Prevalence and Factors of Chronic Kidney Disease

Seul Hyun Oh, M.D., Ha Yeon Kim, M.D., Chan Young Oak, M.D., Min Jee Kim, M.D., Chang Seong Kim, M.D., Joon Seok Choi, M.D., Hyung Chul Lee, M.D., Jeong Woo Park, M.D., Eun Hui Bae, M.D., Seong Kwon Ma, M.D., Nam Ho Kim, M.D., and Soo Wan Kim, M.D.

Department of Internal Medicine, Chonnam National University Medical School, Gwangju, Korea

Purpose: The prevalence of chronic kidney disease (CKD) is increasing. Accordingly, hospitalization and mortalities associated with CKD also have increased. The present study aimed to determine the prevalence of CKD, and explore the causative risk factors.

Methods: One thousand one hundred and forty-seven patients who underwent the mass health screening test at Chonnam National University Hospital between July 2007 and December 2007 were studied. The prevalence of CKD and possible risk factors such as gender, previous history of diabetes mellitus and hypertension, smoker status (current and ex-smoker), BMI, increased LDL cholesterol, triglyceride levels, HDL cholesterol level and anemia were analyzed.

Results: There were 631 male and 616 female subjects. Mean age was 48.6 years and mean glomerular filtration rate was 117.2±28.7 ml/min/1.73m². The prevalence of CKD was 10.3%, and the prevalence of advanced CKD (CKD stage 3-5) was 0.5%. The prevalence of advanced CKD was higher in subjects with diabetes. The awareness of CKD was very low. Factors independently associated with CKD were sex favoring men (odd ratio [OR], 2.106; 95% CI, 1.436-3.090), smoker (OR, 0.575; 95% CI, 0.382-0.867), DM (OR, 2.395; 95% CI, 1.338-4.286), inadequate blood sugar (OR, 2.536; 95% CI, 1.267-5.077), HDL<40 mg/dL (OR, 0.418; 95% CI, 0.191-0.915) in a univariate analysis. With a multivariate analysis, female gender (OR, 2.123; 95% CI, 1.209-3.730) was the only independent risk factor for CKD.

Conclusion: Since the CKD is a public health burden, closer attention is needed to prevent the CKD in the high-risk group.

Key Words: Prevalence, Factors, Kidney diseases

INTRODUCTION

Chronic kidney disease (CKD) is an escalating global public health problem that results in an increased prevalence of end-stage renal disease (ESRD) with its attendant problems of high cost and high mortality. This is a trend that may be worse in an aging population where chronic conditions such as diabetes and hypertension are more prevalent, leading to greater occurrence of kidney disease. The prevalence of CKD, thus, is expected to increase further because of the aging population and the continuing increase in the prevalence of diabetes. Indeed, growth rate of CKD prevalence is higher than that of population, and ranked in the top 10 of the world. The reduced glomerular filtration rate (GFR) in CKD patients is related to the high mortality rate, prevalence of hypertension and cardiovascular diseases. Early diagnosis and treatment
of renal damage due to hypertension and diabetes can reduce many complications of decreased GFR and reduce progression rate to ESRD. However, only few patients, who have a moderately decreased GFR, are aware of their renal diseases, and the effect of early diagnosis and treatment is not satisfactory.

There are few clinical studies of healthy subjects in Korea, so research and medical education quote other nations’ data. Though the Korean Society of Nephrology registers the CKD patients, there have been a few studies in our country in this field. Thus foreign countries’ data have been used, due to the lack of Korean data. The present study examined 1,251 patients who underwent the mass health screening test, and the prevalence of CKD, factors such as gender, previous history, diabetes mellitus and hypertension were analyzed.

**PATIENTS AND METHODS**

1. Subjects

One thousand one hundred and forty-seven patients who underwent the mass health screening test at Chonnam National University Hospital between July 2007 and December 2007 were enrolled.

2. Screening Protocol and Evaluation Criteria

Data were collected from electric medical record (EMR) in public health center of Chonnam National University Hospital. All subjects completed a questionnaire documenting their personal and family health history (e.g., hypertension, diabetes, and kidney disease), and life style behaviors (e.g., smoking, alcohol drinking). Anthropometric measurements were obtained. Indicators of kidney damage were examined. Blood and urinary samples were tested.

1) Proteinuria

Proteinuria was measured by using dipstick technique. Proteinuria was defined as +1 ≥ dipstick.

2) Hematuria

Urine samples were examined using subdued bright-field illumination at original magnifications under a light microscope. More than 3–5 red blood cells/high-power field were considered abnormal.

3) Estimated GFR

Blood was collected by means of a venipuncture after an overnight fast. Estimated GFR (eGFR) was calculated by using the estimating equation developed by the Modification of Diet in Renal Disease (MDRD) formula:

\[
186 \times \text{Serum Cr}^{-1.154} \times \text{age}^{-0.203} \times 0.742
\]

(if the subject is female). Decreased kidney function was defined as eGFR less than 60 ml/min/1.73m².

4) Hypertension and diabetes status

Blood pressure was measured once after 20–30 minutes resting. Hypertension was defined as systolic blood pressure (SBP) of 140 mmHg or greater, diastolic blood pressure (DBP) of 90 mmHg or greater, use of antihypertensive medications or hypertension history. Fasting blood glucose was checked. Diabetes was defined as fasting plasma glucose level of 126 mg/dL, use of diabetic medications or a previous diagnosis of diabetes. Inadequate BP was defined as an SBP of ≥140 mmHg or DBP of ≥90 mmHg. Inadequate blood sugar (BS) was defined as a fasting plasma glucose level over 126 mg/dL.

5) Others

Serum total cholesterol, low-density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL), and triglycerides were measured. CKD was defined as the presence of renal damage or eGFR <60 ml/min/1.73m². The stage of CKD was classified as follows: group 1: GFR ≥60 ml/min/1.73m² and renal damage, group 2: GFR 15–59 ml/min/1.73m², and group 3: GFR <15 ml/min/1.73m² or dialysis. Advanced CKD was defined as CKD group 2 and group 3. Body