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Original Research Article

Status of Neurocognitive Functions in HIV Patients on HAART at ART Centre of a Tertiary Care Teaching Hospital

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Abstract

Background: The Central Nervous System is one of the major targets of HIV infection and is often associated with neurocognitive impairment.

Aims & Objectives: The present study is aimed to determine the status of neurocognitive functions among HIV positive patients on Highly Active Antiretroviral Therapy (HAART).

Materials & Methods: A cross-sectional study was conducted in 200 HIV positive patients, registered at ART Centre of Government Medical College & AG Hospital, Kota. A test battery comprising two scales was used i.e International HIV Dementia Scale (IHDS) and Activities of Daily Living (ADL) Scale to diagnose cognitive dysfunction and dependence in ADL respectively.

Results: The prevalence of HIV associated neurocognitive disorder (HAND) was found to be 36.5% (n=73). Out of these cognitively impaired patients 2.5% (n=5) patients were dependent in $\geq$ 2 activities of daily living. The lower baseline CD4 count and duration of HAART < 1year, both were found to be significantly associated with cognitive impairment.

Conclusion: Asymptomatic and mild neurocognitive impairment is prevalent among HIV patients on HAART. This suggests the need to routinely screen HIV positive patients, to recognize the neurocognitive deficits at an early stage.

Keywords: HIV- Associated Neurocognitive Disorder, IHDS, ADL Scale, CD4 Cell Count.

Introduction

The HIV infection is associated with neurocognitive deficits in attention/ working memory, motor abilities and executive functioning, which are often attributed to disruption in fronto-striatal circuitry. HIV associated neurocognitive disorder(HAND) occurs on a spectrum ranging from asymptomatic neurocognitive impairment(ANI) to mild neurocognitive disorder(MND) to frank HIV associated dementia(HAD) [1]

Since the introduction of Highly Active Antiretroviral Therapy (HAART), the incidence of severe forms of HAND has declined significantly, whereas the prevalence of the milder forms has increased. [2]

These disorders can lower the quality of life among persons living with HIV by interfering with activities of daily living such as employment and importantly adherence to prescribed antiretroviral therapy. [3]

Several studies reported that CD4 cell count is inversely related with neurocognitive impairment. [4]

The neurocognitive impairment among HIV positive patients remains largely unrecognized because it is not routinely screened.

There is paucity of data on the prevalence of these disorders in HIV positive population of our area. We, therefore conducted this cross-sectional study to find out the status of neurocognitive functions in HIV patients on HAART in Kota city.

Materials and Methods

Study design: This cross sectional observational study was conducted among 200 HIV positive patients receiving the HAART regimen between February 2022 and August 2022 at ART centre of Government Medical College & AG Hospital, Kota, Rajasthan (India).

Ethical considerations: The study was approved by the ethical committee of GMC, Kota. Study participants were invited to consent after being provided with adequate information about the study.Patients were screened using an eligibility checklist and those who satisfied the following criteria were enrolled consecutively.

Inclusion Criteria: (i) HIV- positive patients on stabilized HAART for more than six weeks

(ii) HIV positive patients between the age of 21 and 50 years (iii) Ambulatory patients with a CD4 count above 200 cells/mm3 (iv) Ability to comprehend the study procedures

Exclusion Criteria: (i) Seriously ill/moribund patients (ii) Addiction/any substance abuse (iii) Severe psychiatric disorder or any other illness (TB, epilepsy, cancer etc.) (iv)Pregnancy

Data collection tools

International HIV Dementia Scale (IHDS) [5]: It is a bedside screening tool, especially developed for detecting HIV dementia. The IHDS consists of three subtests: (i) Timed finger tapping (ii) Timed alternating hand sequence test and (iii) Recall of four items in two minutes. The maximum total score is 12 with a contribution of 4 points from each subtest. If the score is $\leq$ 10, then the patient should be evaluated for possible cognitive impairment.

Lawton Instrumental Activities of Daily living (IADL) Scale: The IADL was used to assess functional status and was primarily designed to assess a person's ability to live independently. Eight domains are measured using the IADL. Participants were scored by choosing the item description that most closely resembled their highest functional status (either 0 or 1) and the summary score ranged from 0(low function, dependent) to 8(high function, independent)[6]

Statistical Analysis

To analyse the association between the various factors and the cognitive dysfunction the Chi square test was employed. A p value of less than 0.05 is considered as statistically significant. All statistical analysis was done using the Microsoft Excel Software.

