Chronic kidney disease in HIV patients

S Bakri¹, H Rasyid¹, H Kasim¹ and S Katu²

¹Nephrology and Hypertension Division, Department of Internal Medicine, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
²Tropical Infection Division, Department of Internal Medicine, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia

Abstract. Chronic kidney disease (CKD) is a health problem in human immunodeficiency virus (HIV) population. Prediction of CKD in HIV patients need to be done. This study aims to identify the prevalence of CKD in HIV patients. This is a cross-sectional study of male and female, age 18-60 years old, diagnosed HIV at Wahidin Sudirohusodo & Hasanuddin University Hospital Makassar. Diagnosed as CKD if estimated glomerular filtration rate (eGFR) <60ml/min/1.73m² and/or microalbuminuria (MA) is found. Total of 86 HIV patients included in the analyses. Distribution of CKD, showed 3 (3.5%) subjects with eGFR<60mL/min/1.73m². Based on CKD stage, 2 (2.3%) subjects in stage 3a and 1 (1.2%) subject in stage 4. If all of the subjects were grouped according to MA criteria only, eGFR<60mL/min/1.73m² only and MA with eGFR<60mL/min/1.73m², we found 2 (2.3%) subjects with eGFR<60mL/min/1.73m² & MA, 1 (1.2%) subject with eGFR<60mL/min/1.73m² & MA, and 32 (37.2%) subjects with eGFR ≥60mL/min/1.73m² & MA. We concluded that the prevalence of CKD in HIV populations in Makassar is still quite low.

1. Introduction

Human immunodeficiency virus (HIV) is a virus that attacks the human immune system. HIV has infected more than 60 million people worldwide.[1] In Indonesia, HIV spread in 368 out of 497 districts/cities across the province. Indonesia is the third country in the world that has the highest number of people with HIV infected as many as 640,000 people, after China and India. According to data from the Joint United Nations Program on HIV and AIDS (UNAIDS), in Indonesia, there are about 690,000 people living with HIV until 2015.[2]

Chronic Kidney disease (CKD) is a health problem in HIV-infected populations that characterized by high prevalence of CKD in HIV patients.[3] Several cross-sectional studies have shown that kidney function decline in HIV-infected patients ranges from 4-17%.[4]

Previous epidemiological studies have shown that the independent risk factors for CKD events in HIV-infected patients include old age, hypertension, and diabetes mellitus (DM).[5] Some experimental studies also show that HIV-infected patients typically have at least one or more risk factors for CKD. Ando et al.[3] conducted a prospective cohort study of 623 HIV-infected subjects in Tokyo, Japan, and found that 18 subjects (2.9%) developed into CKD after 1-year follow-up. In multivariate logistic regression analysis, five variables independently associated with CKD in HIV-infected patients (LFG <90 ml/min/1.73m²) proteinuria, diabetes, age (≥50 years old) and CD4 cell counts (< 200 cells/µl).
There is a strong correlation of CKD with poor clinical outcomes in HIV patients that requiring identification and the need for the early diagnosis to determine therapy. Therefore, predicting the prevalence of CKD in HIV patients are expected to play a role in slowing the progression of kidney function decline and reducing the risk of cardiovascular disease. Early detection and diagnosis of CKD in HIV patients are very important to prevent and to slow the progression of kidney function decline, thus improving the clinical outcome of HIV-infected patients. Kidney Disease Improving Global Outcomes (KDIGO) defined CKD if there is a finding of albuminuria and estimated glomerular filtration rate (eGFR)<60 mL/min/1.73 m² that lasting >3 months. This study aimed to identify the prevalence of CKD in HIV patients.

2. Methods
This study was a cross-sectional study conducted in Wahidin Sudirohusodo& Hasanuddin University Hospital Makassar from January 2017 to August 2017. Subjects in this study area subject that meets the inclusion criteria (men or women with HIV positive, aged 18-60 years old, willing to participate in this study). Sampling was done by consecutive sampling. Total of 86 HIV patients included in the analyses.

Diagnosis of HIV established by anti-HIV testing results; with rapid tests or with ELISA that is showing positive results (3 times of examination). Diagnosed as CKD if eGFR<60 ml/min/1.73m² and/or MA is found. Classification of CKD stage based on eGFR is divided into 5 stages; Stage 1 if eGFR ≥90mL/min/1.73m², stage 2 if eGFR 60-89mL/min/1.73m², stage 3a if eGFR 45-59mL/min/1.73m², stage 3b if eGFR 30-44mL/min/1.73m², stage 4 if eGFR 15-29mL/min/1.73m² and stage 5 if eGFR<15mL/min/1.73m² or undergoing dialysis or renal transplantation.

