

# Performance of Community Screening Instrument for Dementia in Screening for HIV-Associated Neurocognitive Disorders in Nigeria

Ahmad M Yakasai<sup>1\*</sup>, Lukman F Owolabi<sup>2</sup>, Mustafa I Gudajic<sup>3</sup>, Aliyu Ibrahim<sup>2</sup>, Hamza Muhammad<sup>4</sup>, Abayomi S Ogun<sup>5</sup> and Abdulrazaq G Habib<sup>4</sup>

<sup>1</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>2</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>3</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>4</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

<sup>5</sup>Department of Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria

\*Corresponding author: Ahmad MY, Infectious and Tropical Diseases Unit, Department of Medicine, Aminu Kano Teaching Hospital Kano, Kano, Nigeria, Tel: +234 806 541 9097; E-mail: [ahmadmaifada@gmail.com](mailto:ahmadmaifada@gmail.com)

Received date: March 31, 2014; Accepted date: May 29, 2014; Published date: June 5, 2014

Copyright: ©2014 Ahmad MY, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Abstract

**Background:** Cognitive function of HIV-infected patients in Nigeria has been studied using the community screening instrument for dementia (CSI-D) battery. However, its ability to detect HIV-associated neurocognitive disorders (HAND) is unclear. The study assessed the CSI-D battery in detecting HAND.

**Methods:** Age, sex and education matched 30 HIV-positive and 30 HIV-negative subjects were administered the CSI-D battery. An extensive multi-domain neuropsychological tests (MDNPT) battery was used as gold standard. Measures of functional status including personal assessment of own functioning inventory (PAOFI), instrumental activities of daily living (IADL) and Beck depression inventory (BDI) were also administered. Diagnostic accuracy indices of the CSI-D were determined from a receiver operator characteristic (ROC) curve. Linear associations were explored using correlation coefficient.

**Results:** HIV-positive subjects performed significantly worse than HIV-negative subjects in several domains across the 2 batteries. Large effect sizes were found in verbal fluency (COWAT), verbal learning, memory recall and language comprehension. Significant correlations between the two batteries were seen in all the domains except motor function. Subjects with HAND but normal on CSI-D scored poorly on motor function test. The area under the ROC curve was 0.79; 95 % confidence interval (CI) of 0.68-0.90,  $p < 0.0001$ . At cut-off score of 63, the CSI-D had sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of 77%, 63%, 55% and 61% respectively.

**Conclusion:** CSI-D has good psychometric properties for use as a screening tool for HAND. The addition of test of motor function is advisable to complement it.

industrialized countries is required to assess these subcortical functions before proper classification and rating of impairments. The MDNPT battery has been validated in Nigeria, Cameroon, South Africa and Uganda [5-8]. Despite demonstrating the ability to detect impairment across several domains in African HIV-positive patients, it has several limitations that may not allow its routine application in

positive individuals have reached the Acquired Immune Deficiency Syndrome (AIDS) stage (having had an AIDS-defining illness), while 14 (47%) were non-AIDS. 14 (47%) of the 30 HIV-positive subjects

Domain and NP test	HIV-positive (n=30)	HIV-negative (n=30)	P-value	Cohen's d effect size
Verbal fluency (Animal fluency)	13.93 (4.52)	16.60 (4.93)	0.033	0.56
Language expression (Naming)	6.57 (0.73)	6.90 (0.31)	0.024	0.59
Memory recall	11.70 (1.95)	13.57 (1.10)	<0.0001	1.18
Orientation to place and time	11.37 (1.07)	11.97 (0.18)	0.040	0.78

Cut-off value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
75.0	100	3.3	51.7	100
72.0	100	6.7	51.7	100
69.0	96.7	16.7	53.7	83.3
66.0	93.3	33.3	58.3	83.3
63.0	76.7	63.3	54.8	61.1
60.0	66.7	73.3	47.6	44.4
57.0	40.0	93.3	85.7	50.0
54.0	20.0	100	100	55.6
50.0	13.3	100	100	53.6
47.0	6.7	100	100	51.7

Table 5: Sensitivity, specificity, PPV and NPV of the CSI-D at varying cut-off values derived from the ROC curve, NPV – Negative Predictive Value, PPV – Positive Predictive Value.



