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ORIGINAL ARTICLE

Prevalence of Chronic Kidney Disease in an Adult Population

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Background and Aims. One strategy to prevent and manage chronic kidney disease (CKD) is to offer screening programs. The aim of this study was to determine the percentage prevalence and risk factors of CKD in a screening program performed in an adult general population.

Methods. This is a cross-sectional study. Six-hundred ten adults (73% women, age 51 ± 14 years) without previously known CKD were evaluated. Participants were subjected to a questionnaire, blood pressure measurement and anthropometry. Glomerular filtration rate estimated by CKD-EPI formula and urine tested with albuminuria dipstick.

Results. More than 50% of subjects reported family antecedents of diabetes mellitus (DM), hypertension and obesity, and 30% of CKD. DM was self-reported in 19% and hypertension in 29%. During screening, overweight/obesity was found in 75%; women had a higher frequency of obesity (41 vs. 34%) and high-risk abdominal waist circumference (87 vs. 75%) than men. Hypertension (both self-reported and diagnosed in screening) was more frequent in men (49%) than in women (38%). CKD was found in 14.7%: G1, 5.9%; G2, 4.5%; G3a, 2.6%; G3b, 1.1%, G4, 0.3%; and G5, 0.3%. Glomerular filtration rate was mildly/moderately reduced in 2.6%, moderately/severely reduced in 1.1%, and severely reduced in <1%. Abnormal albuminuria was found in 13%. CKD was predicted by DM, hypertension and male gender.

Conclusions. A percentage CKD prevalence of 14.7% was found in this sample of an adult population, with most patients at early stages. Screening programs constitute excellent opportunities in the fight against kidney disease, particularly in populations at high risk.

Key Words: Chronic kidney disease, Prevalence, General population, Screening.

Introduction

Chronic kidney disease (CKD), and particularly its ultimate outcome end-stage renal disease (ESRD), is a severe worldwide health problem associated with increased morbidity and mortality, decreased quality of life and enormous economic costs (1). Therefore, it is of great importance to early diagnose and prevent CKD, whose obvious advantage is the implementation of measures recognized to reduce the risk and/or slow progression of nephropathy (most effective when initiated early in the course of renal disease) (2,3). Notwithstanding, most individuals at earlier stages of kidney disease have been largely undiagnosed and/or undertreated (4,5).

One strategy to prevent and manage CKD is to offer screening and prevention programs. The World Kidney Day (WKD) has become one of the most widely celebrated events to raise awareness among the general public and health professionals about the dangers of the kidney disease (6).

The aim of the present study was to determine the percentage prevalence and risk factors of CKD in a screening program performed in general population.

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Subjects and Methods

In March 10, 2011, the Hospital de Especialidades, Centro Médico Nacional de Occidente, Instituto Mexicano del Seguro Social (IMSS) in Guadalajara, Mexico organized a 1-day public event celebrating WKD with educational and screening activities for CKD. Within the previous 2 weeks, the general public was informed by means of local media (press, TV and radio interviews), informative posters and pamphlets distributed in Family Medicine Units and strategic public areas of the city of Guadalajara. By all these means, persons aged 18 years and older were encouraged to attend this event. Patients with already known CKD, ESRD or self-reported potential transitory causes of proteinuria (i.e., urinary tract infections, menstruation or fever) were excluded. All personnel involved in the screening program (22 physicians, 19 nurses, six laboratory chemists/technicians, 14 medical students, and 11 other profession) were trained in logistics and procedures (four sessions in 2 weeks).

Participants stayed in a sitting area receiving lectures and pamphlets and watching videos and a theatrical performance about the importance of kidneys and CKD while waiting their turn to be evaluated. Subsequently, individuals were subjected to a questionnaire, blood pressure measurement, and anthropometry. A questionnaire specifically designed for this purpose contained questions about sociodemographic variables and risk factors and was applied by physicians. Blood pressure was measured by nurses on three separate occasions according to criteria of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (7). A mean of these readings was used for analysis. Weight, height and waist circumference were measured according to standardized methods. In a blood sample obtained after 8 h of fasting, serum creatinine was determined by the kinetic Jaffe-method with a Cobas c 111 Analyzer (Roche Diagnostics, Rostkreuz, Switzerland). This method has been standardized against isotope dilution mass spectrometry. With the serum creatinine result, glomerular filtration rate (GFR) was estimated by means of the Chronic Kidney Disease Epidemiology Collaboration creatinine equation (8). Additionally, a random urine sample was obtained for dipstick urinalysis (Multistix 10 SG; Bayer de México, S.A. de C.V., Ecatepec, Mexico) and albuminuria-specific dipstick (Micral-Test; Roche Diagnostics GmbH, Mannheim, Germany). Results of urinalysis and albuminuria dipsticks were interpreted by trained and experienced personnel.

The same day of the celebration, results were provided to participants. Those patients with CKD were advised to seek attention by primary health-care physicians or specialists (as appropriate) in order to confirm diagnosis and receive treatment.

Definitions

CKD was classified according to the Kidney Disease Improving Global Outcomes (KDIGO) 2012 (9). We defined albuminuria as a value >50 mg/dL in the micraltest dipstick. In previous studies, we found this cut-off value as reliable, valid and rapid method for screening of albuminuria in diabetic and nondiabetic patients (10). Hypertension was defined as a self-reported history of high blood pressure, intake of antihypertensive medication or a mean blood pressure $>140/90$ mmHg during screening; adequate control was considered if mean blood pressure was $<140/90$ mmHg. Diabetes mellitus was defined as a self-report or treatment with antidiabetic drugs. A diagnosis of cardiovascular disease was considered if patients reported a history (or there was clinical evidence at examination) of heart failure, arrhythmias, or cerebrovascular accidents. A probable diagnosis of urinary tract infection or hematuria was considered when leukocytes and nitrites or blood, respectively, indicated a trace or greater in the urinalysis dipstick. Patients were classified as smokers if they reported to be smokers at the time of the questionnaire, and alcoholism was defined as at least one episode of alcohol intoxication during the previous month.

Statistical Analysis

Data are expressed as mean $\pm$ SD, median (percentiles 25% −75%), or percentages as appropriate. Comparisons between groups (according to gender, diabetes or hypertension) were made by independent samples Student t, Mann-Whitney U or chi-square tests, as appropriate. Multivariate analysis to identify factors predicting CKD was performed by Conditional Backward Logistic Regression; p value <0.05 was accepted as significant.

Results

Six-hundred ten patients were evaluated; their main demographic and family antecedents are shown in Table 1. Most participants were women and mean age was 51.1 $\pm$ 14.5 years (minimum 18, maximum 94). Age groups between 31 and 70 years were predominant. Three quarters of the population had social security health coverage and 25% had no coverage. Of those with social security affiliation, 92% were covered by the IMSS, 7% by Seguro Popular, and 1.5% by other institutions. Predominant marital status was married (64%) followed by single (18%), widow (9%), and other (9%). Ninety-six percent of the sample was from the state of Jalisco, 2% from the state of Michoacán, and 1% from other locations. More than half of the sample had an educational level of high school or lower. Family history of chronic noncommunicable