



## ROLE OF PHYSIOTHERAPY IN HUMAN IMMUNODEFICIENCY VIRUS ASSOCIATED NEUROCOGNITIVE DISORDER - A NARRATIVE REVIEW

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Article Received on 15/10/2024

Article Revised on 04/11/2024

Article Accepted on 24/11/2024

### ABSTRACT

Human Immunodeficiency Virus (HIV) infection results in neurocognitive dysfunction of varying degrees, ranging from mild impairment to dementia, together termed HIV-Associated Neurocognitive Disorder (HAND). Combined antiretroviral treatment led to marked decrease in the number of patients with more severe manifestations of HAND, yet with poor outcomes on formal neurocognitive tests. An electronic database search generated 63 results out of which 4 studies were included in this review based on the selection criteria. Patients with HAND often experience a myriad of physical challenges that hinder their day-to-day activities and independence. Physiotherapists are uniquely positioned to address the physical and functional aspects of HAND, improving their quality of life. As research and clinical practice continue to evolve, physiotherapy will remain a valuable tool in the arsenal against HAND, helping patients live more fulfilling and independent lives. Implementation of physical activity regimen yielded positive results on neurocognitive performance and may play a role in HIV standard of care treatment as a prophylaxis for HAND.

**KEYWORDS:** Human Immunodeficiency Virus, HIV-associated neurocognitive disorder, HIV-associated dementia, exercise-based intervention in HIV.

### INTRODUCTION

HIV has changed since the development of combination antiretroviral therapy (ART), and many people are aging and living longer with HIV-related health issues, side effects from treatment, and multimorbidity.<sup>[1]</sup> Many people living with HIV experience disability-related symptoms such as pain, weariness, activity restrictions, issues with social inclusion, despair, and cognitive impairments.<sup>[2]</sup> Before ART was extensively used, significant cognitive impairment, sometimes known as HIV-associated dementia or HIV encephalopathy, was frequently experienced by these individuals who developed acute HIV syndrome after seroconversion.<sup>[3]</sup> The prevalence of dementia caused by HIV has decreased due to the widespread use of ART. However, there has been an increase in the prevalence of mild, self-limiting forms of HIV-Associated Neurocognitive Disorder (HAND), especially in low and middle-income nations.<sup>[4]</sup>

People living with HIV may develop a spectrum of cognitive, motor, and mood problems collectively known as HIV-Associated Neurocognitive Disorder. Mild Neurocognitive Disorder is a common form of HAND that mildly interferes with everyday function. Even if systemic viral suppression is achieved, HIV continues to replicate in the brain and causes the symptoms of HAND.<sup>[5]</sup> Neurocognitive impairment is more likely to occur in the brain when neural networks and affected parts of the brain are damaged.<sup>[6]</sup> Memory loss, impulsivity, impatience, visuospatial difficulties, acalculia, and trouble focusing and paying attention are among potential symptoms of HAND.<sup>[7]</sup> Literature search reveals that sarcopenia and HIV-related neurocognitive impairment are both linked to a lower quality of life (QoL).<sup>[8-10]</sup> Physical exercise therapies may provide a non-pharmacological alternative for treating and rehabilitating HAND in the affected patients, given the negative consequences associated with long-term use of ART.<sup>[11]</sup> Physical activity improves physical functioning, psychological well-being and QoL in the general

population as well as amongst this group.<sup>[12-14]</sup> Physical activity stimulates blood brain barrier permeability, enhances synaptic plasticity, increases the secretion of neurotrophins and regulates neuroinflammation.<sup>[15]</sup>

Additionally, aerobic exercise helps to partially reverse sarcopenia by easing issues caused by the mitochondria and enhancing the muscles' ability to respond to resistance training.<sup>[16]</sup> Previous research has examined the role of exercise in the deteriorating patients' cognitive impairment. The few studies that are now available have utilized various study designs, frequently sampling mixed populations of HIV individuals with or without cognitive impairment and evaluating low-intensity exercises.<sup>[17]</sup> Long-term, intense aerobic exercise enhances blood permeability to ART and controls neuroinflammation,<sup>[18]</sup> improving the quality of life for HAND patients. HAND impacts participation in society, functional mobility, balance, gait disturbance, neuropathy and quality of life. Physiotherapy can play a major role in the rehabilitation of these individuals and despite the high incidence of the disorder and high scope of physiotherapy in HAND, there is limited research studying the role of physiotherapy in HAND.

