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A Study on the Associated Risk Factors among Patients with Chronic Kidney Disease in a Tertiary Care Hospital

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ABSTRACT

Objective: This study was designed to assess the associated risk factors among CKD patients in a tertiary care hospital. **Materials and Methods:** This cross-sectional observational study was conducted in the nephrology department of Vivekanandha Medical Care Hospital, Tiruchengode over 8 months from May to November 2019. The study was approved by the institutional ethics committee and written informed consent was obtained from each patient before enrolment. A specially designed proforma was used to collect demographic, clinical, and medication details. **Results:** Among the 176 patients, 103 (58.52%) were females and 73 (41.48%) were males. The mean (±SD) age of the total study population was 52±19.9 years and the prevalence of CKD increased with aging in both males and females. Prevalence of CKD was found to be higher for stage 3, 24 (13.64%) male and 41 (23.30%) female patients had stage 3 CKD. The mean values of BMI (p=0.0007), SBP (p=0.02), DBP (p=0.04), S_{cr} (p=0.04), UA (p=0.0001), TCH (p=0.0001), TG (p=0.0001), and Hb (p=0.0007) were significantly higher in male patients compared to female patients with CKD.HDL and LDL were found to be significantly higher p=0.0001 and p= 0.0001 respectively in female patients compared to males patients with CKD. **Conclusion:** The risk factors such as age, gender, smoking, educational level, waist-hip circumference, body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol (TCH), triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), serum creatinine (S_{cr}), uric acid (UA) and hemoglobin level (Hb) were found to be associated with CKD.

INTRODUCTION

Chronic kidney disease (CKD), characterized by a progressive decline in glomerular filtration rate (GFR), is a major public health issue worldwide and is associated with high morbidity and mortality[1]. CKD is defined as either kidney damage or a decreased glomerular filtration rate of less than 60 mL/min/1.73 m^2 for 3 or more months by The Kidney Disease Outcomes Quality Initiative (K/DOQI) of the National Kidney Foundation (NKF) [2]. CKD accounts for 850,000 deaths worldwide as reported by World Health Organization[3].

Often considered a co-morbidity of diabetes or hypertension, kidney disease has numerous complex causes[4]. Importantly, on global morbidity and mortality, such disease has an indirect impact by increasing the risks associated with at least five other major killers: cardiovascular diseases, diabetes, hypertension, infection with human immunodeficiency virus (HIV) and malaria[5]. For example, 1.2 million deaths, 19 million disability-adjusted life-years (DALYs) and 18 million years of life lost from cardiovascular diseases were directly attributable to reduced glomerular filtration rates as estimated from the 2015 Global Burden of Disease (GBD) study[6].

Early diagnosis and treatment of the underlying causes and institution of secondary preventive measures are imperative in patients with kidney disease to limit the worsening of renal function. Therefore, identification of risk factors will help to reduce the damage of the kidney. The medical care of patients with kidney disease should focus on halting the progression of chronic kidney disease, treating the pathologic manifestations of chronic kidney disease, timely planning for long-term renal replacement therapy, including dialysis and transplantation[7].

This study aimed to assess the related risk factors of CKD. Evidence suggesting the association of specific factors with CKD will help to identify those individuals who are likely to develop CKD. Moreover, it is also important to identify factors that increase the risk of CKD, even in individuals with normal GFR.

MATERIALS AND METHODS

This cross-sectional observational study was conducted in the nephrology department of Vivekanandha Medical Care Hospital, Tiruchengode over a period 8 months from May to November 2019. The study was approved by the institutional ethics committee and written

informed consent was obtained from each patient before enrolment. CKD patients of both genders, above 18 years of age, from the in-patient department of nephrology with a discharge summary, were included in the study. Patients attending the out-patient department, prescription with insufficient data, Patients undergoing peritoneal dialysis, pregnant and lactating women were excluded from the study. The discharge-summary records of 176 CKD patients, admitted to nephrology wards were scrutinized and the data was collected in a specially designed proforma which included the following details:

Demographic data: Name, age, gender, reason for admission, past medical history, past medication history, family history, educational level, marital status, allergies (drugs, foods, and others), social history (alcoholic/ smoker/ tobacco/ betel nuts, etc.) and anthropometric measurements such as weight, height, waist-hip ratio, body mass index (BMI) and blood pressure.

Blood and urine sample collection: Morning urine samples (non- menstrual period for women) were obtained after an overnight fast (for least 10 hours). Urinary factors were measured and urinary sediments were examined. Venous blood samples were collected at the same time and used to measure various biomarkers, including fasting blood sugar (FBS), postprandial blood sugar (PPBS), total cholesterol (TCH), triglycerides (TG), high-density lipoprotein (HDL), low density (LDL), uric acid (UA), serum creatinine (S_{cr}), and hemoglobin (Hb). Diagnosis of CKD and severity of CKD was calculated according to Kidney Disease Outcomes Quality Initiative (K/DOQI) of the National Kidney Foundation (NFK), defined as kidney damage, ascertained by the presence of albuminuria and/ or hematuria, or estimated glomerular filtration rate (eGFR) < 60 mL/min/1.73 m^2, irrespective of cause. The estimated glomerular filtration rate (eGFR) was calculated by the CKD-EPI equation using the mobile application.

