Scientific Research Article

Experience of World Kidney Day 2013 at the Central Military Hospital in Bogotá: Metabolic syndrome and renal disease

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Abstract

In the last decade wills have joined in the fight against the progression of chronic kidney disease. Thus, in 2006 the International Kidney Day was established, being the second Thursday of March of each year the commemorative date. In the Central Military Hospital in Bogotá, under the International Kidney Day, an educational and screening journey of renal risk factors was performed. Attendees were users of the health system of the Armed Forces of Colombia. It was found in 4.5% of the population a decline in the glomerular filtration rate according to age, with 11% presence of microalbuminuria. The metabolic syndrome is frequent in our environment and in our study population about half (52%) of the attendees met the diagnostic criteria. Association between increased BMI or elevated glycosylated hemoglobin and development of microalbuminuria was identified. Campaigns are needed to control the metabolic syndrome in order to control the underlying risk for chronic kidney disease.

Key words: chronic kidney disease, metabolic syndrome, microalbuminuria.

Experiencia del día mundial del riñón 2013 en el Hospital Militar Central de Bogotá: Síndrome metabólico y enfermedad renal

Resumen

En la última década se han sumado voluntades en la lucha contra el avance de la enfermedad renal crónica. Con este fin se creó el Día Internacional del Riñón, para el cual se estableció como fecha conmemorativa el segundo jueves de marzo, de cada año, a partir del 2006. En el Hospital Militar Central de Bogotá, en el marco del Día Internacional del Riñón, se realizó una jornada educativa y de tamizaje de factores de riesgo renal, en población usuaria del sistema de salud de las Fuerzas Militares de Colombia. Se encontró en el 4,5% de la población disminución de la tasa de filtración glomerular esperada para la edad, con 11% de presencia de microalbuminuria. El síndrome metabólico es una entidad frecuente en nuestro medio y en la población estudiada cerca de la mitad (52%) de los asistentes cumplía con los criterios para establecer el diagnóstico. Se identificó asociación entre el aumento del índice de masa corporal o la elevación de la hemoglobina gli-

cosilada y el desarrollo de microalbuminuria. Es necesario realizar campañas para el control del síndrome metabólico, con miras a controlar el riesgo subyacente para enfermedad renal crónica. Se describen los hallazgos encontrados.

Palabras clave: Enfermedad renal crónica, síndrome metabólico, microalbuminuria.

Introduction

Chronic kidney disease (CKD) is a public health problem that has increased dramatically over time. According to the National Health and Nutrition Examination Surveys (NHANES), the prevalence of CKD in the United States increased from 11% in the 1990s to 13% at the beginning of the last decade. Incidence also increased in developing countries like Colombia, which is attributed to an increase in the frequency of risk factors for impaired kidney function, such as prediabetes, type 2 diabetes mellitus, arterial hypertension and obesity. The aim of this study is to describe estimated glomerular filtration rate (eGFR), markers of chronic kidneydisease such as microalbuminuria (MA), and clinical characteristics of a population group evaluated on the occasion of International Kidney Day.

One hundred and fifty-seven countries have celebrated this day uninterruptedly, under the joint initiative of the International Society of Nephrology (ISN) and the International Federation of Kidney Foundations (IFKF), to promote renal health through prevention and promotion of healthy lifestyles. The main purpose of this celebration is to promote early detection and treatment of renal and cardiovascular diseases to dramatically reduce other associated complications and increasing costs of death and disability.

Every year a theme for the International Kidney Day is chosen, based on which all initiatives and activities are carried out. The slogan for 2013 was "Kidneys for Life – Stop Kidney Attack!", which motivated our country to make efforts to continue this project year after year and is the starting point to describe our experience in this document. For 2014, the campaign was called "Chronic Kidney Disease (CKD) and Aging," which was planned to include a greater number of people and, in turn, to keep it as a trend year after year. The results of this evaluation can provide important information for the development of future national preventive programs to optimize the resource allocation process and raise public awareness of CKD-related diseases.

Objectives

The objective was to describe the clinical characteristics of patients undergoing CKD screening who voluntarily attended World Kidney Day commemorative and informative activitiescarried out on Thursday, March 14, 2013 at the Hospital Militar Central (HMC) in Bogotá, Colombia.

Methods

On 2013 World Kidney Day, the HMC held a commemorative day in which education, healthy lifestyle promotion and kidney disease prevention activities were carried out by a multidisciplinary group of nephrology, cardiology, endocrinology, psychology, nutrition, nursing and social work professionals from the HMC Nephrology Service in Bogotá. As an additional support, a video was prepared and disseminated by the ISN and IFKF for the occasion, which is available at www.worldkidneyday.org. After the educational and informative session, there was a forum for discussion and resolution of doubts.

