Journal of Microbiology, Immunology and Infection (2015) 48, 256–262

Available online at www.sciencedirect.com

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ORIGINAL ARTICLE

Prevalence of and associated factors with chronic kidney disease in human immunodeficiency virus-infected patients in Taiwan

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Received 3 April 2013; received in revised form 7 August 2013; accepted 27 August 2013
Available online 8 October 2013

KEYWORDS
Chronic kidney disease;

Background: Chronic kidney disease (CKD) is an important issue for individuals who live with human immunodeficiency virus (HIV) following the use of highly active antiretroviral therapy; however, the prevalence rate of CKD varies between countries.
Methods: The present study screened HIV-infected patients in a medical center and a regional teaching hospital in southern Taiwan from January 2008 to December 2012. CKD was defined as

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http://dx.doi.org/10.1016/j.jmii.2013.08.013

Human immunodeficiency virus;
Prevalence

a urine microalbumin-to-creatinine ratio ≥30 mg/g, and/or a protein ≥1 + on urine dipstick examination, and/or an estimated glomerular filtration rate <60 mL/min/1.73 m^2 for 3 months. The prevalence rate and the analyzed associated factors of CKD were determined.
Results: Among 1639 HIV-infected patients, only 512 had adequate data to be enrolled in the study. Thirty-six (7.03%) of these patients had CKD, and 476 did not. In a univariate analysis, CKD was associated with an older age, a higher peak HIV RNA load, diabetes mellitus (DM), hypertension, exposure to antiretroviral therapy, and cholesterol levels ≥240 mg/dL. Multivariate analysis revealed that DM, hypertension, and cholesterol ≥240 mg/dL were statistically significant factors.
Conclusion: In Taiwan, the prevalence of CKD in HIV-infected patients was low (7.03%). The classical risk factors for CKD, such as DM, hypertension, and hypercholesterolemia, were demonstrated to be associated with CKD in Taiwanese HIV-infected patients.

Introduction

Following the introduction of the wide use of highly active antiretroviral therapies (ARTs), the median survival of human immunodeficiency virus (HIV)-infected patients has increased remarkably, and the outcome of renal complications, such as the risk of end-stage renal disease and 1-year survival in patients with dialysis, also improved.[1–3] Despite this improvement, chronic kidney disease (CKD) is an important issue in managing HIV-infected patients due to the associated higher mortality rate.[4] The literature states that CKD in HIV-infected patients results from various factors, including HIV-associated nephropathy, severe HIV infection, black ethnicity, diabetes mellitus (DM), hypertension, and aging.[3,5] Although highly active ART can reduce HIV-associated nephropathy, nearly all antiretroviral drugs have been reported to cause renal dysfunction.[3] The most notable antiretroviral drugs to be associated with renal disease have been indinavir and tenofovir.[3] Regular urinalyses are recommended in the USA and Europe.[5,6] The prevalence of CKD in HIV-infected patients ranges from 3% to 38% in different races and countries.[7–11] Among the different races, African Americans have been determined to be more prone to develop CKD and end-stage renal disease.[12,13] The prevalence of CKD in the general Taiwanese population was found to be 11.93%, with CKD cases having a higher mortality rate and cardiovascular disease risk.[14] However, the data for CKD in Taiwanese HIV-infected patients are lacking. We conducted a study to evaluate the prevalence and associated factors of CKD in HIV-infected patients in Taiwan.

Materials and methods

Study population

This was a retrospective cross-sectional study. The data were collected from HIV-infected patients who were followed in a medical center and a regional teaching hospital in southern Taiwan. In the medical center, the study period was from January 2008 to December 2012; in the regional teaching hospital, the study period was from January 2010 to December 2012. The present study was approved by the Institutional Review Board of Kaohsiung Medical University Hospital; registration number, KMUHIRB-20120020.

Definitions

The CKD diagnostic criteria were defined as a urine microalbumin-to-creatinine ratio (ACR) ≥30 mg/g, and/or a protein ≥1 + on urine dipstick examination, and/or an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m^2 persisting for at least 3 months.[15] The estimated glomerular filtration rate was calculated using the simplified modification of diet in renal disease formula.[16] The CKD cases were classified into five stages according to the eGFR level. The eGFRs for Stage 1 to Stage 5 were defined as follows: ≥90 mL/min/1.73 m^2; 60–89 mL/min/1.73 m^2; 30–59 mL/min/1.73 m^2; 15–29 mL/min/1.73 m^2; and <15 mL/min/1.73 m^2 or dialysis.[15] The patients who did not meet any given diagnostic criterion were defined as non-CKD. The method to determine urine microalbumin was tested by conjugation of specific antigen and urine microalbumin, and detected by the Synchron System (Beckman Coulter, Pasadena, CA, USA).

Each patient's characteristics were also recorded, including the following metrics: age; sex; body weight; serum creatinine; DM status; hypertension; hepatitis B and C infection status; cholesterol level; triglycerides; high- and low-density lipoprotein levels; HbA1c level; the duration of HIV infection; the peak HIV RNA load and the CD4 cell count nadir following the diagnosis of HIV infection; and the exposure to ARTs. DM was defined as a diagnosis of DM previously, or use of oral antidiabetic agents or insulin. Hypertension was defined as a systolic blood pressure >140 mmHg and/or a diastolic blood pressure >90 mmHg, or use of antihypertensive agents. Hepatitis B infection was defined as being positive for the surface antigen, and hepatitis C (HCV) infection was defined as being anti-HCV antibody-positive. The lipid profiles were recorded as cholesterol ≥240 mg/dL, high-density lipoprotein <40 mg/dL,[17] triglycerides >150 mg/dL, and low-density lipoprotein >130 mg/dL.

Exposure to ART was defined as exposure to ART for at least 3 months. The exposure to each antiretroviral drug