Results

A total of 200 HIV positive patients were recruited, the majority of whom were women (n=112,56%). The socio-demographic characteristics of the participants are presented in Table 1.

Table 1: Socio-demographic characteristics of participants (n=200)

Parameter	Number of participants (%)
Age(in years)	
21-30	20(10%)
31-40	116(58%)
41-50	64(32%)
Gender	
Male	88(44%)
Female	112(56%)
Marital status	
Married	126(63%)
Single	30(15%)
Divorced/Widow	44(22%)
Educational status	
Illiterate	84(42%)
Primary school	66(33%)
Secondary school	30(15%)
College & above	20(10%)

The patients were classified as having cognitive dysfunction and normal cognitive function, using a cut-off score of 10 or less on the IHDS.

Out of total 200 HIV positive patients, 36.5% (n=73) scored below 10, while remaining 63.5% (n=127) scored above 10 (Table 2).

Table 2: Distribution of participants according to the IHDS score

Test score	Number of participants (%)
≤10	73(36.5%)
>10	127(63.5%)

IHDS: International HIV Dementia Scale

Asymptomatic Neurocognitive Impairment (ANI) is very common in AIDS patients and it has been observed in 34% of our study subjects. Whereas HIV associated Mild Neurocognitive Disorder (MND) constituted 2.5% of our study population (Table 3).

Table 3: Prevalence of cognitive dysfunction

Nature of cognitive dysfunction	Number of participants (%)
No cognitive impairment	127(63.5)
Asymptomatic Neurocognitive Impairment	68(34)
Mild Neurocognitive Disorder	5(2.5)
HIV associated dementia	Nil

The initial CD4 count between 200-349 cells/mm^3 was significantly associated with cognitive dysfunction ($p<0.05$) (Table 4).

Table 4: Initial CD4 count and cognitive dysfunction

Initial CD4 count	Cognitive Dysfunction present	No cognitive dysfunction	P value
<400	**32**	**33**	**0.009**
≥400	**41**	**94**	**>0.05**

Further classification of cognitively impaired patients was done on the basis of dependence in ADL. The 2.5% (n=5) of the patients were found to be dependent in ≥2ADL while the 97.5 %(n=195) were able to perform their ADL independently (Table 5).

Table 5: Distribution of patients according to ADL score

Dependency in ADL	Number of patients	Percentage (%)
ADL dependent	5	2.5
ADL independent	195	97.5

ADL: Activities of daily living

The duration of HAART less than one year was significantly associated with cognitive dysfunction ($p<0.05$)**[Table 6]**

Table 6: Duration of HAART and cognitive dysfunction

Duration of HAART	Cognitive Dysfunction present	No cognitive dysfunction	P value
Less than 1 year	**37**	**38**	**0.003**
More than 1 year	**36**	**89**	**>0.05**

Discussion

The routine use of HAART has changed the epidemiology of HIV dementia possibly by reducing the deleterious effects of uncontrolled viral replication. [7] However, despite a reduction in the prevalence of HAD in the era of HAART, milder neurocognitive dysfunction in the form of ANI and MND still persists. [2]

In our study also, the milder forms of HAND i.e ANI was observed in 34% of the patients. All of these subjects were 'ADL independent' which is in agreement with the finding of Lawler et al. [8]

In support of the previous study by Muniyandi K et al [9], mild neurocognitive disorder(MND) constituted 2.5% of our study population who were found to be 'ADL dependent'. None of the patients had the most severe form i.e HAD which was in concordance with studies from India. [10]

Several studies reported [4,5] that CD4 cell count is inversely related with neurocognitive impairment. Similarly we found a significant association between initial CD4 count 200-349 calls/mm3 and cognitive dysfunction.

Multiple studies have shown that patients on HAART show significant improvement, whereas patients not on HAART steadily decline. [11] In support of the previous studies, [12,13] the current study showed significant association ($p<0.05$) between the duration of HAART for less than one year and cognitive dysfunction. [14]

Conclusion

To conclude, the neurocognitive impairment among HIV positive patients leads to a reduction in the quality of life by interfering with activities of daily living and may be more likely to occur with low baseline CD4 cell count. Hence, HAART should be started earlier and HIV positive patients should be routinely screened to recognize the cognitive deficits at an early stage. This will arrest further deterioration of the brain function and improve quality of life.

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