Statistical Analysis: Microsoft Excel and computerized statistical package of graph pad instant version 3.10 were used to analyze the demographic characteristics and biochemical parameters. Values are represented as Mean ± SD (Standard Deviation).

RESULTS

Among the study population, 103 (58.52%) were females and 73 (41.48%) were males. Gender wise distribution among the study population shows that females are more prone to disease.

The mean (±SD) age of the total study population was 52±19.9 years. 3(1.70%) patients were males and 4 (2.27%) patients were females in the age group 18-28 years, 7 (3.98%) patients were males and 9 (5.11%) patients were females in the age group 29-38 years, 12 (6.82%) patients were males and 14 (7.95%) patients were females in the age group 39-48 years, 13 (7.39%) patients were males and 21 (11.93%) patients were females in the age group 49-58, 17 (9.66%) patients were males and 23 (13.06%) patients were females in the age group 59-68 years, 21 (11.93%) patients were males and 32 (18.18%) patients were females in the age group >68 years. (Table 1)

Table No. 1: Gender wise distribution among different age groups (n=176)

Sr. No.	Age in years	No. of patients		Percentage (%)	
		Males	Females	Males	Females
1.	18-28	3	4	1.70	2.27
2.	29-38	7	9	3.98	5.11
3.	39-48	12	14	6.82	7.95
4	49-58	13	21	7.39	11.93
5	59-68	17	23	9.66	13.06
6	>68	21	32	11.93	18.18
7	Total	73	103	41.48	58.52
8	Mean age	52±19.9 Years			

Of the study population, 5 (2.84%) males and 8 (4.55%) female patients had stage 1, 9 (5.11%) male and 18 (10.23%) female patients had stage 2, 24 (13.64%) male and 41 (23.30%) female patients had stage 3, 20 (11.36%) male and 22 (12.50%) female patients had stage 4, 15 (8.52%) male and 14 (7.95%) female patients had stage 5 CKD respectively. (Table 2)

Table No. 2: Frequency of chronic kidney disease stages

Sr. No.	Stages of CKD	No. of patients		Percentage (%)	
		Males	Females	Males	Females
1	Stage 1	5	8	2.84	4.55
2	Stage 2	9	18	5.11	10.23
3	Stage 3	24	41	13.64	23.30
4	Stage 4	20	22	11.36	12.50
5	Stage 5	15	14	8.52	7.95

Considering the social history of the participants, 40 (22.73%) male patients and 2 (1.14%) female patients were alcoholic, 54 (30.68%) male patients and 9 (5.11%) female patients were smokers/ tobacco users. (Table: 3)

Of the participants16 (9.09%) male and 19 (10.8%) female patients had low waist-hip ratio, 37 (21.02%) male and 42 (23.86%) female patients had moderate waist-hip ratio, 20 (11.36%) male and 46 (26.14%) female patients had high waist-hip ratio. (Table: 3)

Considering BMI of the study participants, 7 (3.98%) male and 13 (7.39%) female patients were underweight, 15 (8.52%) male and 49 (27.84%) female patients were having normal weight, 39 (22.16%) male and 30 (17.04%) female patients were overweight, 12 (6.82%) male and 11 (6.25%) female patients were obese. (Table: 3)

Table No. 3

		No. of patients		**Percentage (%)**	
		Males	**Females**	**Males**	**Females**
Social History	Alcoholic	40	2	22.73	1.14
	Smoker/ Tobacco	54	9	30.68	5.11
Waist-Hip Ratio	Low	16	19	9.09	10.8
	Moderate	37	42	21.02	23.86
	High	20	46	11.36	26.14
BMI	Underweight	7	13	3.98	7.39
	Normal	15	49	8.52	27.84
	Overweight	39	30	22.16	17.04
	Obese	12	11	6.82	6.25

The biochemical variations of the study groups were compared. CKD males had significantly elevated BMI, SBP, DBP, TCH, TG, $S_{cr,}$ UA, Hb and CKD females had significantly elevated HDL, LDL. There was no statistically significant difference in terms of PPBS, FBS, and eGFR.

