Prevalence and Risk Factors of HIV-Associated Neurocognitive Disorders in Rural Southwestern Uganda

Jane Kasozi Namagga, MNS, BNS, RN[*] **[Lecturer]**,
Department of Nursing, Faculty of Medicine, Mbarara University of Science and Technology, Uganda.

Godfrey Zari Rukundo, PhD, MMed Psych, MBChB [Senior Lecturer],
Department of Psychiatry, Faculty of Medicine, Mbarara University of Science and Technology, Uganda.

Joachim G. Voss, PhD, RN, ACRN, FAAN [Professor]
Case Western Reserve University, Frances Payne Bolton School of Nursing, Cleveland, Ohio, USA.

Abstract

Advances in treatment of HIV have dramatically improved survival rates; HIV-associated neurocognitive disorders (HAND), however, remain highly prevalent and continue to represent a significant public health problem, especially in resource-limited settings. We completed a cross-sectional study to describe the prevalence and risk factors for HAND in rural Southwestern Uganda AIDS Support Organization Centers. After securing ethical clearance from relevant bodies, 393 participants were screened for HAND using the International HIV Dementia Scale. A cutoff score of   10 and a significance level of p .05 were set. More than half of the 393 participants ($n = 229$, 58.23%) screened positive for HAND. The associated risk factors were gender (odds ratio [OR] 0.54, $p = .017$), peasant farming (OR 1.70, $p = .04$), and older age (OR 1.03, $p = .019$). HIV-associated neurocognitive disorder remains one of the major complications of HIV despite improvement in antiretroviral therapy and life expectancies.

Keywords

gender; HIV; HIV-associated neurocognitive disorders; International HIV Dementia Scale; Uganda

Neurocognitive dysfunction is one of the major complications of HIV (Sanmarti et al., 2014). Dysfunctions range from mild neurocognitive functional impairment to severe dementia and are collectively termed HIV-Associated Neurocognitive Disorders (HAND; Antinori et al., 2007). This term includes HIV-associated asymptomatic neurocognitive impairment, HIV-associated mild neurocognitive disorder, and HIV-associated dementia

[*]Corresponding author: Jane Kasozi Namagga, jkasozi@must.ac.ug.

(Saylor et al., 2016). These dysfunctions cause mental slowing, memory loss, and difficulties in complex tasks, motor disorders, and behavioral abnormalities (Simioni et al., 2010), which can cause personal, economic, and societal burdens that negatively influence the lifespan and quality of life for people living with HIV (PLWH; Pandya, Krentz, Gill, & Power, 2005; Yeung, Krentz, Gill, & Power, 2006). Regardless of the use of antiretroviral therapy (ART), HIV-related neurologic dysfunctions continue to cause difficulties associated with diminished ART adherence and increased morbidity (Eggers et al., 2017; McArthur, Brew, & Nath, 2005).

Globally, it is estimated that 50% of PLWH are affected by HAND (Heaton et al., 2010; Valcour et al., 2004), with varying rates in different countries. These include India, 33% (Saini & Barar, 2015); Thailand, 37.5% (Pumpradit et al., 2010); Nigeria, 28.8% (Royal et al., 2012); and Switzerland, 69% (Simioni et al., 2010), regardless of undetectable HIV in the blood.

Yusuf et al. (2014) reported that sub-Saharan African countries account for almost two-thirds of the cases of HAND worldwide. Studies in Uganda and Botswana have reported a prevalence of HAND at 41% and 38%, respectively (Sacktor et al., 2014; Yusuf et al., 2014). Because of limited resources in many African countries, patients in Africa start ART late in the disease trajectory, thereby predisposing themselves to prolonged exposure to high viral loads and neurologic complications (Simioni et al., 2010). Neurologic damage sustained before the start of ART and persistent immune cell activation play an important role in the development of cognitive impairment (Saylor et al., 2016).

Despite overall advances in the treatment of HIV, HAND continues to represent clinical deterioration in HIV disease, especially when treatment is delayed (Mind Exchange Working Group, 2012). This is because the immune system becomes so depleted that it can no longer prevent HIV or other infections from entering the brain, affecting CD4+ T-cell decline (Monaco, Ferrari, Gajofatto, Zanusso, & Mariotto, 2012).