Urine albumin excretion rate is the amount of albumin excreted through the kidney units of time, measured by ACR. Categorized normoalbuminuria (NA) if ACR <30mg albumin/g creatinine, MA if ACR 30-300mg albumin/g of creatinine and macroalbuminuria if ACR is>300mg of albumin/g creatinine. Data analysis was done using SPSS version 20.

3. Results
During the study period, there were 86 subjects who met the inclusion criteria. Characteristics of subjects were in table 1.

| Variable | Category | n  | %   | Range  | Mean ± SD |
|----------|----------|----|-----|--------|-----------|
| Sex      | Men      | 61 | 70.9| 21 – 60| 34 ± 8.4  |
|          | Women    | 25 | 29.1|        |           |
| Age (Years) | 20-29  | 22 | 25.6|        |           |
|          | 30-39    | 47 | 54.6|        |           |
|          | 40-49    | 12 | 14.0|        |           |
|          | 50-60    | 5  | 5.8 |        |           |
| BMI (kg/m²) | <18.5  | 18 | 20.9| 13.8 – 42.1 | 21 ± 3.8 |
|          | 18.5-24.9| 60 | 69.8|        |           |
|          | ≥25.0    | 8  | 9.3 |        |           |
| SBP (mmHg) | <130    | 73 | 84.9| 90 – 160| 115 ± 11.2|
|          | 130-139  | 12 | 14.0|        |           |
|          | ≥140     | 1  | 1.1 |        |           |

BMI: Body Mass Index
SBP: Systolic Blood Pressure
SD: standard deviation

Distribution of CKD in 86 subjects showed 3 (3.5%) subjects with eGFR<60mL/min/1.73m², and 83 (96.5%) subjects with eGFR ≥60mL/min/1.73m² (Table 2).
Distribution of subjects based on CKD stage showed that 72 (83.7%) subjects diagnosed with CKD stage 1, 11 (12.8%) subjects diagnosed with CKD stage 2, 2 (2.3%) subjects diagnosed with CKD stage 3a, 1 (1.2%) subject diagnosed with CKD stage 4 and subjects neither diagnosed with CKD stage 3b nor stage 5 (Table 3).

The distribution of urine albumin excretion rate showed that in 86 subjects, 53 (61.6%) subjects with NA, 33 (38.4%) subjects with MA, and no subjects with macroalbuminuria (Table 4).

If the subjects in this study were grouped based on MA criteria alone, eGFR<60mL/min/1.73m² alone and MA with eGFR<60mL/min/1.73m², found that 2 (2.3%) subjects with eGFR<60mL/min/1.73m² were with NA, 1 (1.2%) subjects with eGFR<60mL/min/1.73m² were with MA and 32 (37.2%) subjects with eGFR ≥60mL/min/1.73m² were with MA (Table 5).

### Table 2. Distribution of CKD in HIV patients.

| Category | n  | %  |
|----------|----|----|
| eGFR<60  | 3  | 3.5|
| eGFR≥60  | 83 | 96.5|

eGFR: glomerular filtration rate estimated

### Table 3. Subjects distribution based on CKD stage.

| CKD Classification | N | %  |
|--------------------|---|----|
| Stage 1            | 72| 83.7|
| Stage 2            | 11| 12.8|
| Stage 3a           | 2 | 2.3|
| Stage 3b           | 0 | 0.0|
| Stage 4            | 1 | 1.2|
| Stage 5            | 0 | 0.0|

CKD: Chronic Kidney Disease

### Table 4. Distribution of urine albumin excretion.

| ACR          | N | %  |
|--------------|---|----|
| NA           | 53| 61.6|
| MA           | 33| 38.4|
| Macroalbuminuria | 0 | 0.0|

NA: normoalbuminuria  
MA: microalbuminuria  
ACR: albumin creatinine ratio

### Table 5. Distribution of CKD based on MA and eGFR.

| Category | N  | %  |
|----------|----|----|
| eGFR<60 + NA | 2 | 2.3|
| eGFR<60 + MA | 1 | 1.2|
| eGFR≥60 + MA | 32| 37.2|

eGFR: Glomerular Filtration Rate Estimated  
NA: normoalbuminuria  
MA: microalbuminuria
4. Discussion

