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Chronic Kidney Disease and Human Immunodeficiency Virus. A cross-sectional study in a resource limited setting in Lilongwe, Malawi to determine prevalence, associations and methods of determination.

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Chronic kidney disease (CKD) poses a major health threat to people all over the world, especially in combination with other chronic diseases, such as other noncommunicable diseases (NCDs) and human immunodeficiency virus (HIV). HIV can affect renal function via direct infection or as a side effect of antiretroviral treatment. Widespread schistosomiasis constitutes an additional risk factor for the acquisition of CKD and HIV. Despite these prevailing risks in Malawi, a country particularly impacted by HIV as well as NCDs as hypertension and diabetes, research about the prevalence of CKD is scarce. Assessment of renal function is often performed with a serum-creatinine or serum-cystatin C-based equation and the measurement of proteinuria. However, there are several equations with different adjustment factors, all of which were evaluated in an environment not comparable to the study. This study assessed different glomerular filtration rate (GFR) equations and estimated the prevalence of CKD in an urban Malawian population, both HIV-positive and -negative.

A cross-sectional study was conducted at an HIV-testing and counselling centre in Lilongwe, Malawi between the 24th of January 2012 and the 29th of March 2012. All clients ≥ 18 years were invited to participate in the study. Following informed consent, a questionnaire-based interview about the current medical situation as well as medical history was completed. Blood pressure, body weight and height were measured, and a urine and blood sample obtained. Proteinuria analysed with dipstick and albumin/creatinine ratio, and serum-creatinine and cystatin C as well as serological tests for schistosomiasis were performed. The Cockcroft-Gault, the MDRD-4 and the CKD-EPI equation, all serum-creatinine based for estimating glomerular filtration rate, were assessed in comparison to the cystatin C-based equation by van Deventer et al.. Renal impairment was classified according to the matching CKD stages by the Kidney Disease Outcomes Quality Initiative using estimated glomerular filtration rate (eGFR) and albumin/creatinine ratio. Schistosomiasis serology was performed using enzyme-linked

immunosorbent assay and parenchymal and focal indirect immunofluorescence assays. Descriptive analysis was conducted and associations with chronic kidney disease and differences between HIV-positive and -negative study participants assessed.

Between January and March 2012, 366 clients consented to participate in the study out of which 363 were included in the final analysis. Reasons for exclusion were the previous use of antiretroviral therapy or missing samples. Prevalence of renal impairment corresponding with CKD stages 2-5 was 7.4%, respectively 3% for CKD stages 3-5. There was a significant difference between the prevalence of renal impairment (CKD stages) between HIV-positive and HIV-negative individuals, with 15.5% of the HIV-positive clients classified as CKD 2-5 compared to 3.6% among HIV-negative clients. Other than HIV, age, hypertension (22% reported or measured) and diabetes (4.4%) were significantly associated with CKD in the study sample. Regarding schistosomiasis as a risk factor, 34% of the participants (63.4% male) had a positive schistosomiasis serology indicating at least prior exposure.

Evaluating the creatinine-based equations for eGFR versus the cystatin C-based equation revealed the best performance for the CKD-EPI equation without applying the factor for black Americans. EGFR of HIV-positives was however significantly overestimated/higher compared to the results reached by cystatin C-based equations and could therefore result in underestimating CKD prevalence.

In summary, this study confirms that the prevalence of renal impairment in HIV-positive individuals in Malawi is higher than in the general population and needs to be monitored especially in presence of additional underlying risk factors like diabetes, hypertension or older age. A cystatin C-based equation for GFR estimation would be preferable. However, cystatin C assessment is considerably more expensive than creatinine assessment and therefore rarely used in resource limited health settings. Therefore, the CKD-EPI equation without the factor for black Americans could be used in settings comparable to this study and a second tests using a cystatin C-based equation could be used in HIV-positive individuals classified as CKD 2 and 3 to reduce misclassification. In order to improve care for patients with several chronic diseases such as HIV and CKD, it would be desirable to also integrate care for HIV and NCDs, as is already established for tuberculosis and reproductive health.