In Uganda, the few studies that have examined cognitive function in PLWH have focused mainly on urban populations. We could not find a study conducted in a rural population. We discuss the prevalence of HAND using the International HIV Dementia Scale (IHDS) and identify risk factors associated with HAND in clients attending The AIDS Support Organization (TASO) centers in rural Southwestern Uganda.

Methods

Study Setting

Our study was conducted in Mbarara and Rukungiri districts in rural Southwestern Uganda at two HIV treatment centers of a nongovernmental organization, TASO. The Mbarara TASO center has four community satellite sites: Ibaare, Katabi, Busheshe, and Kagango, whereas the Rukungiri center has five community sites: Ruhinda, Kihihi, Rweshema, Buyanja, and Rwerere. TASO is the largest nongovernmental organization recognized as a center of excellence in treatment and care for PLWH in Uganda. It provides comprehensive HIV care that includes HIV voluntary counseling and testing, ART for adult and pediatric

patients, prevention of maternal to child transmission, and testing and routine laboratory services, including viral load testing. In 2015, a total of 36,083 PLWH (female = 22,694, male = 13,389) and 15,000 adult clients on ART were registered at TASO Mbarara and Rukungiri, respectively (Rubaihayo, Tumwesigye, & Konde-Lule, 2015). The TASO care management model is focused on patient-centered care, tailored to medication adherence, disease monitoring, and home-based care. These services are delivered through community drug distribution points and/or at TASO centers and community sites. The choice of delivery venue is part of the client's adherence plan agreed upon with the service provider.

Study Design and Procedures

We conducted a cross-sectional study and consecutively sampled PLWH attending TASO centers and community outreach sites between April and July of 2017. Participants were enrolled by trained research assistants, fluent in English and Runyakitara, the local language spoken by participants. Enrollment was on days when participants came to a site for medical care and services. Each participant was eligible only once. On agreement to participate, written informed consent was obtained to confirm participation. Recruitment was pursued until the calculated sample size was reached. The calculated sample was 384 participants, and we added nine participants to compensate for any missing data. Our total sample was 393 participants. The sample size was calculated by a mathematical expression, $N = Z^2PQ/D^2$ (Lwanga & Cho-Yook, 1986), where

- N = Sample size

- Z = Normal distribution at 1.96 that corresponds to 95% confidence interval

- P = 50% (0.5), the estimated proportion in the target population with HAND

- D = Margin of errors allowed, which corresponded to 0.05 error

- Q = Estimated proportion without HAND (1-p) = 50% (0.5)

    – $N = 1.96^2*0.5*0.5/0.05^2 = 384.16$

Permission to review participant medical records was sought from the directors of the centers. Approximately \$6USD was given to participants as a transport refund and compensation for time during the study period.

Inclusion and Exclusion Criteria

We included PLWH who were on ART and were between ages 18 and 50 years. We excluded individuals ages 50 years or older because older age is a known risk factor for cognitive impairment (Valcour et al., 2004). To ensure that there were no obvious causes of HAND other than HIV, we excluded 20 individuals with a history of opportunistic infections of the central nervous system; regular substance abuse; a diagnosis of schizophrenia or depression, thyroid dysfunction, diabetes mellitus, and/or hypertension; the deaf; the mentally disabled; and pregnant women. These diagnoses were confirmed by reviewing participant medical records.

Data Collection

We collected data using the IHDS (Sacktor et al., 2005). The IHDS was translated into Runyakitara and back translated into English to make sure that the original meaning was maintained. An additional sociodemographic questionnaire was designed to elicit demographic information including age, gender, education, occupation, and other demographic variables. We used a checklist to obtain information from participant records such as time of the start of treatment, treatment line, viral load, and adverse drug effects, which provided time for participants to relax before the IHDS was administered.

Instruments

The IHDS is a sensitive and well-tolerated screening instrument for diagnosis of subcortical dementia in PLWH (Nakku, Kinyanda, & Hoskins, 2013). It is a rapid assessment tool that evaluates memory recall and motor and psychomotor speed (Saini & Barar, 2015) that requires 2 to 3 minutes to complete. The tool consists of three assessments: (a) an assessment of motor speed through finger tapping, (b) an assessment of psychomotor speed through a defined alternating hand sequence (AHS) that a participant is asked to repeat, and (c) an assessment of memory recall through a four-word recall after the timed finger tapping and AHS tests are performed. Finger tapping and AHS were scored on a five-point scale (0–4), whereas the four-word recall was scored out of a maximum of four points, corresponding to the number of words correctly recalled (Sacktor et al., 2005).