Attendees of the educational day signed the informed consent to participate in the CKD screening. With the support of internal medicine specialists and nurses, we conducted a CKD risk factors survey, vital signs check-up, an anthropometric eva-

luation, and paraclinical screening tests: Hematological (hemogram), kidney function (nitrogen urea, serum creatinine, urinalysis and microalbuminuria) and metabolic (percentage of glycosylated hemoglobin) tests. At the end of the day, patients participated in a group activity to clear up doubts and, once the results of the day were obtained, they were shared through an institutional communication issued by the head of the nephrology service, with relevant recommendations and guidance. Cases with pathological involvement, identified during the day, were later assessed by the relevant group of specialists.

Statistical analysis

Firstly, a descriptive analysis of the population was performed, representing numerical variables with averages and standard deviation, and categorical variables such as number of individuals and corresponding percentage (Table 1). The Student's T test was used to evaluate the difference between the means of relevant and stratified variables.

Results

A total of 224 individuals were evaluated, out of which 55% were men, with an average age of 49 and an estimated glomerular filtration rate by MDRD4 of 90 on average (Table 1, Figure 1). The prevalence of known history and risk factors for impaired kidney function is presented in Table 2. We found that 52% of patients were overweight (BMI greater than 25), 15% obese (BMI greater than 30) and 33% had a BMI of less than or equal to 25 (Figure 2).

The latter is also correlated with a significant prevalence of abdominal obesity in 52% of the cases (defined for the Latin American population as an abdominal circumference greater than 94 cm in men and greater than 90 cm in women)[2] (Figure 3). Distribution of non-diabetic patients according to HgbA1c is shown in Figure 4.

Table 1		
General characteristics of the study population		
Total patients N	224	
Women N	101	45%
Men N	123	55%
Average age (SD)	49,3	16,1
GFR x MDRD ml/min avg. (SD))	90	19,4
Average BMI (SD)	27,1	3,6
Average HgbA1c (SD)	5,84	0,99

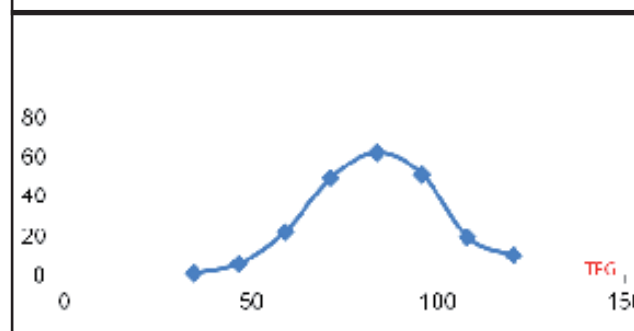
Figure 1
Distribution of eGFR by MDRD in the study population

Table 2		
History and risk factors for developing CKD		
History and renal risk factors		
Diabetes mellitus T2 (N)	17	7,6%
Arterial hypertension (N)	52	23%
Urinary tract infection (N)	30	13%
Heart failure (N)	13	6%
Coronary and vascular disease (N)	26	12%
Use of non-steroidal anti-inflammatory drugs (N)	55	25%
Use of contrast medium (N)	68	30%

In the testing of an isolated sample of urine, no MA was present in 89% of patients, 10% had MA between 30 and 300 mcg/g, and only 1% had MA greater than 300 mcg/g. In this population, operating characteristics of the urinalysis were evaluated to detect MA in comparison with MA in an isolated sample, finding 80% sensitivity, 94% specificity, a positive predictive value of 63%, and a negative predictive value of 97%.

Finally, the difference between means of microalbuminuria among relevant variables was evaluated, finding significant differences among patients with HbA1C percentages higher and lower than 5.5 (p <0.009), and body mass indexes higher and lower than 25 (p < 0.005), without significant differences in both men and women with abdominal obesity (Table 3).