Figure 1: Receiver operator characteristic curve of the total CSI-D score compared to Frascati criteria defined MND and HAD categories of HAND as gold standard. At cut-off score of 63, the total CSI-D had sensitivity of 77% and specificity of 63% for detecting HAND.

applying a generous criterion and a conservative criterion respectively [9].



Figure 2 Correlations of the total CSI-D score with the extensive MDNPT battery; 2A-COWAT versus (vs) total CSI-D score ( $r=0.548$   $p=0.000$ ); 2B - WAIS-III symbol search vs total CSI-D,  $r=0.313$   $p=0.015$ ; 2C-Color trails 2 vs total CSI-D,  $r=-0.257$ ,  $p=0.024$ ; 2D-WMS-III spatial span vs total CSI-D,  $r=0.269$ ,  $p=0.037$ .

One of the limitations of this study is the small sample size. This may be responsible for lack of significant difference between the cases and controls in some of the domains. Nevertheless, the effect of this is likely to be minimal as significant difference in tests results were found between the study groups in three domains examined. Moreover, as 50% of the cases were on ART neurological improvement could not be ruled out in some of the domains tested [18-21]. The strength of this study lies in the administration of an extensive MDNPT battery that assesses multiple domains that are sensitive to HIV infection. We explored the characteristics of the CSI-D battery on this background gold standard neuropsychological testing. We found it to be psychometrically good for use as a screening tool to detect patients at risk of HAND that may ultimately benefit from detailed neuropsychological evaluation. However, we recommended that test of motor function like grooved pegboard DH should be added to the CSI-D so as to increase its efficiency for use as a screening tool for HAND.

Application of culturally suitable and well standardized assessment tools in neuropsychology is always desired. It has the advantage of making neurocognitive evaluation simpler, more reliable, easier to

administer and more tolerable to the patients. Extensive neuropsychological tests that are indexed to the industrialized countries are not readily available in most countries in SSA, they often require several hours for administration and expertise. Given the busy HIV clinics in Nigeria and across SSA, the CSI-D with the capacity for routine application to screen for patients at risk of developing HAND will be highly useful.

## Conflicts of Interest

We declare that we have no conflicts of interest.

## Acknowledgement

We are grateful to the study participants, Sister Murjanatu Abdulmumin and all the other staff of the HIV clinic in Aminu Kano Teaching Hospital, Kano, Nigeria.

## References

1. Habib AG, Yakasai AM, Owolabi LF, Ibrahim A, Habib ZG, et al. (2013) Neurocognitive impairment in HIV-1-infected adults in Sub-Saharan Africa: a systematic review and meta-analysis. *Int J Infect Dis* 17: e820-e831.
2. WHO/UNAIDS (2012) Global summary of AIDS epidemic.
3. CIA World Fact book (2012). Accessed March 17, 2014.
4. Antinori A, Arendt G, Becker JT, Brew BJ, Byrd DA, et al. (2007) Updated research nosology for HIV-associated neurocognitive disorders. *Neurology* 69: 1789-1799.
5. Royal 3rd W, Cherner M, Carr J, Habib AG, Akomolafe A, et al. (2012) Clinical features and preliminary studies of virological correlates of neurocognitive impairment among HIV-infected individuals in Nigeria. *Journal of neurovirology*. 18: 191-199.
6. Kanmogne GD, Kuete CT, Cysique LA, Fonsah JY, Eta S, et al. (2010) HIV-associated neurocognitive disorders in sub-Saharan Africa: a pilot study in Cameroon. *BMC Neurol* 10: 60.
7. Joska JA, Westgarth-Taylor J, Myer L, Hoare J, Thomas KGF, et al. (2011) Characterization of HIV-Associated Neurocognitive Disorders among individuals starting antiretroviral therapy in South Africa. *AIDS and behavior*. 15: 1197-203.
8. Sacktor NC, Wong M, Nakasujja N, Skolasky RL, Selnes OA, et al. (2005) The International HIV Dementia Scale: a new rapid p

