Assessment of Neuro-AIDS and complications in Uganda

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HIV-associated Neurological Complications

HIV Dementia is seen in about 10-15% of HIV+ individuals with advanced infection in the U.S.

HIV sensory neuropathy is seen in 30% of individuals with AIDS.

In Africa the prevalence of dementia and neuropathy is largely unknown.

In environments where CD4 is not available, HIV dementia may be an indication for starting HAART.
Objective

To measure the prevalence of HIV-D and Minor Cognitive Motor Disorder (MCMD) in an ambulatory sub-Saharan HIV clinic.

To determine the validity of a rapid screening test, the International HIV dementia scale for detecting HIV-D in an African population.

To measure the prevalence of HIV sensory neuropathy in the same population.
Methods

81 HIV+ individuals received detailed demographic, neuropsychological, neurological and functional assessments.

HIV+ individuals with active CNS infections were excluded.

76 HIV- individuals were also evaluated to establish age and education matched controls for the 6 neuropsychological tests.
Neuropsychological Test Battery

Fine/Gross Motor – Grooved Pegboard, Timed Gait
Memory – WHO-UCLA Auditory Verbal Learning Test
Attention/Executive – Digit Span – Forward and Backward, Color Trails 2
Psychomotor speed – Symbol-Digit, Color Trails 1
Neuropsychological Battery – Color
Trails 1
International HIV Dementia Scale

Memory-Registration – Give four words to recall (dog, hat, bean, red) (in Luganda, kopo, engatto, doodo, myufo) – 1 second to say each. Then ask the patient all four words after you have said them. Repeat words if the patient does not recall them all immediately. Tell the patient you will ask for recall of the words again a bit later.

1. Motor Speed: Have the patient tap the first two fingers of the non-dominant hand as widely and as quickly as possible.
   - 4 = \( \geq 15 \) in 5 seconds
   - 3 = 11-14 in 5 seconds
   - 2 = 7-10 in 5 seconds
   - 1 = 3-6 in 5 seconds
   - 0 = 0-2 in 5 seconds

2. Psychomotor Speed: Have the patient perform the following movements with the non-dominant hand as quickly as possible:
   1) Clench hand in fist on flat surface. 2) Put hand flat on surface with palm down. 3) Put hand perpendicular to flat surface on the side of the 5th digit. Demonstrate and have patient perform twice for practice.
   - 4 = 4 sequences in 10 seconds
   - 3 = 3 sequences in 10 seconds
   - 2 = 2 sequences in 10 seconds
   - 1 = 1 sequence in 10 seconds
   - 0 = unable to perform

3. Memory-Recall: Ask the patient to recall the four words. For words not recalled, prompt with a semantic clue as follows: animal (dog); piece of clothing (hat); vegetable (bean); color (red).
   - Give 1 point for each word spontaneously recalled.
   - Give 0.5 points for each correct answer after prompting
   - Maximum – 4 points.

Total International HIV Dementia Scale Score
This is the sum of the scores on items 1-3. The maximum possible score is 12 points. A patient with a score of \(< 10\) should be evaluated further for possible dementia.

(Sacktor et al. *Neurology* 2003 60;1:A186-187)
Data Analysis

Means between the HIV+ group and HIV- group were compared using independent sample T-test assuming identical variances.

Data from each HIV+ were analyzed by an HIV neurologist and neuropsychologist in order to give them an MSK rating, and to assess the presence or absence of peripheral neuropathy.
### Demographics of HIV+ and HIV- Patients

<table>
<thead>
<tr>
<th></th>
<th>HIV+ N=81</th>
<th>HIV- N=76</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)-mean</strong></td>
<td>37.0*</td>
<td>31.6</td>
</tr>
<tr>
<td><strong>Education(years)-mean</strong></td>
<td>8.7</td>
<td>9.6</td>
</tr>
<tr>
<td><strong>Karnofsky-mean</strong></td>
<td>74.8*</td>
<td>97.0</td>
</tr>
<tr>
<td><strong>Male-percent</strong></td>
<td>31%*</td>
<td>50%</td>
</tr>
<tr>
<td><strong>CD4-mean</strong></td>
<td>217</td>
<td>---</td>
</tr>
</tbody>
</table>

* P <0.05
## NP Test Results

<table>
<thead>
<tr>
<th>Test Description</th>
<th>HIV+ mean (N=81)</th>
<th>HIV- mean (N=76)</th>
<th>T-Test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHDS Total</td>
<td>9.9</td>
<td>10.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>VALT 5 Trial Total(words)</td>
<td>39.1</td>
<td>43.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>VALT Delayed Recall(words)</td>
<td>7.5</td>
<td>9.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Symbol Digit(secs)</td>
<td>25.8</td>
<td>28.4</td>
<td>0.16</td>
</tr>
<tr>
<td>Grooved Peg Dominant(secs)</td>
<td>90.5</td>
<td>89.5</td>
<td>0.74</td>
</tr>
<tr>
<td>Grooved Peg Non-dominant(secs)</td>
<td>101.1</td>
<td>106.3</td>
<td>0.35</td>
</tr>
<tr>
<td>Color Trails 1(secs)</td>
<td>87.8</td>
<td>76.2</td>
<td>0.05</td>
</tr>
<tr>
<td>Color Trails 2(secs)</td>
<td>165.4</td>
<td>128.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Timed Gait Three Total(secs)</td>
<td>21.1</td>
<td>20.7</td>
<td>0.40</td>
</tr>
<tr>
<td>Digit Span Forward</td>
<td>5.0</td>
<td>5.2</td>
<td>0.16</td>
</tr>
<tr>
<td>Digit Span Backward</td>
<td>3.1</td>
<td>3.4</td>
<td>0.10</td>
</tr>
</tbody>
</table>
Frequency of Dementia

- MSK 1.0: 31%
- MSK 0: 23%
- MSK 0.5 (equivocal/subclinical impairment): 46%

- MSK 0 (no impairment)
- MSK 0.5 (equivocal/subclinical impairment)
- MSK 1.0 (mild dementia)
IHDS vs. MSK Rating

*P < 0.05
Results – IHDS Performance

For HIV-D, the sensitivity of the IHDS was 80% and specificity was 57%. (Using a cutoff of ≤ 10.)
Results – HIV Sensory Neuropathy

- 37% of HIV+ patients complained of subjective symptoms of numbness, parasthesias or pain in feet.
- 46% had decreased vibratory sensation in one or both feet.
- 38% had decreased ankle reflexes in one or both feet.
Problems encountered

- Interview time ranges between 1.30hr - 2.15hr
- Understanding of instructions.
- Level of education does not seem to be a factor in understanding for those with low education i.e. <8 years of education.
- Interview fatigue for both interviewer and interviewee.
Problems encountered ctned..

- Patients had trouble with the 30 minutes recall.
- Difficulty in executing the symbol digit.
- Digit span backwards- many could only stop at 2 digits.
Conclusion

HIV+ individuals with advanced infection have impaired verbal memory, psychomotor, and functional performance compared to HIV-individuals, suggesting that HIV dementia as well as sensory neuropathy are common (HIV-D - 30%, neuropathy- 40%) among HIV+ individuals in an Infectious Disease clinic in Uganda.

The IHDS may be a useful tool for non-neurologist personnel to screen for cognitive problems in the developing world.
Future Studies

To further define the epidemiology of HIV-associated neurological outcomes.

To evaluate the effect of HAART on HIV-D and neuropathy.

To evaluate the frequency of psychiatric outcomes. (e.g. delirium, psychosis, depression.)
Collaborators

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