Discussion

One of the most important limitations in the prevention of CKD at present is the patient's poor awareness or lack of knowledge about his illness. In the "Kidney Early Evaluation Program" (KEEP) of US Kidney Foundation, kidney disease screening was performed on 26,213 individuals for 10 years of follow-up. Of this group, only 9.5% of participants were aware of having some degree of renal compromise[3].
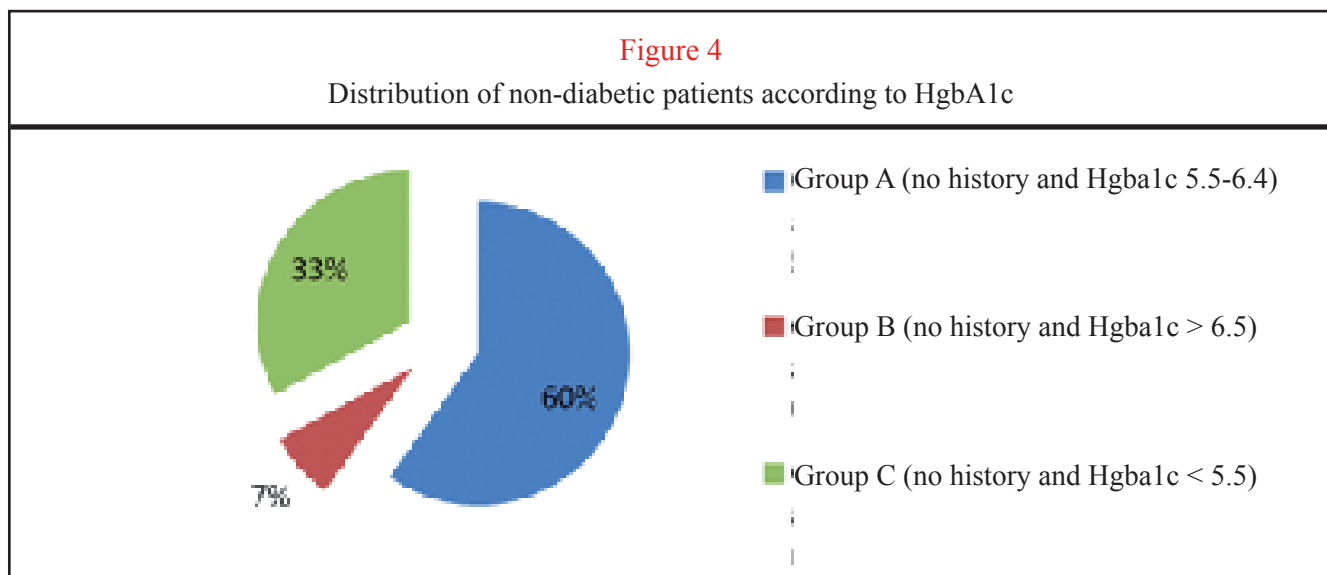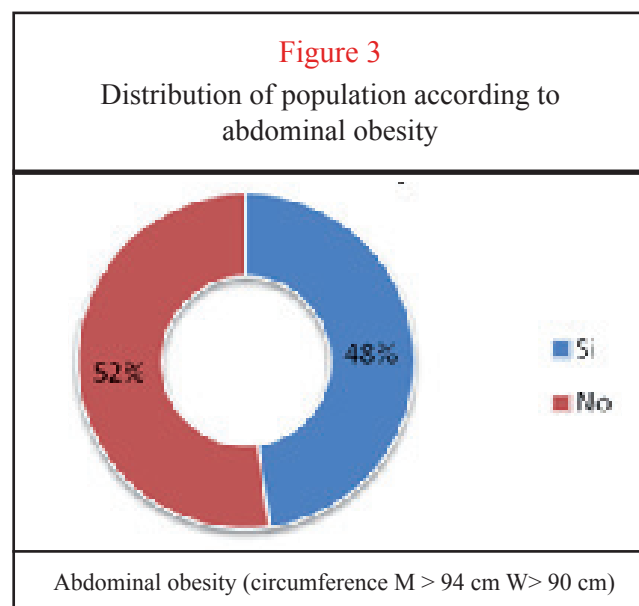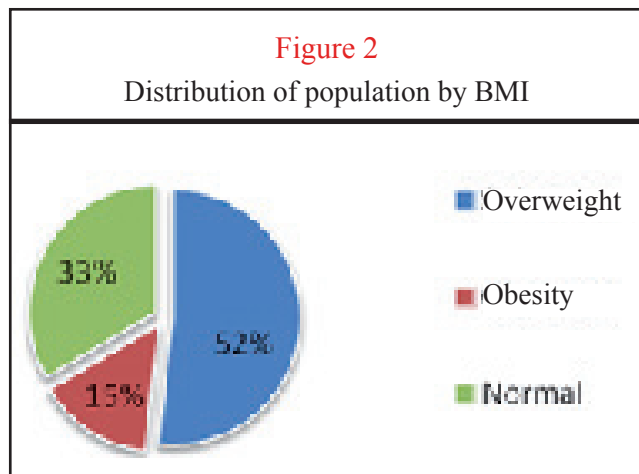
Figure 2
Distribution of population by BMI

Figure 3
Distribution of population according to abdominal obesity

Abdominal obesity (circumference M > 94 cm W> 90 cm)

Figure 4
Distribution of non-diabetic patients according to HgbA1c

Group A (no history and Hgba1c 5.5-6.4)

