Asian Nursing Research 8 (2014) 8–14

Contents lists available at ScienceDirect

Asian Nursing Research

journal homepage: www.asian-nursingresearch.com

Research Article

Health Behaviors and Risk Factors Associated with Chronic Kidney Disease in Korean Patients with Diabetes: The Fourth Korean National Health and Nutritional Examination Survey

Suk Jeong Lee, PhD, RN,[1] Chae Weon Chung, PhD, RN[2,*]

[1] Red Cross College of Nursing, Chung-Ang University (CAU), CAU Health Care System, Seoul, South Korea
[2] College of Nursing, Research Institute of Nursing Science, Seoul National University, Seoul, South Korea

ARTICLE INFO

Article history:
Received 2 March 2013
Received in revised form
23 July 2013
Accepted 4 September 2013

Keywords:
chronic kidney diseases
diabetes mellitus
health behavior
kidney diseases
nursing

SUMMARY

Purpose: The purpose of this study was to identify health behavior and risk factors for chronic kidney disease (CKD) in Korean patients with diabetes.
Methods: This study was a secondary analysis of the Fourth Korean National Health and Nutritional Examination Survey (2007–2009). Of the 24,871 participants, 1,239 aged over 19 years with diagnosis of diabetes were included. Stratified and cluster variables in the analysis-plan file for a weighted, complex sample were analyzed. CKD was confirmed by the estimated glomerular filtration rate level of 15.0 –59.9 mL/min/1.732 m^2. Odds ratios between the variables and CKD were calculated using logistic regression analysis with adjustment for gender, age, educational background, income, and duration of diagnosis.
Results: The results showed that 14.7% of participants with diabetes were accompanied with CKD. The risk of developing CKD in those who made efforts to take proper nutrition but failed was 1.76 times higher than those taking nutrition properly. In those who used to smoke compared to their nonsmoking counterparts, the risk was 2.06 times higher; in those who did not do vigorous exercise compared to those who did, the risk was 2.12 times higher; in those with hypertension than those without, the risk was 2.4 times higher; and in those with anemia compared to those without, the risk was 2.32 times higher. Only 19% of the participants received health education for diabetes, which did not affect the incidence of CKD.
Conclusion: Since renal functions are affected by lifestyle factors, it is critical for healthcare professionals to provide diabetic patients with health education focused on changing their behavior so that it is conducive to health. It is also necessary to consider that diabetes education should be made more available and provided more effectively to these patients.

Introduction

The prevalence rate of diabetes mellitus (DM) has increased rapidly worldwide. Without proper treatment and management, DM can cause many serious complications. Some of the major long-term complications of DM include chronic kidney disease (CKD) or renal failure, cardiovascular disease, and retinal damage by prolonged high blood glucose and glucose absorption. The onset and progression of CKD is much more rapid in patients with DM than those without (Iseki, 2005). The prevalence of CKD in Korean DM patients at initial diagnosis is less than 10%, but it increases to 25% in the 20 years after the initial diagnosis (Ha, 2005). Moreover, the risk of mortality in patients with CKD is 5–10 times as high as that in non-CKD patients, and the prevalence of cardiovascular diseases in patients with CKD is twice as high as that in non-CKD patients (Collins et al., 2003; Go, Chertow, Fan, McCulloch, & Hsu, 2004). Patients even in the early stages of CKD have high prevalence and mortality rates of comorbidities (Go et al.).

CKD in DM patients is the leading cause of end-stage renal disease (ESRD) and accounts for approximately 40% of new cases of ESRD annually (Barrett, 2003). Early detection and treatment of CKD in patients with DM, therefore, can prevent or lower the progress to ESRD. Previous studies have reported that lifestyle factors such as smoking, exercise, obesity, and diet, played a major role in aggravating DM and leading to CKD (Goudswaard, Stolk, Zuithoff, de Valk, & Rutten, 2004; Norris, Lau, Smith, Schmid, &

* Correspondence to: Chae Weon Chung, PhD, RN, College of Nursing, Seoul National University, 103 Daehak-ro, Jongno-gu, Seoul 110-799, South Korea.
E-mail address: chungcw@snu.ac.kr

1976-1317/$ – see front matter
http://dx.doi.org/10.1016/j.anr.2013.11.001

Engelgau, 2002). Currently, a diversity of educational programs focused on behavioral change in DM has been reported; the effectiveness of the programs in terms of the improvement in self-help skills in patients with DM and the decrease in developing serious complications of DM has been shown by Lee et al. (2003). Educational intervention for patients nearing renal replacement therapy improved health outcomes substantially, including delaying the initiation of dialysis therapy and increasing overall survival rates (Devins, Mendelssohn Barre, & Binik, 2003; Devins, Mendelssohn, Barre, Taib, & Binik, 2005). Clinical parameters such as hyperglycemia, elevated blood pressure, elevated plasma lipid, and anemia serve as the major indicators of risk factors for CKD in patients with DM (Beauvieux, Moigen, Lasseur, Raffaitin, & Permoine, 2007; Lou et al., 2012).

