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Original Research Article

Prevalence of chronic kidney disease in Bhuj district: a cross sectional study

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ABSTRACT

Background: In order to control any disease basic knowledge about the prevalence and risk factors of the particular disease is required.
Methods: In this cross-sectional study, 2600 individuals aged between 25 and 70 years old were recruited. Participants were selected from the general population residing in Bhuj, Gujarat, India via simple random sampling. Demographic data were collected. Urine and blood test were performed, and the glomerular filtration rate was estimated.
Results: One hundred and thirty participants (10%) had CKD. The mean age was significantly higher in the CKD group. Hypertension and diabetes mellitus were significantly more prevalent among the participants with CKD than those without CKD ($P < 0.001$ for both). Proteinuria was significantly associated with CKD, whereas a history of urinary tract infection, a history of nephrolithiasis, smoking, serum uric acid level, lipid profile, and blood glucose level were not.
Conclusions: Overall, it seems that CKD is a common health problem in Gujarat, but further studies in other parts of this country is recommended for the better estimation of CKD prevalence. This study shows the importance of screening for CKD.

Keywords: Bhuj, Cross-sectional, Glomerular filtration, Kidney disease, Proteinuria

INTRODUCTION

Chronic kidney disease (CKD) is one of the most important diseases with increasing prevalence worldwide.[1-3] Many patients with CKD reach a state that is called end-stage renal disease, in which the surviving is impossible unless with renal replacement therapy. Some evidence suggests that CKD is not well recognized.[4] It is a major risk factor for cardiovascular diseases, and also it is a reason for mortality with increasing prevalence in almost all populations all over the world.[5] Patients who are at risk of developing CKD should be screened with both urine and blood tests for proteinuria and creatinine, respectively, to estimate glomerular filtration rate (GFR).[6] Patients who are at risk of glomerulonephritis should be screened for hematuria by urinalysis. In India, there are studies about the prevalence and other epidemiologic aspects of CKD, but none of them were conducted in the Kutch district of India.

METHODS

This cross-sectional study was conducted in Bhuj, a city located in the Kutch district Gujarat, India. By using stratified simple random sampling, individuals from the communities served by each center were selected proportioned to each stratum. Inclusion criterion was an age between 20 years 60 years. The presence of acute kidney injury was considered as an exclusion criterion. After phone calls and describing the study, a total number

of 1300 individuals enrolled in this survey. This study was approved by the local ethics committee. Written informed consent was obtained from all participants.

Demographic information including age, sex, and educational status were collected. Laboratory tests were performed, including urinalysis, blood urea nitrogen, serum creatinine, serum uric acid, fasting blood glucose, and serum levels of total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and triglyceride. Height, body weight, and blood pressure were also measured. Glomerular filtration rate was estimated using the simplified modification of diet in renal disease (MDRD) a GFR less than 60 mL/min/1.73 m^2 was considered CKD. The t test and the Mann-Whitney test were applied to comparisons of normally distributed and skewed data, respectively. To examine the association between categorical data, the chi-square and the Fisher exact tests were used, where appropriate.

RESULTS

A total of 1300 individuals participated in this study. Among those, 770 (59.2%) were women and 530 (40.8%) were men. The mean age of the participants was 47.9±11.6 years, and on average, the women were 2.5 years older than the men (P=0.001). Among all of the participants, 5.3% had CKD. While the age ranges were comparable between the CKD and non-CKD groups, the mean age was significantly higher in the CKD group (P = 0.001; Table 1).

Table 1: Demographic and clinical characteristic of participants.

Characteristics	CKD (n = 130)	Non-CKD (n = 2470)	P
Sex			
Male	54	1006	0.85
Female	76	1464	
Mean age (years)	44.3±8.5	42.1±9.7	0.01*
Diabetes mellitus	18	186	0.002*
Hypertension	44	250	0.016*
Mean systolic blood pressure, mm Hg	129.8±20	116.7±14.3	0.003*
Mean diastolic blood pressure, mm Hg	82.12±7.5	74.4±9.7	0.04*
History of urinary tract infection	14	162	0.22

* indicates statically significant difference at p=0.05.

Table 2: Laboratory findings of participants.

Characteristics	CKD (n = 65)	Non-CKD (n = 1235)	P
Fasting blood glucose, mg/dL	112.5±45.3	101.4±30.1	0.21
Blood urea nitrogen, mg/dL	19.1±7.8	12.1±3.2	0.004*
Serum creatinine, mg/dL	8.2±2.5	1.2±1.5	0.04*
Serum uric acid, mg/dL	3.5±2.6	3.5±1.0	0.57
Serum total cholesterol, mg/dL	155.5±63.0	133.5±83.4	0.32
Positive proteinuria	20	71	0.008*

Hypertension was significantly more frequent among the participants with CKD than those without CKD (P ≤001); The systolic blood pressure ranged from 105 mm Hg to 175 mm Hg in the CKD group 75 mm Hg to 170 mmHg in the non-CKD group. The diastolic blood pressure ranged from 75 mm Hg to 105 mm Hg versus 55 mm Hg to 95 mm Hg in the CKD and non-CKD groups, respectively. Chronic kidney disease was present in 18% of hypertensive patients, whereas it was present 2.7% of the participants with normal blood pressure. Diabetes mellitus was also more rampant among those with CKD (Table 1). Chronic kidney disease was present in 8.5% of diabetic patients, while it was present in 4.5% of the nondiabetic participants.

Eight percent of the participants with a history of urinary tract infection had CKD, but 4.7% of those without a history of urinary tract infection were screened positive for CKD. Among individuals with a history of nephrolithiasis, 3 (6.3%) had CKD and 45 (93.7%) did not, while among those without a history of nephrolithiasis, 41 had CKD and 795 did not (P = ≥0.05; Table 1). Serum creatinine level ranged from 1.2 mg/ dL to 10.0 mg/dL in the CKD group. Other than serum creatinine and blood urea nitrogen levels, none of the blood tests showed a significantly different level in the CKD group as compared with the non-CKD group (Table 2). Among 1194 persons whose dipstick tests were

negative for proteinuria, 3.9% had CKD, whereas this was 21.9% in those with proteinuria (Table 2).

DISCUSSION

Prevalence of CKD has been reported to vary in between studies. In present study, as mentioned above, the prevalence of CKD was 5.3%. In different studies in Kutch, India, this prevalence was between 4.6% and 37.9%. On the other hand, Ghaffari and coworkers reported a prevalence of 37.9% in West Azerbaijan.[7] One of the probable causes of differences in these results is the difference in the method of measuring the serum creatinine level. The other probable cause might be due to difference in the way of determining GFR.[8] In some studies, insulin clearance or diethylene triamine Penta acetic acid clearance are the measuring methods for GFR estimation, while in some studies measuring of serum creatinine alone is used.[7 9]

Variations in the populations' characteristics would be the other reason for differences between our result and what Ghaffari and colleagues reported. They studied the high-risk groups, while our sample came from the general population.[7,10] The prevalence of CKD in a study by Mahdavi-Mazdeh and colleagues was 6.5%, whereas both studies used the MDRD method. It would be because of the differences in populations too; in current study, there were no significant differences between men and women, while in most of the abovementioned studies, the prevalence of CKD was higher in women.[11]

CONCLUSION

Overall, it seems that CKD is a common health problem in Gujarat, but further studies in other parts of this country is recommended for the better estimation of CKD prevalence. This study shows the importance of screening for CKD. Greater attention to risk factors and underlying diseases should be placed high on the agenda.

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