Proposal for screening of kidney disease in a random population based on World Kidney Day campaign

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ABSTRACT

Despite the advances on early screening techniques, getting to know the chronic kidney disease (CKD) prevalence in Brazil and worldwide remains a challenge for researchers. Aging, diabetes and hypertension are the main CKD causes in Brazil. The aim of the study was to evaluate the presence of urinary dipstick abnormalities in World Kidney Day campaign. This is a cross-sectional studyconducted at FMABC. This study was based on the answers to a kidney disease questionnaire and urinary dipstick test. A total of 205 patients were randomly invited to collect urine samples on World Kidney Day 2013. Among the 205 studied patients, 66.34% were women with mean age of 46.32 years. Around 34.14% of the patients were hypertensive and 9.75% diabetic. Urinalysis alterations were observed in 28.29% of patients. The group with urine alterations had older individuals (51.36 years) andmore diabetes (18.96%) with higher levels of glucose (143.2 mg/dl). Brazilian population is getting older and diabetic which represent risk factors for the onset of CKD. The necessity of an early detection by means of specific campaigns is thus of great importance. The use of dipstick test for screening is an important tool for kidney disease diagnosis.

Keywords: Proteinuria; Diabetes; Hypertension.

1. INTRODUCTION

Getting to know the real prevalence of chronic kidney disease (CKD) has been a challenging matter. However, this task has been made easier thanks to measures taken that focus on the disease screening. Today it is known that CKD has a growing incidence worldwide related to higher mortality rates owing to cardiovascular diseases, especially in developing countries [1].

It is estimated that between 8 and 16% of the world population suffer from CKD, having hypertension and diabetes as its main causes. Population aging and the expanded access to

diagnosis explain the increase in number of cases over the last years [2].

In Brazil, CKD represents 554 patients in dialysis per million of population, with around 84% of the total costs sponsored by the National Public Health Service [3].

An early diagnosis is important due to the possibility of providing immediate intervention and control of the conditions that lead to the deterioration of renal function. This screening may be done by the measurement of creatinine serum levels and the analysis of urine by reagent strips to detect proteinuria. Both methods are quite accurate when it comes to the detection of CKD [4].

The aim of this study was to evaluate the presence of urinary abnormalities by reagent strips to screen to kidney disease in the World Kidney Day campaign in São Bernardo do Campo, Brazil.

2. METHODS

2.1. Study design

This is a cross-sectional study conducted by the Discipline of Nephrology at Faculdade de Medicina do ABC on World Kidney Day. Patients were randomly invited to collect isolated urine samples for the investigation of proteinuria after signing the informed consent term. This work was approved by Institutional Ethics Committee (protocol number 09/2015) and is in accordance with the ethical principles of the Helsinki Declaration (1996).

2.2. Sample selection

Inclusion criteria consisted in being over 18 years-old. Women during their menstrual cycle and patients of both sexes who were not São Bernardo do Campo residents were excluded.

2.3. Variables and statistical analysis

Data regarding presence of hypertension, diabetes, heart disease, previous CKD, smoking and regular use of non-hormonal anti-inflammatories (NSAID) were collected.

Random capillary blood glucose was determined using an Accu-Check® glucometer (Roche,

Switzerland), weight measured in kilograms (kg) with a Filizola PL 200 scale (Filizola®, Brazil) and blood pressure assessed with a Tycos® Aneroid sphygmomanometer (Welch Allyn®, USA) by auscultatory method. Mean blood pressure was calculated according the formula:
(2 x Diastolic Pressure + Systolic Pressure) / 3.
Once measurements were performed, for the sake of comparison, patients were divided into two groups according the presence of urinary dipstick abnormalities.

Results of quantitative and continuous variables were expressedas mean and standard deviation values. Qualitative variables were described by absolute and relative frequencies.

Student's t-test was used in order to compare the means between both groups, and whenever the assumption of data normality was rejected, the non parametric test of Mann-Whitney was applied. Homogeneity of proportions was tested by chi-square test; however, when the expected frequencies were less than five, Fisher's exact test was used. The significance level applied was $p=0.05$. The statistical package SPSS 17.0 for Windows (Microsoft, USA) was used for analysis.

3. RESULTS

A total of 209 patients were interviewed and they all collected urine samples. Among that number, four women were excluded owing to the fact they were in their menstrual cycle. Table 1 shows the demographic and clinical characteristics of the patients.

The mean age was 46.32 years, and there was a higher prevalence of women among the sample (66.34%). Around 34.14% of the subjects declared themselves to be hypertensive and only 9.75% diabetic. The mean capillary blood glucose was 118.2 mg/dl (± 48.52). Of the 205 patients, 28.29% showed alterations in the urinary screening test.

Table 2 highlights the division of patients into groups according to the presence or absence of abnormalities. A statistical difference could be observed concerning age, higher in the group with abnormal results (group 2), which suggests an association between higher age and abnormalities in the urine test.

