Impact of HIV associated neurocognitive disorders on activities of daily living and its association with depression in outdoor patients undergoing HAART

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ABSTRACT
Objective: The prime objective was to determine the impact of HIV-associated neurocognitive disorders on activities of daily living and its association with depression. Material & Methods: A prospective cohort study was conducted in ‘80’ HIV positive patients, registered at ART Centre of PBM and AG Hospital, Bikaner. A test battery comprising of three scales was used i.e. International HIV Dementia Scale (IHDS), Activities of Daily Living(ADL) scale and PRIME-MD Patient Health Questionnaire(PHQ-9) to diagnose cognitive dysfunction, dependence in ADL and depression respectively. Results: The 32.50% (n=26) of the patients were diagnosed to have cognitive dysfunction (IHDS Score<10) while remaining 67.50% (n=54) of the patients were normal (IHDS Score>10). Out of these cognitively impaired patients, n=2 patients were found to be dependent in >2 ADL while remaining patients were able to perform their ADL independently. No significant association was found between depression and cognitive dysfunction. Conclusion: Patients having score of <10 on IHDS were further classified on the basis of dependence in ADL. The patients having high degree of depressive symptoms were more likely to have cognitive dysfunction but the results were not significant.

Key words: HIV-associated neurocognitive disorder, Activities of daily living (ADL) scale, Patient health questionnaire (PHQ), International HIV dementia scale (IHDS), Asymptomatic neurocognitive impairment, Mild neurocognitive disorder, HIV associated dementia.

INTRODUCTION
The HIV infection has been declared as one of the worst pandemic, which is often associated with neurocognitive and psychological impairment. The neurocognitive complications associated with HIV have recently been characterized as HIV-associated neurocognitive disorders (HAND). HAND defines three categories of dysfunction: asymptomatic neurocognitive impairment (ANI), mild neurocognitive disorder (MND) and HIV-associated dementia (HAD). 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.

There is clinical significance of identifying the milder forms of HAND, as they can have a significant impact on the lives of people living with HIV. They have been shown to interfere with medication adherence, workplace performance, driving and ability to carry out tasks independently.

Major depressive disorder (MDD) is the most common neuropsychiatric symptom associated with HIV. MDD may share similar pathological features (e.g. frontostriatal circuits) to HIV infection and has been independently associated with subtle cognitive decline in areas including attention, psychomotor speed, learning and memory, and executive functioning. Despite the similar underlying neural abnormalities, most studies have failed to find synergistic effects of depression and HIV infection on cognition.

The neuropsychological impairment among HIV-positive patients remains largely unrecognized because it is not routinely screened for, despite this recommendation in HIV treatment guidelines. Early and periodical neuropsychological screening of HIV positive asymptomatic individuals is a must in future to spot the neurocognitive deficits at an early stage.

MATERIAL AND METHODS

Study design
This was a prospective cohort study undertaken between Oct.2011 and Sept.2012 in ‘80’ HIV/AIDS patients undergoing antiretroviral treatment. All the participants were registered with the ART Centre of PBM and AG Hospital, Bikaner, Rajasthan, India.

Ethical considerations
The study obtained ethical approval from the Ethical Committee of Sardar Patel Medical College, Bikaner. Study participants were invited to consent after being provided with adequate information about the study. To be eligible for inclusion in this study, following criteria were used for the participants-

- HIV positive patients on stabilized HAART for more than 6 weeks
- Men/women between the age 21-50 years
- Ambulatory patients with CD4 count above 200 cells/mm³
- Ability to comprehend study procedures
Seriously ill patients, pregnant women, patients having severe psychiatric disorder or any substance abuse were excluded from the study.

Data collection tools
All the participants underwent neurocognitive examination, assessment of depression and activities of daily living. The tools included a socio-demographic questionnaire, the International HIV Dementia Scale (IHDS), Activities of Daily Living (ADL) scale and PRIME-MD Patient Health Questionnaire (PHQ-9).

According to modified updated American Academy of Neurology (AAN) criteria, patients with HAND are classified on the basis of neurocognitive impairment and severity of dependence in activities of daily living (ADL). To assess neurocognitive impairment we used IHDS while dependence in ADL was assessed by ADL scale.

International HIV Dementia Scale
The IHDS is a screening measure of neurocognitive impairment that assesses for memory impairment, motor and psychomotor speed. It can be used in a clinic setting, does not require one to be proficient in English and is brief and inexpensive. Here a cut-off score of $\leq 10$ was taken to screen dementia cases.\(^9\)

Activities of daily living scale
This questionnaire was selected for its wide use and demonstrated validity in studies of medically ill and dementia population, including HIV. It includes 2 scales namely Katz basic activities of daily living scale and Lawton-Brody Instrumental activities of daily living scale.\(^10,11\) It is a ’14-item scale’ that measures physical self-maintenance activities and instrumental activities of daily living. Patients were classified as ‘ADL dependent’ if they reported decline in two or more ADL.