The total score on the IHDS was computed by adding scores from the three individual assessments. The maximum possible score was 12 as per the standard protocol (Sacktor et al., 2005). The IHDS was first developed by Power, Selnes, Grim, and McArthur (1995), and, since 2005, many studies have demonstrated its effectiveness in a variety of populations (Cross, Önen, Gase, Overton, & Ances, 2013; Haddow, Floyd, Copas, & Gilson, 2013; Sacktor et al., 2005; Simioni et al., 2010). It has been validated to screen HAND in the United States, Uganda, Ethiopia, Argentina, and South Africa (Nakku et al., 2013; Sacktor et al., 2005). The tool has been recommended for use in research studies because it is easy to administer by all trained health workers. Another advantage of the IHDS is that it requires no sophisticated instrumentation other than a watch with a second hand, and the instrument is independent of language and culture (Njamnshi et al., 2008).

Statistical Analysis

Our primary outcome of interest was the presence or absence of HAND, as defined by IHDS scores of 10 or lower (Sacktor et al., 2005). We used the Pearson chi-square test and logistic regression analysis to determine associations between HAND and demographic variables, with the level of statistical significance set at p .05. The variables that were statistically significant in the univariate analysis were further analyzed using multivariate logistic regression to confirm the relationship and were retained in the final model. We conducted all analyses using STATA version 12.

Ethical Consideration

We obtained ethical approval from the Mbarara University of Science and Technology Research Ethics Committee (MUST-REC No. 27/10-16) and the Uganda National Council

for Science and Technology (UNCST No. HS2194). We further had written authorization from the TASO Institutional Review Board. At data entry, all participant identifiers were removed. Each participant was instead assigned a number to maintain confidentiality.

Results

We tested a total of 393 participants for HAND. The mean age of the participants was 37.9 (±8.6), with a range of 18 to 50 years. The majority were Banyankore, 62% ($n = 244$); female, 73% ($n = 288$); Anglican, 54% ($n = 211$); and married, 47% ($n = 186$). More than half (57%; $n = 221$) had attained a primary level of education, 28% ($n = 111$) had full-time employment, and 45% ($n = 179$) worked as peasant farmers. Table 1 summarizes the demographic characteristics.

In the initial univariate analysis, HAND was significantly associated with gender (odds ratio [OR] 0.52, $p = .004$), secondary education (OR 0.35, $p = .0023$), peasant farming (OR 2.01, $p = .005$), older age (OR 1.04, $p < .001$), longer HIV duration (OR 1.05, $p = .05$), and duration on ART (OR 0.95, $p = .046$). The final degree of association as determined by adjusted OR in the multivariate model, revealed that only gender (OR 0.54, $p = .017$), older age (OR 1.03, $p = .019$), and peasant farming (OR 1.70, $p = .04$) remained significantly related to HAND. A summary of the multiple logistic regression analysis is shown in Table 2.

Discussion

We aimed at determining the prevalence and risk factors for HAND in PLWH using the IHDS (Sacktor et al., 2005). We found a high HAND prevalence of 58%. The risk factors for HAND were gender, peasant farming, and older age. The reason for the high prevalence of HAND is not clear, especially for people already on ART (most with viral load suppression). Similar findings have been reported (Clifford & Ances, 2013) in PLWH experiencing neurocognitive deterioration despite successful therapy and virologic control, which could be due to the HIV inflammatory response on the nervous system (Ellis, Calero & Stockin, 2009) before initiation of ART.

Prevalence of HAND

Our prevalence rate (58%) was higher than in previous Ugandan and international studies and suggests that HAND is a significant neurological condition in PLWH in rural Southwestern Uganda. Studies have shown prevalence rates at the Infectious Disease Clinic in Kampala, Uganda, of 31% and 41% (Sacktor et al., 2005, 2014), 33% in India (Saini & Barar, 2015), 28.8% in Nigeria (Royal et al., 2012), and 38% in Botswana (Lawler et al., 2010). However, our rates were considerably lower than findings in Switzerland of 84% (Simioni et al., 2010) and in Cameroon of 85% (Atashili et al., 2013). Continuing high rates of HAND in the ART era may be due to multiple nonexclusive reasons such as irreversible brain injury before initiating ART, neurotoxicity of ART, or prolonged exposure to inflammatory responses in long-term survivors (Woods, Moore, Weber, & Grant, 2009). Conversely, the discrepancy between our study and earlier studies may be due to the

difference in study designs and methods used along with variance in the target population and sociodemographic characteristics (Nightingale et al., 2014).

