

Ophthalmic pathologies and their relationship with neurological morbidity in older HIV-Positive Adults in Northern Tanzania

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1. Introduction

- Almost 43 million people are infected by the Human immunodeficiency virus (HIV) globally, with 90% of cases in developing countries (1)
- Increasing roll-out of combination antiretroviral therapy (cART) is resulting in emergence of chronic HIV-related complications, such as HIV-associated neurological disorders (HAND) and HIV-associated eye diseases, affecting up to 50% and 70% of HIV-positive cohorts respectively (2)
- Screening for, and identification of, HAND is currently challenging (3)

2. Aims

- To determine if HIV retinopathy is a potential biomarker of HIV-associated neurocognitive impairment in older cART-treated HIV positive individuals in Tanzania
- To determine if remote retinal screening using a smartphone-based retinal camera is potentially useful in this context



Figure 1: Images of Mawenzi Hospital

3. Methodology

A cross-sectional study of systematically sampled ≥ 50 -years adults under long-term follow-up in Northern Tanzania government funded HIV clinic (Figure 1). Data collected are summarised in Table 1:

| | |
|---------------------------------|--|
| Medical Examination | Demographics, general risk factors, HIV biomarkers, functional assessments, medical examination, blood sample, urine test, electrocardiogram, ankle-brachial pressure index, bioimpedance |
| Assessment for HAND | Neuropsychological assessment, neurological examination, structured history, collateral history |
| Ophthalmology assessment | Visual acuity: ring "C" chart tested at 3metres in LogMar Visual fields: 'quadrant finger counting' confrontation Colour vision: Ichihara charts Inattention and nystagmus Fundoscopy, retinal imaging post dilatation: VOLK InView smartphone retinal camera (Figure 2) Image review by 2 remote teams of ophthalmologists |

Table 1: Summary of proforma

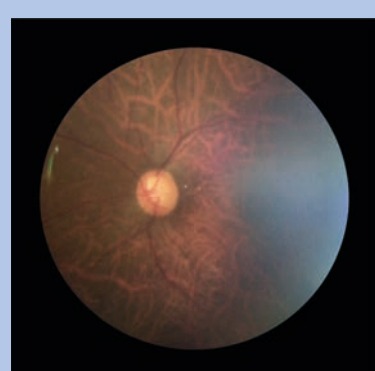


Figure 2: Images of retinal camera used and an image taken on retinal camera

Definitions and diagnoses:

VISUAL IMPAIRMENT:

- Mild-moderate vision loss: VA >0.3 , ≤ 0.8
- Severe vision loss: VA >0.8
- HIV retinopathy signs include Cotton-wool spots, retinal haemorrhage
- Suspected glaucoma diagnosed by cup-disc-ratio ≥ 0.6

HAND: Diagnosed using gold-standard American Academy of Neurology criteria and subtypes summarised in Table 2:

| Criteria | Asymptomatic neurocognitive impairment | Mild neurocognitive disorder | HIV-associated dementia |
|---|--|------------------------------|-------------------------|
| Number of domains of cognitive impairment | ≥ 2 | ≥ 2 | ≥ 2 |
| Number of standard deviations from normal | ≥ 1 | ≥ 1 | ≥ 2 |
| Interferes with everyday functioning | x | ✓ | ✓✓ |
| Meets criteria for delirium | x | x | x |
| Meets criteria for dementia | x | x | ✓ |

Table 2: Summary of HIV-associated neurocognitive disorder subtypes

4. Results

- 129 individuals (63.4% female, median age 56) were systematically sampled.
- 53 (41.1%) and 37 (28.7%) individuals had mild-moderate and severe visual impairment respectively.
- 86 (66.7%) had HAND (CI=58.5-74.8%) which is sub-divided in Figure 3.