Group B (no history and Hgba1c > 6.5)

Group C (no history and Hgba1c < 5.5)

Table 3		
Difference between the means of albuminuria among relevant variables		
Variable	Albuminuria (mcg/gr)	p
Hgba1c < 5.5 vs. > 5.5	8.00	21.57	0.0098
BMI< 25 vs. > 25	7.88	23.08	0.0057
Women's waist circumference > 90 cm vs. < 90 cm	13.91	12.04	0.6808
Men's waist circumference > 94 cm vs. < 94 cm	29.99	13.74	0.1904

Despite being a small population sample, we found that participants had a distribution of eGFR by MDRD4 similar to those described in national cohorts (Figure 1), with high similarity in the major risk factors for impaired kidney function. However, when we analyzed the prevalence of overweight and obesity, we found a higher proportion of individuals with these two conditions (67% overweight or obese), together with a high frequency of abdominal obesity (52%). Additionally, we noted that 7% were known diabetics, but 60% had HgA1C in the prediabetes range, and an additional 7% were confirmed as de novo diabetic patients in later controls. Based on these results, we can affirm that at least 60% of patients in our study population could meet criteria for metabolic syndrome[4]. In addition, 40% of the diabetic population was outside the expected therapeutic range of HgA1C.

Considering the worldwide increase in CKD associated with metabolic syndrome, it is necessary to delve into this issue. CKD has been found as an incidental finding in different population studies. An American group found an increase in the proportion of eGFR deterioration (OR 2.60, 95% CI 1.68-4.03) and presence of MA (OR 1.89; CI 95% CI 1.34-2.67) in 6,217 participants when comparing individuals with metabolic syndrome versus those who did not have it[5]. A recently published Korean study found similar outcomes with increased risk of CKD in patients with metabolic syndrome, both men (OR 1.45, 95% CI 1.2-1.6) and women (OR 1.76, 95% CI 1.2-1.76), when compared to the control population. In addition, the Korean group showed that this association increased in the presence of arterial hypertension or low levels of HDL[6].

Our cohort revealed the association between increased body mass index (> 25) or elevated HgA1C (> 5.5) and the development of albuminuria. From the pathophysiological point of view, some studies state that the development of CKD in populations with these characteristics is an independent risk factor from other comorbidities such as hypertension and diabetes, contrary to what might be expected. Histopathological changes in the renal tissue of patients with metabolic syndrome such as tubular atrophy, interstitial fibrosis and sclerosis have been described.

Several studies have also demonstrated different pathways that associate insulin resistance or hyperinsulinemia with CKD6. This develops through several phases: first, insulin resistance with compensatory hyperinsulinemia that promotes inadequate activation of the renin-angiotensin-aldosterone system, inducing hyperaldosteronism and glomerular hypertension. Secondly, insulin resistance increases oxidative stress that has also been involved in the progression of glycoxidation and lipid peroxidation; insulin resistance induces mesangial cells proliferationand extracellular matrix production through stimulation of endothelin 1 and other growth factors; and, finally, hyperinsulinism deregulates renal action of peroxisome receptors and, thereby, foam cell

formation, renal lipotoxicity and endothelial dysfunction are induced.

Other World Kidney Day campaign experiences[7] have highlighted the importance of early diagnosis of renal compromise and identification and proper management of risk factors to prevent progression of CKD. The metabolic syndrome should be emphasized as an unexplored factor in our population, which should serve as initial screening with simple tests aimed at early detection of renal compromise. Our results suggest that it is necessary to carry out interventions aimed at changing patients' lifestyle and reducing the prevalence of the metabolic syndrome in order to control a possible precipitating factor of renal compromise in our population.

Conclusions

We presented the results of our experience at the Hospital Militar Central in Bogotá, in a population enrolled in the military healthcare system, with which we carried out CKD promotion and prevention activities in the framework of World Kidney Day.

In 4.5% of the population, we found a decrease in the expected eGFR for age, with presence of MA in 11%. The urinalysisprovided a positive predictive value of 65%, while its negative predictive value was 97% for detecting MA. The most relevant risk factors for the development of CKD identified as history in the population analyzed were arterial hypertension, diabetes mellitus and urinary tract infection, use of non-steroidal anti-inflammatory drugs and exposure to a contrast medium.

The metabolic syndrome is a frequent phenomenon in our environment and, in the study population, nearly half met the criteria for its diagnosis. An association between increased body mass index or elevated HgA1C and development of microalbuminuria was identified. Campaigns for metabolic syndrome control are needed to manage the underlying risk of CKD.

Conflict of interest

Authors declare to have no conflict of interest.

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