Risk Factors Associated With HAND

We found that gender, peasant farming, and age were factors independently associated with the presence of HAND as defined by the IHDS. The majority of our participants were female, as is found in many HIV clinics in Sub-Saharan Africa (Nakku et al., 2013), where the majority (72.7%) of respondents were female. Notably, the Joint United Nations Programme on HIV/AIDS (2008) also reported that half of PLWH worldwide were women with a higher burden in Sub-Saharan Africa and the Caribbean. In our study, despite a majority of women, we found women living with HIV to be at a lower risk for HAND compared with men, which could be related to the fact that women were usually screened during antenatal visits as part of prevention of mother-to-child transmission and, when found to have HIV, were referred for treatment (Yusuf et al., 2014). However, this differed from other studies that reported women to be at a higher risk of HAND compared with men. For instance, women in Europe had almost twice the risk of being diagnosed with HAND compared with men (Maki & Martin-Thormeyer, 2009).

Contrary to the above, Robertson et al. (2004), in their prospective study of 146 adults living with HIV and HAND in the southeastern United States, reported no gender differences in neurocognitive complications, which could have been due to the low sample size. Similarly, Sacktor et al. (2005) found that gender was not statistically significant in the occurrence of cognitive disorders in a study conducted in the United States and central Uganda. The observed difference was probably due to a full neuropsychological test battery that was performed to assess neurocognitive function in combination with the IHDS.

We observed that peasant farming was associated with HAND. Peasant farming is normally regarded as low-paying employment or unemployment. The majority of peasant farmers do subsistence farming in addition to being casual laborers. These findings have been reinforced in other studies (Heaton et al., 2010), which reported that individuals with HAND were nearly twice as likely to be unemployed compared with persons with normal neurocognitive performance. This is a major psychosocial problem with clinical implications regarding the importance of managing PLWH in rural settings. Health workers, including nurses, should routinely assess those at risk of developing neurocognitive dysfunctions and provide clinical support.

As PLWH age due to longer survival times associated with treatment, there might be an increase in cognitive impairments due to progressive neurodegeneration related to HIV infection (Kojic & Carpenter, 2009). Factors that are thought to contribute to HAND include not only the primary effects of HIV on the brain but also on aging, even with viral suppression (Tozzi et al., 2005; Valcour et al., 2004). Indeed, our study found older age to be associated with progression of HAND despite patients being maintained on ART. Statistically, the odds of developing HAND increased with every year of age by 3%.

Similarly, Mateen and Mills (2012) reported that the odds of developing HAND increased with advancing age. Neural injury continued in some patients regardless of the success of

ART (Robertson et al., 2007), causing motor slowing that is more prominent in the fifth decade of life rather than earlier in life (Woods et al., 2009). Other studies have reported that patients older than 50 years were more likely to experience HAND (Power et al., 1995; Sacktor et al., 2014) because the aging brain might be more vulnerable to neuronal inflammation associated with HIV infection. Valcour et al. (2004) studied the effects of HIV and aging extensively. They found that older adults with HIV experienced two to three times the risk of living with HAND compared with younger adults with HIV. Neurocognitive domains that were selectively vulnerable in older PLWH included speed of information processing and executive function (Cañizares, Cherner, & Ellis, 2014). Although ART has allowed many PLWH to live longer, studies (Nakku et al., 2013) have not found any association between advancing age and neurocognitive disorders in PLWH.

Limitations

Our study was limited by the fact that the IHDS screening tool alone could not identify various categories of HAND (i.e., asymptomatic neurocognitive impairment, HIV-associated mild neurocognitive disorder, and HIV-associated dementia). Furthermore, we were not able to perform detailed neuropsychological assessments for a formal diagnosis of HAND because of a lack of formally trained personnel. However, our study had a large participant pool, and, although it did not allow us to generalize to Uganda as a whole, the results provided a detailed insight into HAND prevalence.