#### MATERIALS AND METHODS

This paper attempts to narratively review and present the role of physiotherapy in HIV-associated neurocognitive disorders concerning the benefits of physiotherapy, and the dosage, feasibility and acceptability in the rehabilitation of HAND. Articles which studied the role of physiotherapy in HIV-associated neurocognitive disorder, articles that included rehabilitation in the acute, sub-acute, and chronic phases after HAND, only experimental studies, articles with full text and articles published from January 2018 to August 2024 were included in this review. Articles written in languages other than English, studies involving other rehabilitation professions and other forms of therapy targeting the HAND were excluded.

A comprehensive literature search was carried out in Google Scholar, PubMed and Web of Science. The following terms were used for the literature search: 'HIV-associated neurocognitive disorder', 'HIV-associated dementia', 'Mild neurocognitive disorder', 'Asymptomatic neurocognitive impairment', 'Exercise-based intervention in HAND', 'Physical activity in HIV'. The studies were screened based on their titles and abstracts. Experimental studies were identified and only articles with full text were obtained for the selected studies which were then assessed to check the fulfilment of the inclusion criteria. After the selection of studies, the data were extracted for information on the title, inclusion and exclusion criteria, type of intervention, sample size, study methodology, primary and secondary outcomes, study limitations, feasibility, and adherence. The data collected were mainly divided based on application of physiotherapy rehabilitation interventions and results in individuals with HAND.

#### RESULTS AND DISCUSSION

HIV has long been associated with a range of medical and neurological complications, among which HIV-Associated Neurocognitive Disorder (HAND) is prominent. HAND encompasses a spectrum of cognitive impairments, ranging from mild neurocognitive disorder to severe dementia, and affects a significant portion of individuals living with HIV. While antiretroviral therapy (ART) has remarkably improved the prognosis for those with HIV, HAND remains a challenging condition that impacts daily functioning and overall quality of life. In this context, physiotherapy emerges as a crucial component of a multidisciplinary approach for managing HAND.

Patients with HAND often experience a myriad of physical challenges that hinder their day-to-day activities and independence. Mobility issues, muscle weakness, and balance problems are common symptoms. These physical impairments can be directly related to HAND or secondary to other factors such as medication side effects, opportunistic infections, or comorbidities. The consequences of these physical limitations can be profound, leading to a reduced ability to perform activities of daily living, increased fall risk, and diminished overall well-being.

Physiotherapists are uniquely positioned to address the physical and functional aspects of HAND. They can perform comprehensive assessments to identify the specific physical impairments and limitations of patients with HAND. These assessments inform the development of individualized rehabilitation programs tailored to each patient's needs and functional goals. Programs often include exercises designed to enhance muscle strength, flexibility, and range of motion.

One of the primary goals of physiotherapy for HAND is to enhance mobility. Physiotherapists work on improving gait patterns, coordination, and movement efficiency. Through targeted exercises and gait training, patients can regain confidence in walking and reduce the risk of falls. Chronic pain is a common complaint among individuals living with HIV, and it can be exacerbated by HAND-related physical limitations. Physiotherapists employ a variety of modalities, manual therapies, and exercise programs to alleviate pain and improve overall comfort. Living with HAND can be emotionally challenging. Physiotherapists offer not only physical but also emotional support, providing motivation and encouragement to help patients cope with the psychological aspects of their condition.

#### CONCLUSION

In conclusion, physiotherapy is a critical component in the comprehensive management of HIV-Associated Neurocognitive Disorder. It addresses the physical impairments and functional limitations that significantly impact the quality of life of individuals living with HAND. Through personalized rehabilitation programs,

mobility enhancement, balance improvement, pain management, psychosocial support, and collaboration with other healthcare professionals, physiotherapists contribute to enhancing the overall well-being and independence of patients with HAND. This multidisciplinary approach underscores the importance of holistic care for individuals living with HIV and neurological complications. As research and clinical practice continue to evolve, physiotherapy will remain a valuable tool in the arsenal against HAND, helping patients live more fulfilling and independent lives.

Research suggests that the combination of good nutrition, vigorous physical activity, and mental and social engagement may provide benefits for people with cognitive disorders. Hence, we conclude that implementation of physical activity regimen will yield positive results on neurocognitive performance and may play a role in HIV standard of care treatment as a prophylaxis for HAND.

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