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Original Research Article

A study on causes of chronic kidney disease in patients without diabetes mellitus and systemic hypertension in a tertiary care hospital

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ABSTRACT

Background: Chronic kidney disease is an increasing health problem worldwide Thus apart from the well-established risk factors for CKD such as diabetes and systemic hypertension, the possibility that environmental, demographic, and various other risk factors an influence in developing chronic kidney disease has been assessed in several studies. Hence, the present study aimed to study the clinical and laboratory profile of chronic kidney disease in non-diabetic and non-hypertensive patients
Methods: The study was enrolled 100 patients diagnosed with chronic kidney disease without diabetes and systemic hypertension in the department of general medicine and department of nephrology in a tertiary care hospital, Pondicherry for 1 year. The baseline data such as socioeconomic status, history of self-consumption of natural medicine and NSAIDs, their occupations, location of their living place, and routine laboratory parameters were collected and analysed.
Results: The socioeconomic status of the present study revealed that upper lower class was the predominant status and the majority of the patients were housewives and farmers. 38% of the patients were exposed to insecticides that were associated with CKD (p=0.0327). 40% of the study population was victims of NSAID consumers (p=0.0236). 42% was consumed natural medication on their own for their illness 46 without any consultation (p=0.0324). The patients came from Cuddalore predominantly (22%).
Conclusions: Insecticide exposure, self-consumption of NSAIDs, and natural medicine are the main causes that progress to CKD in the present study.

Keywords: CKD, NSAIDs, Insecticide, Natural medicine, Risk factors

INTRODUCTION

Chronic kidney disease (CKD) has the potential to be a significant contributor to negative health outcomes, and it is now recognized as an independent risk factor for cardiovascular disease events. Over the last two decades, there has been a significant increase in the global burden of chronic kidney disease (CKD).[1] Globally, the prevalence was predicted to be 147.6 million in 1990, and it has increased to 275.9 million in 2016, according to the world health organization. Over the last two decades, the crude mortality rate has more than doubled, rising from around 0.59 million to 1.2 million people each year.[2] When compared to high-income developed countries, the prevalence of chronic kidney disease is disproportionately high in lower and middle-income economically developing countries (>15 percent higher).[3] Although the underlying cause of chronic kidney disease (CKD) differs from country to country, hypertension and diabetes are the most common causes worldwide.[4]

However, there has been a significant increase in the incidence and prevalence of chronic kidney disease (CKD) of unknown etiology (CKDu) over a wide range of geographical regions, despite the absence of any well-established risk factors.[5-7] Because it is widely found in low-income, tropical/subtropical countries, rural and middle-aged males, and comparable professions demanding physical labor, it is classified as a hazard. Researchers and physicians have become increasingly interested in CKDu in recent years.[8] CKD of unknown etiology (CKDu) is a term that has been used to characterize CKD that is not linked to any typical risk factor such as diabetes, high blood pressure, or HIV. It is becoming increasingly common to record cases of CKDu all over the world, and in many countries of Central and South America, as 2 well as Eastern Europe and South Asia, it is being documented in epidemic proportions.[9-11] According to data from the Indian CKD Registry, CKDu is the second most prevalent underlying cause of CKD (16.0 percent), following diabetic nephropathy as the most common underlying cause (31.3 percent).[12] Different environmental and occupational exposures, including heat stress, dehydration, agricultural chemicals (pesticides, herbicides, fertilizers), heavy metals (cadmium, lead, arsenic) and infections are implicated in the development of CKDu as a multifactorial etiology. It is life-threatening because of the late detection and rapid advancement of the disease. Numerous studies have been conducted to ascertain the prevalence of CKD in non-diabetic and non-hypertensive patients in India. This study is taken up to highlight the clinical and laboratory profile of patients diagnosed with chronic kidney disease who are non-diabetic and non-hypertensive and to find out if there is any modifiable risk factor for this type of CKD in and around Pondicherry.