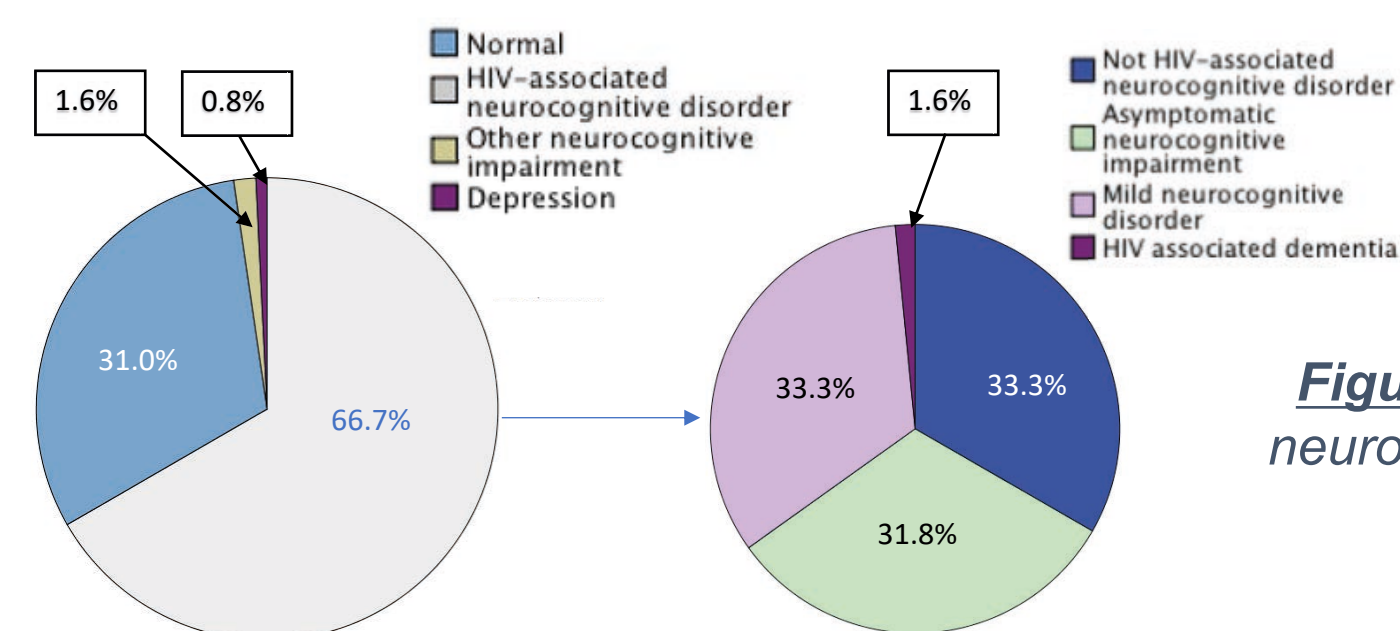


Figure 3: Summary of neurocognitive disorders

- Significant association between HAND severity and HIV retinopathy was found (Figure 4). No significant association between HIV retinopathy with CD4 or viral load was found.
- Overall diagnostic accuracy was poor (AUROC 0.545 to 0.617) but specificity was high as was positive predictive value.

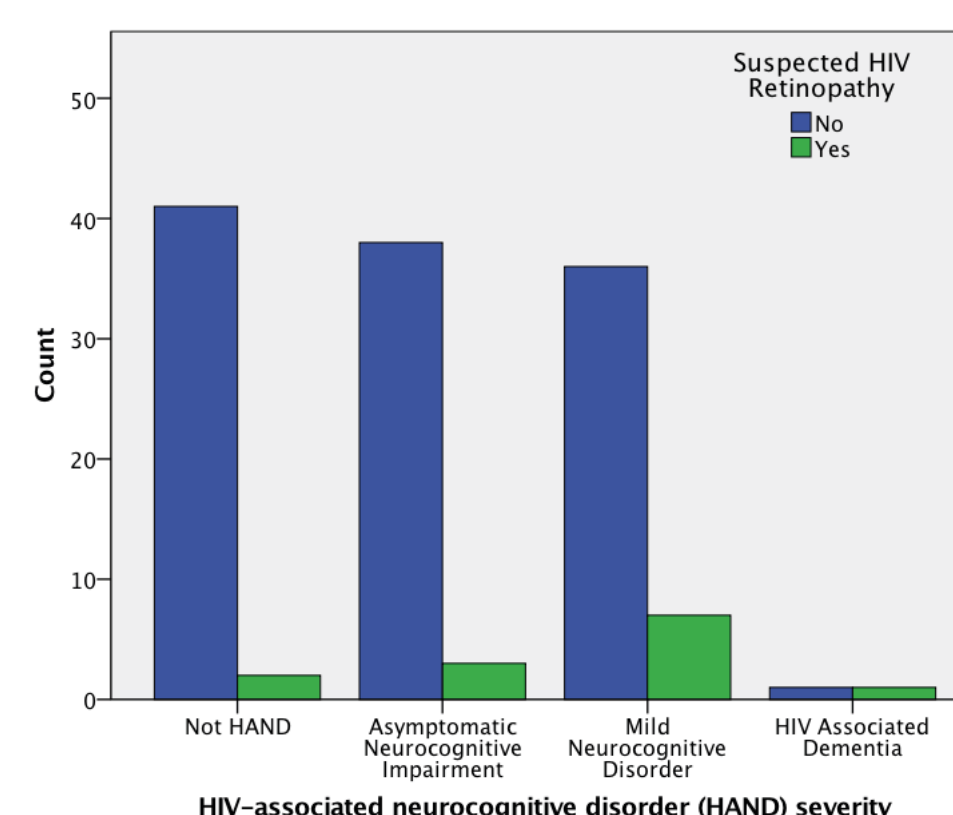


Figure 4: Bar chart of HIV-associated neurocognitive disorder divided by suspected HIV retinopathy

6. Conclusions and Future Work

- Ocular pathology appears very common in this setting.
- HAND were highly prevalence indicating substantial clinical need for low-resource HAND screening tools.
- Although retinal screening cannot be used alone to determine who might need assessment for HAND due to low sensitivity, prioritisation of individuals with abnormal retinal screening could be a potential strategy.

IMPACT

Since this study, the results have been communicated with Mawenzi Hospital. Arrangements are being made aiming to improve ease of access to care and increasing patient presentation through education. The first priority will be to ensure symptom awareness such as visual change. To assess the intervention's effect, a follow-up prevalence study is recommended in the next 5 years.

References:

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2. Clifford DB, Ances BM. HIV-associated neurocognitive disorder. *The Lancet Infectious Diseases.* 2013. doi:10.1016/S1473-3099(13)70269-X
3. Kellett-Wright J, Flatt A, Eaton P, et al. Screening for HIV-Associated Neurocognitive Disorder (HAND) in Adults Aged 50 and Over Attending a Government HIV Clinic in Kilimanjaro, Tanzania. Comparison of the International HIV Dementia Scale (IHDS) and IDEA Six Item Dementia Screen. *AIDS and Behavior.* 2020;(0123456789). doi:10.1007/s10461-020-02998-9

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