Therefore, patients with DM should know how to take care of the disease all by themselves as well as maintain self-management skills, including compliance with the medical regimen properly on a daily basis. Although there have been a number of studies on complications of DM, CKD in patients with DM has not been largely investigated in Korea. A few studies examined the relationships between risk factors and CKD among patients with DM, but the data in those studies were limited to having a convenient sampling of participants, or of small numbers of participants (Lou et al., 2012; Yeo, 2009). Considering the lack of replicability or generalizability of the existing studies, this study used a representative sample of the national data in order to come up with a more generalizable and reliable understanding of Korean patients with DM.

Therefore, the purposes of this study were as follows: (a) To identify kidney functions according to sociodemographic characteristics and health behaviors of patients with DM in Korea; (b) to estimate clinical parameters related to DM and estimated glomerular filtration rate (eGFR) in Korean patients with DM; and (c) to identify the relationship between the heath behavior and the risk factors associated with CKD in Korean patients with DM.

Methods

Study design

This study was a secondary analysis design using population-based data from a nationwide cross-sectional health survey.

Setting and sample

The data from the Fourth Korean National Health and Nutritional Examination Survey (KNHANES) between 2007 and 2009 was collected by the Korea Center for Disease Control and Prevention. The data included a random sample of 24,871 Koreans. The survey was conducted with a stratified, multi-stage, clustered probability design in order to select a representative sample of the noninstitutionalized population in Korea. Of the 1,330 participants who were diagnosed with DM, 1,239 were included in this study. Those who were under the age of 19 ($n = 6$), had no blood test results ($n = 79$), or developed advanced renal dysfunction with a clinical value of eGFR less than 15.0 mL/min/1.732 m^2 ($n = 6$) were excluded from this study.

Ethical consideration

This study did not need the approval of the institutional review board because the analyzed survey data are publicly available. In addition, permission was obtained from the Korea Center for Disease Control and Prevention to use the data before this study was conducted.

Measurement and data collection

Estimated GFR was calculated using the original modification of diet in renal disease equation as follows: eGFR = 186.3 × (serum creatinine) − 1.154 × age − 0.203 × 0.742 (if female) (Levey et al., 2003). Based on the clinical values of eGFR, the participants in this study were divided into three groups: those having a normal level of eGFR (≥90.0 mL/min/1.732 m^2), those having a lowered level of eGFR (60.0–89.9 mL/min/1.732 m^2), and those having the lowest level of eGFR (15.0–59.9 mL/min/1.732 m^2). By definition, CKD was diagnosed by demonstrating an eGFR level between 15.0 mL/min/1.732 m^2 and 59.9 mL/min/1.732 m^2.

Sociodemographic characteristics in this study included gender, age (19–40 years, 41–64 years, & >65 years), educational background (< middle school education, middle school graduates, high school graduates, & ≥ college graduates), and monthly income (low, middle, & high).

In order to collect the participants' self-perceived health status, this study used a 5-point Likert-type scale ranging from 1 (*very poor*) to 5 (*very good*) in response to "How do you assess your own health status?" At the time when the national survey was conducted, physical examinations of the participants were conducted by trained investigators, following a standardized procedure. Body weight and height of the participants were measured for BMI values. BMIs are calculated as the weight divided by height squared (kg/m^2). The participants were classified into three groups: those with the BMI values of <18.5 kg/m^2, 18.5–24.9 kg/m^2, and ≥25.0 kg/m^2. Obesity was defined as having a BMI of over 25.0 kg/m^2.

DM-related characteristics were also divided into four groups based on the length of time being diagnosed with DM, which included those ≤2 years, 3–5 years, 6–10 years, and ≥11 years. The participants were divided into four groups based on the type of treatment for DM, including those with medication-free regimen, with hypoglycemic or oral antidiabetic drugs (OADs), insulin, and both OAD and insulin. Patients with comorbidity in this study, defined as those having one or more diseases in addition to DM, included those with hypertension, hyperlipidemia, ischemic heart disease (IHD) and anemia. Anemia was diagnosed when male patients had a hemoglobin (Hb) level of less than 13 mg/dL, while female patients had a level of less than 12 mg/dL. Patients with proteinuria were categorized into three groups: having a negative, mild (trace–1), or heavy (≥2) level of protein released in urine as measured by the urinalysis stick, or dipstick.

Clinical parameters for blood profiles and blood pressure were measured. For the glucose tolerance test, blood sample was taken from the antecubital vein of the participants 12 hours after overnight fasting. Fasting plasma glucose, hemoglobin A1c (HbA1c), Hb, serum creatinine, and blood urea nitrogen (BUN) were measured using the Hitachi 7600-110 Chemistry Analyzer (Hitachi Ltd., Tokyo, Japan). Blood pressure was measured using a sphygmomanometer after having participants rest for 10 minutes in a sitting position.

Data for health behavior of the participants were collected with a questionnaire on health. Health behaviors included eating, drinking, smoking, and exercise. Specifically, exercise with moderate intensity, which were defined as physical exercise causing a slight increase in heart rates, included table tennis, swimming, yoga, and badminton, while walking was excluded in this category. Data on the participants' experience of receiving health education for DM were also collected by the question, "Have you ever had education for managing DM given by doctors or nurses at places like a clinic, hospital, or health center?" Consultation for the disease that lasted for less than 10 minutes was excluded from the category.