Conclusion

HAND is a widespread problem for PLWH in rural Southwestern Uganda as suggested by low scores on the IHDS in more than half of our participants. It remains an important unresolved issue with its effects on survival, quality of life, and everyday function in PLWH. More research needs to be done to investigate associated risk factors in depth to fully understand the causes of HAND.

Acknowledgments

References

Antinori A, Arendt G, Becker J, Brew B, Byrd D, Cherner M,… Wojna VE. (2007). Updated research nosology for HIV-associated neurocognitive disorders. Neurology, 69, 1789–1799. doi: 10.1212/01.WNL.0000287431.88658.8b [PubMed: 17914061]

Atashili J, Gaynes BN, Pence BW, Tayong G, Kats D, O'donnell JK, … Njamnsh KA. (2013). Prevalence, characteristics and correlates of a positive-dementia screen in patients on antiretroviral therapy in Bamenda, Cameroon: A cross-sectional study. BMC Neurology, 23, 86. doi: 10.1186/1471-2377-13-86

Cañizares S, Cherner M, & Ellis RJ (2014). HIV and aging: Effects on the central nervous system. Seminars in Neurology, 34, 27–34. doi: 10.1055/s-0034-1372340 [PubMed: 24715486]

Clifford DB, & Ances BM (2013). HIV-associated neurocognitive disorder. The Lancet Infectious Diseases, 13, 976–986. doi:10.1016/S1473-3099(13)70269-X [PubMed: 24156898]

Cross S, Önen N, Gase A, Overton ET, & Ances BM (2013). Identifying risk factors for HIV-associated neurocognitive disorders using the international HIV dementia scale. Journal of Neuroimmune Pharmacology, 8, 1114–1122. doi:10.1007/s11481-013-9505-1 [PubMed: 24114509]

Eggers C, Arendt G, Hahn K, Husstedt IW, Maschke M, Neuen-Jacob E, … Straube E. (2017). HIV-1-associated neurocognitive disorder: Epidemiology, pathogenesis, diagnosis, and treatment. Journal of Neurology, 264, 1715–1727. doi:10.1007/s00415-017-8503-2 [PubMed: 28567537]

Ellis RJ, Calero P, & Stockin MD (2009). HIV infection and the central nervous system: A primer. Neuropsychology Review, 19: 144–151. doi:10.1007/s11065-009-9094-1 [PubMed: 19415500]

Haddow LJ, Floyd S, Copas A, & Gilson RJC (2013). A systematic review of the screening accuracy of the HIV Dementia Scale and International HIV Dementia Scale. PLoS One, 8, e61826. doi: 10.1371/journal.pone.0061826 [PubMed: 23613945]

Heaton R, Clifford D, Franklin D, Woods S, Ake C, Vaida F, … Grant I. (2010). HIV-associated neurocognitive disorders persist in the era of potent antiretroviral therapy CHARTER Study. Neurology, 75, 2087–2209. doi:10.1212/WNL.0b013e318200d727 [PubMed: 21135382]

Joint United Nations Programme on HIV/AIDS. (2008). Report on the global AIDS epidemic. Retrieved from http://www.unaids.org/sites/default/files/media_asset/jc1510_2008globalreport_en_0.pdf

Kojic EM, & Carpenter CC (2009). Neurocognitive changes in AIDS: Evolution of treatment of HIV infection In Paul RH, Sacktor NC, Valcour V, & Tashima KT (Eds.), HIV and the brain. New challenges in the modern era. Totowa, NJ: Humana Press.

Lawler K, Mosepele M, Ratcliffe S, Seloilwe E, Steele K, Nthobatsang R,… Steenhoff A. (2010). Neurocognitive impairment among HIV-positive individuals in Botswana: A pilot study. Journal of the International AIDS Society [electronic resource], 13, 15. doi: 10.1186/1758-2652-13-15

Lwanga SK, & Cho-Yook T (1986). Teaching health statistics: Twenty lesson and seminar outlines. Geneva, Switzerland: World Health Organization.

