Background

• 9 million people living with HIV/AIDS (PLWH) in sub-Saharan Africa are taking antiretroviral therapy (ART), and over 20 million are expected to be on ART within the next decade.

• Expanded ART coverage is reducing morbidity and mortality from AIDS, and should encourage a refocus on the long term consequence of HIV on health, including chronic inflammation and cardiovascular disease.

• In high-income countries, HIV infection has been associated with increased cardiovascular risk and arterial stiffness, a strong predictor of future cardiovascular complications, but little is known about this relationship in sub-Saharan Africa.

• A high ankle-brachial index (ABI) is a marker of systemic, calcification-related arterial stiffness and has been correlated with increased risk of all-cause and cardiovascular mortality.

• In this study, we aim to assess vascular stiffness in HIV-infected and uninfected persons in rural Uganda and evaluate cardiovascular risk factors.

Objectives

1. Evaluate the association between HIV infection and arterial stiffness in rural Uganda.

2. Assess the effects of cardiovascular risk factors such as gender and smoking status on vascular stiffness.

Methods

• Cohort study in rural, southwestern Uganda
  - Group 1: HIV-infected persons on antiretroviral therapy at the Mbarara Regional Referral Hospital in Mbarara, Uganda
  - Group 2: Community-based, age and gender-matched HIV-uninfected persons enrolled from the clinic catchment area.

• Data collected on demographics, smoking history, CD4 count and viral load, and bilateral ankle-brachial index (ABI) measurements.

• Primary outcome of interest: elevated ABI>1.2, which is a surrogate marker of arterial stiffness that has been correlated with increased risk of all cause and cardiovascular mortality.

• Fit logistic regression models to estimate the associations between HIV infection and vascular stiffness. Models were adjusted for age, gender, smoking duration, and body mass index.

Results

• 105 PLWH and 100 HIV-uninfected participants were enrolled from November 2013 – October 2014.

• Median age: 50 years (IQR 46-53); 103 (51%) were female, with no differences by HIV status.

• Higher proportion of HIV-uninfected persons were current or former smokers, but the difference was not statistically significant (50% versus 36%, P=0.06).

Table 1. Demographic characteristics of HIV-infected participants and controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>HIV-infected (n=105)</th>
<th>Controls (n=100)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>49 (45-51)</td>
<td>50 (46-54)</td>
<td>0.06</td>
</tr>
<tr>
<td>Female (%)</td>
<td>51</td>
<td>50</td>
<td>0.84</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22.8±4</td>
<td>22.9±5</td>
<td>0.47</td>
</tr>
<tr>
<td>Current or former smoker (%)</td>
<td>36</td>
<td>50</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Figure 1. An Ugandan research assistant conducting an ankle-brachial measurement on a study participant.
HIV infection and vascular stiffness among older-adults taking antiretroviral therapy in rural Uganda

Mark J. Siedner, MD MPH,1 June-Ho Kim, AB,2 Jessica E. Haberer, MD MS,1 Jeffrey N. Martin, MD,3 Yap Boum II, MD,4 Alexander C. Tsai MD PhD,2 Peter Hunt, MD,3 David R. Bangsberg, MD MPH1

1Massachusetts General Hospital, Boston, MA, USA; 2Johns Hopkins University School of Medicine, Baltimore, MD, USA; 3University of California, San Francisco, San Francisco, CA, USA; 4Epicentra, Mbarara, Uganda

Prevalence of vascular stiffness (ABI>1.2) was 27/105 (26%) among PLWH and 10/100 (10%) in the matched control group (P=0.003, Figure 2), and only one participant had an ABI<0.9.

In univariable models, female gender (OR 0.34, 95%CI 0.16 – 0.74, P=0.01) was significantly associated with vascular stiffness and each cumulative year of smoking was marginally associated (OR 1.04, 95%CI 1.00– 1.08, P=0.09).

In multivariable logistic regression models, HIV infection was associated with increased odds of vascular stiffness (AOR 3.64, 95%CI 1.57 – 8.43, P=0.003).

In rural southwestern Uganda, vascular stiffness is associated with HIV infection, independent of other cardiovascular disease risk factors.

The relationship between HIV infection and arterial stiffness appeared to be more pronounced in women than men.

HIV infection may contribute to arterial stiffness through altered immune function, endothelial dysfunction, direct infection of the arterial smooth muscle cells, ART effects, or an elevated inflammatory state. Future research should help better elucidate these mechanisms.

Increased attention to cardiovascular disease risk and morbidity among PLWH in sub-Saharan Africa should be prioritized.

Results cont’d

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Discussion

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References


