and ethical burden.	pre-existing youth groups and programs to ease integration, and allows flexibility in application to promote uptake.
(Webb et al., 2018), united states	RCT	African Americans. During three separate recruitment periods at each site	370 teenagers infected with HIV. Adolescents aged 14–22 years infected with HIV who received treatment at two urban clinics. Two hundred twenty participants were male, and 150 were female.	This was a pilot randomized controlled trial (RCT) of MBSR versus a health education control program.	The adapted MBSR intervention consists of eight 2-hour weekly sessions and one 3-hour retreat led by a trained MBSR instructor experienced with personal mindfulness practice.	HIV-infected adolescents in the MBSR group had higher levels of attention, problem-solving, and life satisfaction and lower levels of aggression.
(Molavi et al., 2020), Iran	RCT	The study was conducted at a behavioral disease counseling center in Ahvaz.	The research population, 30 people, were selected by simple random sampling	The sleep quality scale, the perceived social support questionnaire, the SCL-90-R scale, and the demographic factors questionnaire were used to collect data.	Sessions last 45 minutes and are held at the counseling center over eight weeks.	It can be concluded that mindfulness-based cognitive therapy is efficacious in improving sleep quality and perception of social support for HIV/AIDS patients.
(Creswell, 2017), United States	RCT	Study participants were recruited through HIV/AIDS community agencies in Los Angeles.	48 HIV-positive people aged over 18 years. Forty-three people are male, and five people are female.	All procedures Patient Health Questionnaire-9(PHQ-9)) (Spitzer et al., 2000).	Participants were instructed to practice audio-guided mindfulness exercises for 30 minutes daily at home during the 8-week program.	In short, an 8-week mindfulness meditation and stress reduction program can suppress CD4 + Decreased T lymphocytes in diverse community samples of HIV-1-infected adults. These findings provide the first promising

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e-ISSN: 2985-959X

Study	Design	Settings	Population	Tools	Interventions	**Results**
						indication that mindfulness meditation may have benefits as a complementary adjuvant treatment for HIV-1.

DISCUSSION

The results of the journal review that was carried out were one journal from Myanmar, four from the United States, two from Iran, and one from Uganda. 8 journals used MBSR intervention, and 1 journal used MBCT. Nine journals used eight sessions, and one journal used three sessions. The length of intervention for each session is six journals for 2 hours, one journal for 1 hour, one journal for 45 minutes, one for 2 hours 30 minutes, and one for 30 minutes.

This study suggests that MBSR has the potential to benefit HIV-infected adolescents (Dreyer et al., 2023; Waldron et al., 2021). MBSR resulted in improved alertness, coping styles, life satisfaction, and improved regulation of negative emotional arousal while reducing aggression in HIV-positive adolescents (Mon et al., 2016). MBSR adolescents were more likely to experience changes at follow-up, showing significant improvements in HIV disease control (Temelkovska et al., 2023).

Participants become more aware of every mental and physical experience that occurs at the moment, increasing self-control and emotional self-regulation, thereby reducing symptoms of depression and preventing the recurrence of major illnesses (Vreeman et al., 2017). This is consistent with previous research showing that MBSR reduces depressive symptoms and depression recurrence (Mon et al., 2016). Previous research suggests that the benefits of MBSR in reducing stress are most evident in within-subject designs (Musanje, Camlin, et al., 2023).

Stress associated with living with a chronic disease such as HIV may play a significant role in accelerated immune dysfunction, including dysregulation of the HPA axis, reduced circulating lymphocytes, and more rapid progression to AIDS (Rea, 2020). Of the 10 studies included in the systematic review, only seven markers of disease progression were assessed, the most frequent being CD4+ cell count (Robinson et al., 2003). Nonetheless, psychological changes due to stress reduction (a mechanism hypothesized to lead to normalization of the HPA axis and improved immune function) may have a limited impact on immunological outcomes among those with high CD4+ cell counts. The mean CD4+ count at baseline was high (Iliyasu et al., 2020; Zeng et al., 2022). Cumulative evidence suggests that MBSR positively affects mood and subjective evaluation of physical and psychological symptoms (Hecht et al., 2018).

The findings of the potential psychological benefits of MBSR are similar to results from studies in HIV-infected and HIV-uninfected adults (Musanje, Camlin, et al., 2023). Adolescents manage additional age-related stressors associated with HIV disease, such as identity formation and intimacy (Cohn et al., 2020), are at the center of the complex tasks of adolescent development and often in addressing poverty and under-resourced communities (Jørgensen et al., 2021). The effectiveness of MBSR in improving coping skills, emotional regulation, and life satisfaction among HIV-infected urban adolescents is significant, as these attributes may contribute positively to the development of their self-regulation (Hunter-Jones et al., 2019).

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Research in HIV-infected adults has found that MBSR can help relieve the side effects of ART (Webb et al., 2018), which may reduce barriers to medication adherence. Another possibility is that MBSR influences mechanisms that improve participants' immune systems (Domínguez-Solís et al., 2021; Nakimuli-Mpungu et al., 2021). In a quasi-experimental comparison group, pretest-posttest study of adults without HIV, those who participated in the MBSR group experienced increases in the number and activity of natural killer cells (Vreeman et al., 2017).

This MBSR has the potential to positively impact the development of self-regulation in vulnerable populations (Creswell, 2017). Future research should investigate the impact of MBSR in larger samples of HIV-positive adolescents to replicate these findings, as well as further examine the mechanisms of MBSR's effects in this population (Cook et al., 2022; Vreeman et al., 2017). Reinforcing the growing literature, mindfulness can act as a form of resilience to challenge or resist socio-structural constraints (Waldron et al., 2021).

Qualitative research in the randomized, controlled MBSR trial demonstrated increased ART adherence due to increased acceptance and decreased HIV stigma (Webb et al., 2018). Although some research suggests that mindfulness interventions can improve immune function (Zeng et al., 2022), further research is needed to understand whether increased viral suppression associated with mindfulness is associated with better ART adherence, for example, through improved mental health and/or through immune function (Anderson et al., 2020). Future research should examine the role of mindfulness on sex work-related stigma and its potential role in depression and anxiety (Ikeda et al., 2021).

CONCLUSION

This study examined the completeness of documentation in eight components of the initial nursing assessment form. It was found that the physical assessment component, along with the general assessment and medical history evaluation, demonstrated the highest level of completion. Conversely, the Gordon pattern assessment component showed no recorded completion at all. While a significant percentage of nurses demonstrated compliance in documenting initial assessments, there is still room for improvement, particularly in ensuring thoroughness across all components. This highlights the need for further training and emphasis on comprehensive documentation practices to enhance the quality of nursing care.

ACKNOWLEDGEMENT

Mindfulness's positive impact on outcomes is meaningful and important, including improved emotional coping and regulation, increased life satisfaction, decreased aggression, and decreased disease activity. Mindfulness-based interventions need to be carried out routinely, both formally and informally, in life, especially by adolescent patients with HIV/AIDS. Mindfulness facilitates improved mental health in adolescent patients with HIV/AIDS.

CONFLICT OF INTEREST

None

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e-ISSN: 2985-959X

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Volume 03 Number 02
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