Aim and objectives

Aim and objective of current study were to estimate clinical and laboratory profile of chronic kidney disease in nondiabetic and non-hypertensive patients. The objectives of this study were to study the clinical and laboratory profile of chronic kidney disease in nondiabetic and non-hypertensive patients and to study the association of various factors in relation to chronic kidney disease in non-diabetic and non-hypertensive patients.

METHODS

Study design and population

The study was a cross-sectional observational study. The study was conducted on both in-patients and out-patients diagnosed to have chronic kidney disease without diabetes mellitus and systemic hypertension in the department of general medicine and department of nephrology in Mahatma Gandhi medical college and research institute, Pondicherry between the period of one year from April 2020 to May 2021.

Inclusion criteria

All CKD as per KDIGO guideline 2012 and those aged above 18 years of age were included in the study.

Exclusion criteria

Patients with history of diabetes mellitus and systemic hypertension were excluded from the study.

Sample size calculation

The sample size is calculated based on the number of patients diagnosed to have chronic kidney disease without diabetes and systemic hypertension in a tertiary care hospital, which is approximately around 20%. As we couldn't get any study showing percentage of CKD in non-diabetic and non-hypertensive patients, the expected sample size for my study is taken as 100 (n).

Data collection

The patient demographic details, occupation history, history, personal history, reports of lab parameters such as hemoglobin, serum urea, creatinine, sodium, potassium, urine albumin, and glucose were collected. Also, the details of insecticide exposure, NSAIDs intake, and natural medication intake were collected from all the study patients.

Statistical analysis

The data was entered with an excel sheet. Data was exported to Medcalc version 19.0 for further processing. All categorical variables were expressed as percentages and the continuous variables were expressed as mean±standard deviation. The statistical significance of association among factors using the Chi-square test. All values were considered significant if the p value was <0.05. This research was strictly fulfilling the ethical guidelines as outlined in the declaration of Helsinki, participants signed a consent form, and were assured that their participation was completely voluntary and could be terminated at any time without compromising their medical care.

RESULTS

The present study enrolled patients without diabetes mellitus and hypertension with the mean age of 55.6±16.40 years with the range of 16 to 88 years.

DISCUSSION

There has been a lot of discussion, but there hasn't been any published study in India on particular environmental risk factors for CKD. Significant amounts of silica and other heavy metals in water, extended dehydration, heat stress, nonsteroidal anti-inflammatory medication use, traditional medicines, and high pesticide use have all

been proposed as theories.[13,14] Despite the fact that many of these theories have logical foundations and even some evidence from other parts of the world, epidemiological evidence is still lacking in order to construct a robust evidence base.

Table 1: Demographic profile of the study participants.

Variable	Frequency	%
Gender		
Male	56	56
Female	44	44
Socioeconomic status		
Upper lower	34	34
Lower	30	30
Lower middle	24	24
Upper middle	12	12
Occupation		
Housewife	31	31
Farmer	31	31
Coolie	13	13
Private employee	9	9
Others	8	8
Students	4	4
Retired	4	4

Table 2: Risk factor among the study participants.

Variable	Frequency	Percentage	P value
Smoking			
Yes	36	36	0.2970
No	64	64	
Alcoholic			
Yes	41	41	0.2532
No	59	59	
Insecticide exposure			
Yes	38	38	0.0327
No	62	62	
Taken NSAID			
Yes	40	40	0.0324
No	60	60	
Consumption of natural medication			
Yes	42	42	0.0236
No	58	58	

Table 3: Baseline laboratory profile of the study participants.

Variable	Mean±SD
Hemoglobin	8.85±1.83
Urea	124.83±77.92
Creatinine	5.35±3.66
Sodium	132.38±13.38
Potassium	4.66±0.94

Table 4: Status of urine albumin levels.

Urine albumin	Frequency	%
Trace	22	22
1+	24	24
2+	18	18
3+	11	11
Nil	25	25

Table 5: Location of the study participants.

