

Original Research Article

## **Study to compare performance of International HIV dementia scale (IHDS) and Hindi mental state examination (HMSE) scale in assessing neurocognitive dysfunction among HIV/AIDS patients on antiretroviral therapy**

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**Abstract:** Human immunodeficiency virus (HIV) invades the central nervous system during the primary infection period and often leads to neurological complications that have recently been characterized as HIV- associated neurocognitive disorders (HAND). To better assist in prevention, treatment and management of HAND, it is important to develop and evaluate the neurocognitive screening tools. The main Objective of study was designed to determine the comparative performance of international HIV dementia scale (IHDS) and Hindi mental state examination (HMSE) scale in assessing neurocognitive dysfunction among HIV/AIDS patients on antiretroviral therapy. In methods, a consecutive sample of '80' HIV positive patients registered at ART Centre of PBM and AG Hospital, Bikaner were clinically interviewed and administered the IHDS and HMSE scale to assess any neurocognitive dysfunction. The Results were Individuals with HAND showed significantly poor performance in comparison to individuals without HAND. The mean IHDS scores were low in HIV-positive HAND group as compared to HIV-positive individuals without HAND ( $p < 0.05$ ) while there was no significant difference in mean HMSE score between HIV positive HAND group and individuals without HAND ( $p > 0.05$ ). HAND detection rate was found to be significantly high using the IHDS (26/80 i.e. 32.50%) as compared to HMSE scale (2/80 i.e. 2.5%). In Conclusion the present findings indicate that HMSE scale is a weak tool in comparison to IHDS in terms of defining those with and without HAND. The IHDS may be of great value as a screening test for HAND.

**Keywords:** neurocognitive dysfunction, HIV/AIDS, international HIV dementia scale, Hindi mental state examination scale.

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**INTRODUCTION**

Despite the widespread use of highly active antiretroviral therapy (HAART), HIV- related neurological disorders (HAND) continue to represent substantial personal, economic and societal burdens. According to recent estimates, minor neurocognitive disturbances across various neurocognitive domains remain common in 50% or more of HIV patients [1, 2].

The diagnostic nosology for HAND was recently revised and subsequently amended using recommendations from the US National Institute of Health (NIH) Working Group. The redefined criteria allow for three possible research diagnoses. In order of increasing severity and related impact on everyday functioning, these are Asymptomatic Neurocognitive Impairment (ANI); Mild Neurocognitive Disorder (MND) and HIV-Associated Dementia (HAD) [3].

The diagnosis of HAND is dependent upon a clinical history and neurological examination. However, administration of the entire neuropsychological battery is cumbersome in a real-world clinical scenario because it is time-consuming, language & education dependent and manpower intensive [4, 5].

Several brief neuropsychological tests have been developed for diagnosis of HAND, including the HIV dementia scale (HDS) and its modified form for use in international settings i.e. the IHDS, Trail making A and B, the Grooved Pegboard test and Mini Mental State Examination (MMSE) [6, 7].

The ideal screening tool should emphasize motor skills and timed tasks, must be inexpensive, universally available, brief, sensitive and reliable. In the era of widespread HAART availability, the comparative utility of the bedside screening tools for detecting HAND remains uncertain. Herein, the study hypothesis

was that IHDS would exhibit better performance in comparison to other screening tests such as MMSE in terms of distinguishing between HIV positive patients with and without HAND [8].

## MATERIALS AND METHODS:

### Study design

A prospective cohort study was conducted between October 2011 and September 2012 in '80' HIV/AIDS patients undergoing antiretroviral treatment who were registered with the ART Centre at PBM and AG Hospital, Bikaner, Rajasthan (India). The study was approved by the ethical committee of S.P. Medical College, Bikaner. All the patients were enrolled after getting informed consent.

Following criteria were used for the selection of the patients:-

### Inclusion Criteria:

1. HIV positive patients on stabilized HAART for more than 6 weeks
2. Men/Women between the age 21 and 50 years
3. Ambulatory patients with CD4 count above 200 cells/mm<sup>3</sup>
4. Ability to comprehend study procedures

### Exclusion Criteria:

1. Seriously ill/moribund patient
2. Addiction or any substance abuse
3. Severe psychiatric disorder (e.g. Schizophrenia)
4. Pregnant Women

Baseline demographic parameters, medical history, physical and neurological examination were documented using a standardized Performa. Neurocognitive testing was conducted in each participant using both the scales i.e. the IHDS and the HMSE.