The positive screening for kidney disease was related to the presence of diabetes, higher in group 2 (18.96%) with p=0,005. The mean capillary blood glucose in the group with positive screening outcome was 143.2 mg/dl (±77.98) whereas in the group with normal screening (group 1) result it was 108.22 mg/dl (±23.47), p=0.002.

4. DISCUSSION

Our results show the importance of a simple screening tool for the detection of kidney alterations in a random population. It was observed that only 13.79% of the individuals knew they had some sort of renal condition. Moreover, the great majority of patients who screened positively were not aware of the kind of condition they had.

Table 1. Clinical data and demographic characteristics of patients (n=205).

Variables	Values
Age (years)	46.32 ± 14.68
Gender (Male/Female) (%)	33.66 / 66.34
Weight (Kg)	73.64 ± 15.35
Hypertension (%)	34.14
Diabetes (%)	9.75
Self Report of Kidney Disease (%)	13.50
Heart Failure (%)	10.24
Smoking (%)	16.09
Sedentary (%)	48.29
NSAID* (%)	19.51
Mean Blood Pressure(mmHg)	93.75 ± 13.34
Capillary Glucose(mg/dL)	118.2 ± 48.52
Dipstick urine altered(%)	28.29
Proteinuria (%)	4.87
Hematuria (%)	13.17
Glicosuria (%)	6.87
Leucocituria (%)	12.19

Ω Data expressed as mean and standard deviaton for continuous variables and percentages to cathegorical ones. *NSAID: Non Steroidal Anti Inflammatory Drug.

Table 2. Comparison between groups with and without dipstick test altered among clinical data.

Variables	Group 1 (n = 147)	Group 2 (n = 58)	p
Age (years)	44.34 ± 14.86	51.36 ± 13.03	0.002*
Gender (male/female) (%)	35.38/ 64.62	29.32/ 70.68	0.407**
Weight (Kg)	73.19 ± 15.02	74.80 ± 16.26	0.514*
Hypertension (%)	31.97	39.65	0.296**
Diabetes (%)	6.12	18.96	0.005**
Self-report of kidney disease (%)	13.60	13.79	0.971**
Heart failure (%)	7.48	17.24	0.037**
Smoking (%)	17	13.79	0.572**
Sedentary (%)	46.25	53.44	0.353**
NSAID (%)	19.04	20.68	0.789**
Mean blood pressure (mmHg)	93.40 ± 13.10	94,63 ± 14	0.554**
Capillary glucose (mg/dl)	108.22 ± 23.47	143.2 ± 77.98	0.002*
Dipstick proteinuria (%)	-----	17.24	<0.001***
Dipstick hematuria (%)	-----	46.55	<0.001**
Dipstick glycosuria (%)	-----	24.13	<0.001***
Dipstick leucocyturia (%)	-----	32.75	<0.001***

*Student´s t-Test / **Chi Square Test / ***Fisher Exact Test.
NSAID: Non Steroidal Anti Inflammatory Drug.

CKD can be asymptomatic in its early stages and before it reaches its more advanced phases. Therefore, the American Diabetes Association reinforces the idea of an annual screening for all diabetics so that an early renal dysfunction may be detected [5].

Similarly, the US Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure recommends the screening for CKD in all patients before the onset of antihypertensive treatments [6].

Bastos et al call the attention to the need for intervention in CKD patients whose conditions may lead torenal replacement therapy [7]. The study concludes that the early diagnosis and prompt

referral to a nephrologist are wise measures for a better patient's outcome [7].

Upon performing dipstick screening on 38.721 individuals in São Paulo between the years 2005-2010, Lima et al. observed that the majority of the patients at the mean age of 46 years were of the female sex, a fact that is consonant with our findings [8]. On the other hand, proteinuria levels were lower in our group when compared with the results found by Lima, possibly given the large number of participating patients in his study [8].

Despite the importance of screening, the US Preventive Services Task Force, when conducting a systematic review on the screening and monitoring of CKD at early stages, found no controlled and randomized studies that evaluated screening for CKD and clinical outcomes [9, 10]. However, it is a fact that the Brazilian population is getting old and more diabetic as well, this association may represent risk factors for the development of CKD. The necessity of an early detection by means of specific campaigns is thus of great importance. In Europe, where population is also getting old, there is a substantial variation in CKD prevalence [11] and according to the European Kidney Health Alliance (EKHA), more than 10% of the population suffers from this desease [12]. CDK diagnosis is based on urine creatinine and albuminuria measurement and there is a great heterogeneity of laboratorial methodologies to address their values [11].

In conclusion, the use of urine reagent strips in kidney disease screening through proteinuria assessment in a random population is an important tool for diagnosis and subsequent follow-up to a nephrologist.

AUTHOR´S CONTRIBUTION

MRB and FLAF were responsible for conception and design and study supervision; VCRJ was responsible for analysis and interpretation of data; LYV, TCC and RRB were responsible for acquisition, analysis and interpretation of data; DRS and ACCM were responsible for development of methodology and data acquisition; LAA, ECP and BCAA were responsible for technical and material support. The final manuscript has been read and approved by all the authors.

TRANSPARENCY DECLARATION

The authors declare that they have no conflict of interest.

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