HIV infection independently associated with chronic kidney disease and mild glomerular hyperfiltration, particularly in those of African descent

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Introduction

Background

HIV infected individuals are at increased risk of chronic kidney disease (CKD).1 Traditional risk factors as well as those related to HIV infection and exposure to antiretroviral therapy (ART), particularly tenofovir disoproxil fumarate (TDF), may all contribute.2

Methods

Study population

HIV-1 infected and uninfected AGEhIV Cohort Study participants, aged ≥45 yrs.

Aims

To cross-sectionally compare the prevalence of a low estimated glomerular filtration rate (eGFR), albuminuria and proximal renal tubular dysfunction (PRTD) between HIV-infected and uninfected study participants.

To compare longitudinal eGFR decline during a follow-up up to 4 years (baseline, 2 biennial study visits) in HIV-infected individuals on cART.

Definitions

Low eGFR: eGFR below 60 ml/min, calculated using the CKD Epidemiology Collaboration formula

Albuminuria: urine albumin-creatinine ratio >3mg/mmol

PRTD: urine retinol-binding protein:creatinine ratio >2.93µg/mmol and/or fractional phosphate excretion >20% with plasma phosphate <0.8 mmol/L

Statistical analyses

Multivariable logistic and linear regression analyses: to assess independent associations between HIV-status and a low eGFR, albuminuria and PRTD, adjusting for traditional CKD risk factors (listed below).

Linear mixed effects models to estimate eGFR decline over 4 year follow-up.

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Results

Baseline characteristics

HIV-infected, n=596 HIV-uninfected, n=544

% or median (IQR) % or median (IQR)

age, years 52.7 (48.3 – 59.4) 52.1 (47.9 – 58.1)

male gender 87.9% 84.7%

African descent1 14.3% 6.4%

current / past smoking 32.1% / 35.1% 24.8% / 38.9%

chronic HCV infection2 3.5% 1.1%

diabetes mellitus3 6.7% 4.8%

hypertension4 50.2% 37.3%

LDL-C, mmol/L / using statin 3.1 (2.5 – 3.7) / 14.1% 3.3 (2.7 – 3.9) / 7.8%

using cART 95.0%

regimen containing TDF 73.3%

Conclusion

In this cohort of middle-aged HIV-positive and HIV-negative individuals, the majority on TDF containing ART, HIV was independently associated with prevalent low eGFR, albuminuria and proximal renal tubular dysfunction. Both very low and high eGFR values were more common in HIV-positive individuals, with higher eGFR particularly associated with being of African descent. This could be an expression of glomerular hyperfiltration, a condition associated with increased risk for CKD development. This suggests that HIV-positive individuals of African descent might be at increased risk to progress towards CKD despite currently having high eGFR.

Furthermore, treated HIV infection was independently associated with greater eGFR decline during a follow-up period up to 4 years. To a large extent, the high prevalence and progression of CKD may be due to the frequent and long-term use of TDF in this population.