Location	Frequency	%
Cuddalore	22	22
Panruti	12	12
Kurinjipadi	12	12
Pondicherry	11	11
Viruthachalam	9	9
Chidambaram	5	5
Kallakurchi	4	4
Ariyalur	4	4
Chinnasalem	3	3
Villupuram	2	2
Lalgudi	1	1
Mayiladuthurai	1	1
Nellikupam	1	1
Thirunindravur	1	1
Srimushnam	1	1
Panathu	1	1
Pushpalam	1	1
Thindivanam	1	1
Sirkali	1	1
Thirunindravur	1	1
Nagapattinam	1	1
Vidayampalliyagam	1	1

The most common theory is that drinking water has been contaminated. Several agencies and research groups have analysed the water, with an emphasis on heavy metals, but no consistent abnormalities have been discovered. Water samples obtained in the Uddanam area had a significant silica level, according to one study.[14] According to hydro chemicals data from another study, the groundwater in Uddanam is less mineralized than in other areas.[15] In the Andhra Pradesh district of Uchapally, Khandare et al discovered elevated amounts of strontium and silica in the drinking water.[16] None of these, on the other hand, has been reliably related to renal injury. High amounts of total dissolved solids in water samples from Uddanam have recently been discovered, which could imply high salinity as a result of seawater intrusion into freshwater aquifers and explain the high prevalence of hypertension and/or proteinuria.[17] The findings of the current study matched those of the previous study report. However, we did not evaluate the heavy metals present in the portable water sample drank by the patients in this investigation.

In Uddanam, Tatapudi et al were unable to find any evidence of a link between pesticide use and CKDu.[18]

They relied on self-reporting, which is prone to recall bias, rather than biological markers (pesticide concentrations in blood or urine). In the urban population of Delhi (non-agricultural community) diagnosed with CKDu, Ghosh et al discovered a negative connection between organochlorine pesticides in the blood and the eGFR.[19] Few pesticides used in India and around the world have been related to CKD, and studies have been challenging to conduct due to the remote exposure compared to results and the multiple risk factors of CKD. Insecticide exposure could be a cause of CKDu, according to the findings of this investigation. This observation was by the previous study reports. In Taiwan and the United States, an ecological relationship between air pollution and CKD has been discovered.[20,21] India is home to 22 of the world's 30 most polluted cities.[22] Air pollution is caused by the burning of crops and plastic debris in both rural and urban regions. In rural Indian families, biomass-fueled cooking stoves are prevalent. In India, air pollution has yet to be considered as a contributor to CKD. Based on the findings of the current investigation, the same conclusion was reached.

Data from Taiwan in recent years have revealed the fascinating prospect of a role for previous Leptospira infection in the development of CKDu.[23] Leptospirosis, which was common in Tamil Nadu and Kerala until around 15 years ago, has witnessed a significant drop in incidence, making its significance in the development of CKD in India doubtful. Finally, the function of genetic variables has received little attention. Family history of kidney disease was found to be an independent predictor of CKD in the STOP-CKDu research. Prasad et al observed a substantial correlation of CKDu with single nucleotide polymorphisms associated to the NLRP4 and PRKN genes in a genome-wide association analysis involving 56 cases from Jharkhand categorised as having CKDu and 40 controls.[24] In the present study, we did not analyze any genetic factors and leptospiral infections in the patients. But we had analyzed NSAIDS and natural medicine consumption without any prescription. No other earlier comparable study is available to compare our study results. The mean hemoglobin level of the study participants in the present study was 8.85. The mean urea, creatinine level was 124.83±77.92 and 5.35±3.66. The mean sodium and potassium level was 132.38±13.38 and 4.66±0.94 respectively. Similarly in a study done by Fernando et al, it was shown that the median sodium and potassium was 142 and 4.5 respectively.[25] The mean hemoglobin was 8.6±15.3.

CONCLUSION

In conclusion, CKD is a growing health problem in India, with increasing recognition that kidney disease often develops in individuals who do not have traditional risk factors like diabetes mellitus and hypertension. All patients were found to have anemia and azotaemia. The insecticide exposure, natural medication, and NSAIDs without consultation of medical practitioners are the risk factors for CKD in this study. Also, the vulnerable population was housewives and farmers and the socioeconomic status of the victims have belonged to the upper-lower, and lower class. All the patients were found to have anemia and azotaemia.

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