Maki PM, & Martin-Thormeyer E.(2009). HIV, cognition and women. Neuropsychology Review, 19, 204. doi:10.1007/s11065-009-9093-2 [PubMed: 19430907]

Mateen FJ,& Mills EJ (2012). Aging and HIV-related cognitive loss. Journal of the American Medical Association, 308(4), 349–350. doi: 10.1001/jama.2012.8538 [PubMed: 22820786]

McArthur JC, Brew BJ, & Nath A (2005). Neurological complications of HIV infection. Lancet Neurology, 4, 543–555. doi: 10.1016/S1474-4422(05)70165-4 [PubMed: 16109361]

Mind Exchange Working Group. (2012). Assessment, diagnosis, and treatment of HIV-associated neurocognitive disorder: A consensus report of the mind exchange program. Clinical Infectious Diseases, 56, 1004–1017. doi:10.1093/cid/cis975 [PubMed: 23175555]

Monaco S, Ferrari S, Gajofatto A, Zanusso G, & Mariotto S. HCV-related nervous system disorders. Clinical & Developmental Immunology, 2012, 236148, doi:10.1155/2012/236148 [PubMed: 22899946]

Nakku J, Kinyanda E, & Hoskins S (2013). Prevalence and factors associated with probable HIV dementia in an African population: A cross-sectional study of an HIV/AIDS clinic population. BMC Psychiatry, 13, 1. doi:10.1186/1471-244X-13-126 [PubMed: 23281653]

Nightingale S, Winston A, Letendre S, Michael BD, McArthur JC, Khoo S, … Solomon T. (2014). Controversies in HIV-associated neurocognitive disorders. Lancet Neurology, 13, 1139–1151. doi: 10.1016/S1474-4422(14)70137-1 [PubMed: 25316020]

Njamnshi AK, de Paul Djientcheu V, Fonsah JY, Yepnjio FN, Njamnshi DM, & Muna WF (2008). The International HIV Dementia Scale is a useful screening tool for HIV-associated dementia/cognitive impairment in HIV-infected adults in Yaounde-Cameroon. Journal of Acquired Immune Deficiency Syndromes, 49, 393–397. doi: 10.1097/QAI.0b013e318183a9df [PubMed: 19186351]

Pandya R, Krentz HB, Gill MJ, & Power C. (2005). HIV-related neurological syndromes reduce health-related quality of life. Canadian Journal of Neurological Sciences/Journal Canadien des Sciences Neurologiques, 32, 201–204. doi:10.1017/S0317167100003978 [PubMed: 16018155]

Power C, Selnes OA, Grim JA, & McArthur JC (1995). HIV Dementia Scale: A rapid screening test. Journal of Acquired Immune Deficiency Syndromes, 8, 273–278.

Pumpradit W, Ananworanich J, Lolak S, Shikuma C, Paul R, Siangphoe U,… Valcour V. (2010). Neurocognitive impairment and psychiatric comorbidity in well-controlled human immunodeficiency virus-infected Thais from the 2NN Cohort Study. Journal of Neurovirology, 16, 76–82. doi:10.3109/13550280903493914 [PubMed: 20053142]

Robertson KR, Kapoor C, Robertson WT, Fiscus S, Ford S, & Hall CD (2004). No gender differences in the progression of nervous system disease in HIV infection. Journal of Acquired Immune Deficiency Syndromes, 36, 817–822.doi:10.1097/00126334-200407010-00008 [PubMed: 15213565]

Robertson KR, Smurzynski M, Parsons TD, Wu K, Bosch RJ, Wu J,… Ron J. (2007). The prevalence and incidence of neurocognitive impairment in the HAART era. AIDS, 21, 1915–1921. doi: 10.1097/QAD.0b013e32828e4e27 [PubMed: 17721099]

Royal W III, Cherner M, Carr J, Habib AG, Akomolafe A, Charurat M, … Blattner AW. (2012). Clinical features and preliminary studies of virological correlates of neurocognitive impairment among HIV-infected individuals in Nigeria. Journal of Neurovirology, 18, 191–199. doi: 10.1007/s13365-012-0097-y [PubMed: 22528480]

Rubaihayo J, Tumwesigye NM, & Konde-Lule J (2015). Trends in prevalence of selected opportunistic infections associated with HIV/AIDS in Uganda. BMC Infectious Diseases, 15, 1. doi:10.1186/s12879-015-0927-7 [PubMed: 25567701]

Sacktor N, Nakasujja N, Redd AD, Manucci J, Laeyendecker O, Wendel SK, … Quinn CT. (2014). HIV subtype is not associated with dementia among individuals with moderate and advanced immunosuppression in Kampala, Uganda. Metabolic Brain Disease, 29, 261–268. doi:10.1007/s11011-014-9498-3 [PubMed: 24515303]