PRIME-MD Patient Health Questionnaire (PHQ-9) for endogenous depression
The PHQ-9 follows the Diagnostic and Statistical Manual-IV (DSM-IV) Criteria for screening patients for current depression. If 5 or more of the 9 symptoms are present and one of the symptoms is sadness/ hopelessness or anhedonia, then a diagnosis of major depressive disorder is supported.\(^12,13\)

Statistical Analysis
Means and Standard Deviations (SD) were calculated for continuous variables. To analyse the association between the various factors and cognitive dysfunction, chi square test was employed. The $p$ value of less

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td></td>
</tr>
<tr>
<td>21-30</td>
<td>13 (16)</td>
</tr>
<tr>
<td>31-40</td>
<td>43 (54)</td>
</tr>
<tr>
<td>41-50</td>
<td>24 (30)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45 (56)</td>
</tr>
<tr>
<td>Female</td>
<td>35 (44)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>58 (73)</td>
</tr>
<tr>
<td>Single</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Widow/Divorced</td>
<td>18 (22)</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>41 (51)</td>
</tr>
<tr>
<td>Primary school</td>
<td>25 (31)</td>
</tr>
<tr>
<td>Secondary school</td>
<td>10 (13)</td>
</tr>
<tr>
<td>College &amp; above</td>
<td>4 (5)</td>
</tr>
</tbody>
</table>

Table 2: Classification of HIV patients based on neurocognitive tests

<table>
<thead>
<tr>
<th>Nature of neurocognitive dysfunction</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-Associated Dementia (HAD)</td>
<td>Nil</td>
</tr>
<tr>
<td>Mild Neurocognitive Disorder (MND)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Asymptomatic Neurocognitive Impairment (ANI)</td>
<td>24 (30)</td>
</tr>
<tr>
<td>No cognitive impairment</td>
<td>54 (67.5)</td>
</tr>
</tbody>
</table>

Table 3: Depressive symptom and cognitive dysfunction

<table>
<thead>
<tr>
<th>Depressive symptom</th>
<th>Cognitive dysfunction</th>
<th>No cognitive dysfunction</th>
<th>$\chi^2$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal (1-4)</td>
<td>17 (65.38)</td>
<td>40 (74.07)</td>
<td>0.009</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mild (5-9)</td>
<td>5 (19.23)</td>
<td>10 (18.52)</td>
<td>0.628</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Moderate (10-14)</td>
<td>3 (11.54)</td>
<td>4 (7.41)</td>
<td>0.375</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Moderately severe (15-19)</td>
<td>1 (3.84)</td>
<td>Nil</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Severe (20-27)</td>
<td>Nil</td>
<td>Nil</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
than 0.05 was considered as statistically significant. All statistical analysis was done by using 'INDOSTAT software'.

RESULTS

Of the '80' study participants, 45 were males (56%) and 35 were females (44%). The socio-demographic characteristics of the participants are presented in Table 1.

In present study, using a cut-off score of 10 or less on the IHDS, patients were classified as having cognitive dysfunction and normal cognitive function. Out of total '80' HIV-positive patients, 26 patients (32.50%) had scored <10 on IHDS while remaining 54 patients (67.50%) scored >10 (See Figure 1).

Further classification of cognitively impaired patients was done on the basis of dependence in ADL. The 2.50% (n=2) of the patients were found to be dependent in ≥2 ADL while the 97.50% (n=78) of the patients were able to perform their ADL independently i.e. ADL independent (See Figure 2).

Classification of HAND according to modified updated American Academy of Neurology (AAN) criteria

Patients who were found to be dependent in ADL and had scored <10 on the IHDS were classified under mild neurocognitive disorder (MND) category of HAND whereas the patients who were ADL independent and had a score of <10 on IHDS were categorised under asymptomatic
neurocognitive impairment (ANI) category. The most severe form of HAND i.e. HAD was not observed in any of the subjects (See Table 2).

PRIME-MD PHQ-9 scoring for endogenous depression

The patients having high degree of depressive symptoms were more likely to have cognitive dysfunction but the results were not significant (p>0.05) (See Table 3).

DISCUSSION

In today’s world, HIV/AIDS has poorly affected the vast majority of population and it still remains the major health burden across the world. With the prevalence of milder forms of HAND increasing and limited resources available for formal neuropsychological examinations, there is a critical need to be able to screen people with neurocognitive disorders. Asymptomatic Neurocognitive Impairment (ANI) is very common in AIDS patients and it was observed in 30% of our study subjects. All of these subjects were ADL independent. This finding is an agreement of finding of Lawler K et al, in which majority of the patients having cognitive dysfunction were asymptomatic.9,10

HIV-associated Mild Neurocognitive Disorder (MND) constituted 2.5% of our study population who were found to be ‘ADL dependent’. Similar finding was observed in a previous study by Muniyandi K et al.19 None of the patients had HAD which was in concordance with two prospective studies from India which also reported low incidence of HAD (1 to 2%).16,17

CONFLICT OF INTEREST

The author have no conflict of interest to declare.

ABBREVIATIONS USED

HIV: Human immunodeficiency virus; AIDS: Acquired immunodeficiency syndrome; ART: Antiretroviral treatment; HAART: Highly active antiretroviral therapy; IHDS: International HIV dementia scale; ADL: Activities of daily living; PHQ: Patient health questionnaire; HAND: HIV associated neurocognitive disorder; ANI: Asymptomatic neurocognitive impairment; MND: Mild neurocognitive disorder; HAD: HIV associated dementia; MDD: Major depressive disorder; AAN: American academy of neurology; DSM: Diagnostic and statistical manual; SD: Standard deviation.

ABOUT AUTHORS

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