### Description of the study instruments

The IHDS is a modification of the HIV dementia scale (HDS) first proposed by power *et al.*; [5] and recently adapted by sacktor *et al.*;[6]. It consists of 3 subtests: timed tapping of thumb with first digit of non-dominant hand which measures motor speed (IHDS fingertaps); timed repetition of a three position alternating hand sequence which assesses the psychomotor speed (IHDS Luria); and recall of 4 items in 2 minutes which assess memory registration and recall (IHDS recall). Here a cut-off score of  $\leq 10$  was taken to screen dementia cases.

Each of these subtests is rated on a scale of 0-4. The tests were administered as follows: for assessment of the verbal recall subtest, registration (new learning) was measured by reciting 4 words to the subject (eg. blue, dog, hat and apple) taking 1 second to say each of the words. The subject was asked to repeat the words and recall the 4 words after the timed finger tapping and alternating hand sequence test were performed.

The most common language that the subjects could understand was Hindi and therefore, the Hindi version of the Mini Mental State Examination (MMSE) was used and the standard followed by Ganguly *et al.*; was maintained[10].

The MMSE is a generic instrument that was originally developed to screen for dementia and delirium, and is the most widely used cognitive impairment screening instrument. Despite its ease of administration and wide recognition, the validity of the MMSE has been criticized in sub-cortical disorders such as HAND.

This Hindi Mental State Examination (HMSE) consists of 22 items that test the different components of intellectual capability. The examination covers several areas of cognitive functioning, such as orientation to time and space, attention and concentration, recognition of objects, language function, both comprehensive and expressive speech, motor functioning and praxis. It is relatively simple to administer and provides a quick, brief index of subject's current level of mental functioning. It is a modified version of MMSE. Here a cut-off score of  $\leq 23$  was taken to screen dementia cases [9, 10].

## STATISTICAL ANALYSIS

Means and Standard Deviations (SD) were calculated for continuous variables. To analyse the association between the various factors and cognitive dysfunction, the Chi square test was employed. The p value of less than 0.05 was considered as statistically significant. All statistical analysis was done using 'INDOSTAT software'.

## RESULTS

Out of total '80' HIV-positive patients, 45(56%) were males and 35(44%) were females. Majority of the patients were in age group of 31 to 40 years.

### Comparative performance of the IHDS and the HMSE scale

Based on a cut-off score of 10 to define HAND, '26' patients (32.50%) were found to have

neurocognitive disorders [Table 1] whereas the HAND detection rate of HMSE scale (cut-off score 23) was only 2.5% (n=2 patients) [Table 2]

A significant difference was found for the IHDS total score between the patients with HAND and the patients with normal cognition. The mean IHDS score of cognitively impaired patients was 10.3 compared with 11.1 in patients with normal cognition ( $p < 0.05$ )

**Table 1: International HIV dementia scale findings**

IHDS Score	Number of Patients (%)
≤ 10	26 (32.50)
> 10	54 (67.50)

IHDS- International HIV Dementia Scale

**Table 2: Distribution of Patients according to HMSE score**

HMSE Score	Number of Patients (%)
<23	2(2.50)
>23	78 (97.50)

HMSE- Hindi Mental State Examination

## DISCUSSION

As the prevalence of milder forms of HAND is increasing and the resources for formal neuropsychological examination are limited, there is a critical need to be able to screen and identify people with HAND.

Significant differences in neurocognitive performance and their association with the presence or absence of HAND was observed in present study. The IHDS detected a higher proportion of patients with HAND in comparison to HMSE, affording an advantage for more intensive evaluation and early interventions to improve quality of life.

Although extensive neuropsychological test battery is regarded as the ‘gold standard’ for cognitive assessment, the IHDS offers an advantage in the real world clinical setting. The IHDS can be performed briefly in 2-3 minutes by non- neurologists in an outpatient setting and requires no special instrumentation other than a watch.

Skinner *et al.*; also demonstrated the inferiority of MMSE in contrast to the HDS and IHDS while assessing the neurocognitive dysfunction in HIV patients which may be explained by the fact that IHDS also screens for psychomotor speed, an aspect that is not included in the MMSE scale [11]. Lyon *et al.*; and Ganasen *et al.*; also found a higher sensitivity using the HDS compared to the MMSE [12, 13].

## CONCLUSIONS

In resource-limited settings, where sophisticated neuroimaging technology is often unavailable, the neurocognitive assessment is crucial to diagnose the neurocognitive deficits at an early stage.

When assessments are reliable and valid, they are quite sensitive to even milder forms of CNS compromise and may also provide valuable estimates of functional impairment. Our study suggests that the IHDS is a useful screening instrument in the real-world clinical scenario of HIV/AIDS management. Incorporation of variables to determine the effect on activities of daily living into the original design of these instruments may assist in proper classification of patients with neurocognitive dysfunction.

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