Sacktor NC, Wong M, Nakasujja N, Skolasky RL, Selnes OA, Musisi S, … Katabira E. (2005). The International HIV Dementia Scale: A new rapid screening test for HIV dementia. AIDS, 19, 1367–1374. doi:10.1097/01.aids.0000180790.77379.3a [PubMed: 16103767]

Saini S, & Barar KV. (2015). Assessment of neurocognitive functions in HIV/AIDS patients on HAART using the international HIV dementia scale. International Journal of Nutrition, Pharmacology, Neurological Diseases, 4, 252. doi:10.4103/2231-0738.139408

Sanmarti M, Ibáñez L, Huertas S, Badenes D, Dalmau D, Slevin M, … Jaen A. (2014). HIV-associated neurocognitive disorders. Journal of Molecular Psychiatry, 2, 1. doi:10.1186/2049-9256-2-2 [PubMed: 25408912]

Saylor D, Dickens AM, Sacktor N, Haughey N, Slusher B, Pletnikov M, … McArthur CJ. (2016). HIV-associated neurocognitive disorder—Pathogenesis and prospects for treatment. Nature Reviews Neurology, 12, 234. doi:10.1038/nrneurol.2016.27 [PubMed: 26965674]

Simioni S, Cavassini M, Annoni J-M, Abraham AR, Bourquin I, Schiffer V, … Renaud A. (2010). Cognitive dysfunction in HIV patients despite long-standing suppression of viremia. AIDS, 24, 1243–1250. doi:10.1097/QAD.0b013e3283354a7b [PubMed: 19996937]

Tozzi V, Balestra P, Lorenzini P, Bellagamba R, Galgani S, Narciso P,… Corpolongo A. (2005). Prevalence and risk factors for human immunodeficiency virus associated neurocognitive impairment, 1996 to 2002: Results from an urban observational cohort. Journal of Neurovirology, 11, 265–273. doi:10.1089/aid.2005.21.706 [PubMed: 16036806]

Valcour V, Shikuma C, Shiramizu B, Watters M, Poff P, Selnes o, …. Sacktor N. (2004). Higher frequency of dementia in older HIV-1 individuals: The Hawaii Aging with HIV-1 Cohort. Neurology, 63, 822–827. [PubMed: 15365130]

Woods SP, Moore DJ, Weber E, & Grant I (2009). Cognitive neuropsychology of HIV-associated neurocognitive disorder. Neuropsychology Review, 19, 152–168. doi:10.1007/s11065-009-9102-5 [PubMed: 19462243]

Yeung H, Krentz HB, Gill MJ, & Power C (2006). Neuropsychiatric disorders in HIV infection: Impact of diagnosis on economic costs of care. AIDS, 20, 2005–2009. doi:10.1097/aids.0000247565.80633.d2 [PubMed: 17053346]

Yusuf AJ, Hassan A, Mamman AI, Muktar HM, Suleiman AM, & Baiyewu O (2014). Prevalence of HIV-associated neurocognitive disorder (HAND) among patients attending a tertiary health facility

in Northern Nigeria. Journal of the International Association of Providers of AIDS Care, 16, 48–55. doi:10.1177/2325957414553839

Key Considerations

- HAND is a subcortical cognitive disease with psychomotor slowing as the most significant feature.

- The diagnosis of HAND and the differentiation from other types of cognitive disorders is clinically crucial in routine HIV care and management.

- Risk factors such as sociodemographics have a significant effect on cognitive function and, therefore, should be given more attention while managing patients with HAND.

- In daily clinical practice, PLWH should be routinely screened for HAND using simpler screening tools such as the International HIV Dementia Scale for early diagnosis.

Table 1.