Table No. 4:

Variable	CKD MALES (mean ±SD)	CKD FEMALES (mean ±SD)	p-valuee
BMI	27.1±4.7	24.5±4.9	**0.0007****
SBP	145.2±24.9	136.9±22.73	**0.02***
DBP	95.6±9.1	92.5±10.3	**0.04***
FBS	113.1±25.9	109.7±21.9	**0.35^{NS}**
PPBS	150.6±39.5	146.2±31.4	**0.41^{NS}**
S_{cr}	3.0±1.8	2.4±0.5	**0.04***
UA	7.4±1.2	5.5±1.6	**0.0001****
TCH	169.7±16.4	146.2±31.4	**0.0001****
TG	127.5±12.7	114.2±18.1	**0.0001****
HDL	71.1±14.6	83.4±17.2	**0.0001****
LDL	73.1±15.2	87.0±10.1	**0.0001****
Hb	13.5±2.8	12.1±2.4	**0.0007****
eGFR	34.0±24.6	38.2.1±26.1	**0.29^{NS}**

* P<0.05 is considered statistically significant.

****P<0.001 is considered extremely significant.

NS is considered statistically non-significant.

DISCUSSION

This study aimed to assess the related risk factors of CKD, the key findings of the study were that of the 176 CKD patients 103 (58.52%) were females and 73 (41.48%) were males. A study conducted by Leila Malekmakan et al.,[8] resulted that 59.6% of CKD cases account for females and 40.4% for males. The result of this study was found to be similar to the above study and indicated that the female gender was the strongest risk factor for CKD.

In this study, the mean (±SD) age of the total study population was 52±19.9 years. 53 (30.11%) patients were in the age group of >68 years. The result of this study coincides with the study conducted by Leila Malekmakan et al.,[8] and Lin et al., which resulted that the prevalence of CKD increased with aging in both males and females and the prevalence of CKD was higher in women than in men in almost all age groups respectively.

In our study, using CKD EPI equation used to mobile application to calculate eGFR, the prevalence of CKD was found to be higher for stage 3. 24 (13.64%) male and 41 (23.30%) female patients had stage 3 CKD. The result of this study is in contrast to the study conducted by Kore C et al.,[9] which showed the prevalence of CKD is higher for stage 5 and lower for stage 3 and stage 4.

In this study, 40 (22.73%) male patients and 2 (1.14%) female patients were alcoholic, 54 (30.68%) male patients and 9 (5.11%) female patients were smokers/tobacco users which shows that majority of the patients were smokers. By the waist-hip ratio, 16 (9.09%) male and 19 (10.8%) female patients had low waist-hip ratio, 37 (21.02%) male and 42 (23.86%) female patients had moderate waist-hip ratio, 20 (11.36%) male and 46 (26.14%) female patients had high waist-hip ratio. This indicates that the majority of male patients have moderate and the majority of the female patients have a high waist-hip ratio respectively. In this study, 7 (3.98%) male and 13 (7.39%) female patients were underweight, 15 (8.52%) male and 49 (27.84%) female patients were having normal weight, 39 (22.16%) male and 30 (17.04%) female patients were overweight, 12 (6.82%) male and 11 (6.25%) female patients were obese which shows that majority of male patients were overweight whereas majority of female patients were of normal weight range.

The mean values of body mass index (BMI) (p=0.0007), systolic blood pressure (SBP) (p=0.02), diastolic blood pressure (DBP) (p=0.04), serum creatinine (S_{cr}) (p=0.04), serum uric acid (UA) (p=0.0001), serum total cholesterol (TCH) (p=0.0001), serum triglycerides (TG) (p=0.0001), and haemoglobin (Hb) (p=0.0007) were significantly higher in male patients compared to female patients with CKD. The current study results coincides with the study conducted by Lingyu Xue et al.,[10] which resulted that body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), serum creatinine (S_{cr}), serum uric acid (UA), serum total cholesterol (TCH), and serum triglycerides (TG) were significantly higher for male patients with CKD.

Serum high-density lipoprotein (HDL), and serum low-density lipoprotein (LDL) are found to be significantly higher p=0.0001 and p= 0.0001 respectively in female patients compared to males patients with CKD. This study result is similar to the study conducted by Lingyu Xue et al.,[10] which resulted from that serum high-density lipoprotein (HDL), and serum low-density lipoprotein (LDL) were significantly higher in CKD females ($p < 0.05$ each).

Fasting blood sugar (FBS) (P= 0.35), post pranial blood sugar (PPBS) (P= 0.41), and estimated glomerular filtration rate (eGFR) (P= 0.29) was not statistically significant when compared between CKD male and CKD female patients in this study.

CONCLUSION

There is a high burden of chronic kidney disease in the Indian population that accounts for a high prevalence of morbidity and mortality. Our study concluded that the risk factors such as age, gender, smoking, educational level, waist-hip circumference, body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol (TCH), triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), serum creatinine ($S_{cr)}$, uric acid (UA) and hemoglobin level (Hb) were found to be associated with CKD.

CONFLICT OF INTERESTS

The authors have no funding sources or conflicts of interest to report.

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