CKD is a health problem in HIV-infected populations characterized by high prevalence of CKD in HIV patients. Several cross-sectional studies have shown that kidney function decline in HIV-infected patients ranges from 4-17%. [4]

Previous epidemiological studies have shown that independent risk factors for CKD in HIV-infected patients include old age, hypertension, and diabetes mellitus (DM). [3] Experimental studies also show that HIV-infected patients typically have at least one or more risk factors for CKD. Ando et al. [3] conducted a prospective cohort study of 623 HIV-infected patients in Tokyo, Japan and found five independent variables that correlated with CKD prevalence in HIV-infected patients; LFG <90ml/min/1.73m$^2$ (p=0.0007; OR 12.6; 95% CI=7.81-23.9), proteinuria (p=0.0278; OR 6.14; 95% CI=2.34-28.9), history of diabetes mellitus (p=0.0037; OR 2.40; 95% CI=1.03-7.22) and CD4 cell count (<200cells/μl) (p=0.0466; OR 2.21; 95% CI=1.01-5.14).

In this study, the distribution of CKD prevalence in 86 subjects, showed 3 (3.5%) subjects with eGFR<60mL/min/1.73m$^2$ and 83 (96.5%) subjects with eGFR≥60mL/min/1.73m$^2$ (Table 2). The distribution of urine albuminexcretion rates in 86 HIV subjects, 53 (61.6%) subjects were NA, 33 (38.4%) subjects were MA and no subjects with macroalbuminuria (Table 4).

Distribution of CKD based on CKD stage showed that 72 (83.7%) subjects were in CKD stage 1, 11 (12.8%) subjects were in CKD stage 2, 2 (2.3%) subjects were in CKD stage 3a, only 1 (1.2 %) subject was in CKD stage 4 and neither subject with stage 3b nor stage 5 (Table 3).

In general population, proteinuria and the decreased of renal function will provide poor clinical outcomes. In HIV-infected patients, proteinuria and the decreased of renal function are correlated with rapid progress to acquired immune deficiency syndrome (AIDS) and death. The effect of CKD on mortality of HIV-infected patients increased with the decrease of renal function. [6] In this study the distribution of CKD prevalence based on MA and eGFR showed that 2 (2.3%) subjects with eGFR<60mL/min/1.73m$^2$ were accompanied with NA, 1 (1.2 %) subject with eGFR<60mL/min/1.73m$^2$ was accompanied with MA and 32 (37.2%) subjects with eGFR ≥60mL/min/1.73m$^2$ were accompanied with MA (Table 5).

Choi et al. [7] reported that HIV-infected patients with eGFR<15mL/min/1.73m$^2$ were six times more likely to die than HIV patients with eGFR>60mL/min/1.73m$^2$. Although almost one-third of HIV-infected patients have abnormalities of kidney function, several studies have shown that only a few individuals are known to have kidney disease. [3] Early detection and early diagnosis of CKD in HIV patients is essential to prevent and to slow the progression of kidney function decline, thus can improving the clinical outcome of HIV-infected patients.

5. Conclusion

The prevalence of Chronic Kidney Disease in HIV populations in Makassar is still quite low.

References

[1] World Health Organization 2007 WHO case definitions of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children (WHO Library Cataloguing in Publication Data) 146

[2] Kementerian Kesehatan RI 2012 Pedoman nasional tatalaksana klinis infeksi HIV dan terapi antiretroviral pada orang dewasa dan remaja catalog dalam terbitan kementerian kesehatan RI 194

[3] Ando M, Yanagisawa N, et al. 2011 A simple model for predicting incidence of chronic kidney disease in HIV-infected patients Clin. Exp. Nephrol. 15(2) 242-7

[4] Mocroft A, Kirk O, et al. 2007 Chronic renal failure among HIV-1-infected patients AIDS 21 1119–27

[5] Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group 2013 Clinical practice guideline for the evaluation and management of chronic kidney disease Kidney Int. 3 1–150
[6] Flandre P, Pugliese P, et al. 2011 Risk factors of chronic kidney disease in HIV-infected patients Clin. J. Am. Soc. Nephrol. 6(7) 1700-7
[7] Choi A I, Rodriguez R A, et al. 2007 Lower rates of antiretroviral therapy among HIV-infected patients with chronic kidney disease Clin. Infect. Dis. 45 1633–9