Demographic Characteristics

		No HAND	HAND		
		IHDS ≥ 11	IHDS ≤ 10		
Factor	Total Cohort, $N = 393$	$n = 164$ (41.7%)	$n = 229$ (58.3%)	χ^2	P Value
Gender, n (%)				9.3	.002
Female	288 (73.3)	107 (65.2)	181 (79.0)		
Male	105 (26.7)	57 (34.8)	48 (21.0)		
Age in years, M (SD)	37.9 (8.6)	39.2 (8.6)	35.9 (8.3)		< .001
Age in years, M (SD)					
Female	37.7 (8.7)	39.3 (8.5)	35.1 (8.3)		1.000
Male	38.2 (8.4)	38.9 (8.9)	37.7 (8.0)		.801
Tribe, n (%)				4.9	.181
Nkore	244 (62.1)	108 (65.5)	136 (59.7)		
Mukiga	93 (23.7)	35 (21.2)	58 (25.4)		
Ganda	22 (5.6)	12 (7.3)	10 (4.4)		
Others	34 (8.7)	10 (6.1)	24 (10.5)		
Religion, n (%)				1.5	.681
Anglican	211 (54.0)	85 (52.2)	126 (55.3)		
Catholic	130 (33.3)	55 (33.7)	75 (32.9)		
Moslem	21 (5.4)	8 (4.9)	13 (5.7)		
Others	29 (7.4)	15 (9.2)	14 (6.1)		
Marital status, n (%)				11.3	.01
Unmarried	49 (12.5)	20 (12.2)	29 (12.6)		
Married	186 (47.3)	87 (53.0)	99 (43.2)		
Widow/widower	100 (25.5)	28 (17.1)	72 (31.4)		
Divorced/separated	58 (14.8)	29 (17.7)	29 (12.7)		
Education level, n (%)				6.7	.08
No formal	31 (7.9)	8 (4.9)	23 (10.1)		
Primary	221 (56.5)	87 (53.4)	134 (58.8)		
Secondary	101 (25.8)	50 (30.7)	51 (22.4)		

Factor	Total Cohort, $N = 393$	No HAND	HAND	χ^2	P Value
		IHDS $\geq$ 11	IHDS $\leq$ 10		
		$n = 164\ (41.7\%)$	$n = 229\ (58.3\%)$		
Vocational/tertiary	38 (9.7)	18 (11.0)	20 (8.8)		
Employment, n (%)				17.7	<.001
Full time	111 (28.1)	53 (32.1)	58 (25.2)		
Part time	55 (13.9)	31 (18.8)	24 (10.4)		
Peasant	179 (45.3)	55 (33.3)	124 (53.9)		
Unemployed	34 (8.6)	17 (10.3)	17 (7.4)		
Others	16 (4.1)	9 (5.5)	7 (3.0)		

Note. HAND = HIV-associated neurocognitive disorders; IHDS = International HIV Dementia Scale; M = mean; SD = standard deviation.

Table 2.

Univariate and Multivariate Analyses of the Risk Factors Associated With HAND

Factor	Univariate Analysis			Multivariate Analysis		
	Odds Ratio	95% CI	P Value	Adjusted Odds Ratio	95% CI	P Value
Gender						
Male	Ref			Ref		
Female	0.52	0.33–0.81	0.004	0.54	0.33–0.89	.017
Age in years	1.04	1.02–1.07	<0.001	1.03	1.01–1.06	.019
Marital status						
Unmarried	Ref					
Married	1.33	0.69–2.53	0.393			
Widow/widower	0.60	0.29–1.22	0.158			
Divorced/separated	1.53	0.70–3.31	0.284			
Education level						
No formal	Ref					
Primary	0.54	0.23–1.26	0.152	1.7	0.67–4.18	.268
Secondary	0.35	0.15–0.86	0.023	1.3	0.35–7.06	.682
Vocational/tertiary	0.39	0.14–1.08	0.069	2.3	0.68–4.35	.182
Employment						
Full time	Ref			Ref		
Part time	0.69	0.36–1.33	0.272	0.84	0.43–1.66	.615
Peasant	2.01	1.23–3.28	0.005	1.70	1.03–2.83	.040
Unemployed	0.90	0.42–1.94	0.781	0.81	0.371–1.78	.598
Others	0.70	0.24–2.01	0.504	0.98	0.33–2.92	.969
Viral load						
Undetected	Ref					
Detected	1.32	0.48–3.68	0.592			
Missing	0.79	0.42–1.47	0.452			
HIV duration	1.04	1.00–1.08	0.005	1.01	0.97–1.05	.579
Duration on ART	0.95	0.9–0.99	0.046	0.99	0.93–1.04	.68
Treatment line	1.10	0.45–2.74	0.831			

	Univariate Analysis			Multivariate Analysis		
Factor	Odds Ratio	95% CI	P Value	Adjusted Odds Ratio	95% CI	P Value
Drug adverse effect	0.91	0.61–1.37	0.658			

Note. ART 5 antiretroviral therapy; Ref = reference.