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Original Research Article

The study of co-morbid conditions in various stages of chronic kidney disease

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ABSTRACT

Background: Chronic kidney disease (CKD) is a global health problem affecting 10% of the adult population worldwide. In CKD, Multimorbidity is common which mainly includes hypertension (HTN), diabetes mellitus (DM) and cardiovascular diseases. So, there is a need to find out the effect of multi-morbidity on renal outcomes.

Objective: The main objective is to study the impact of comorbidities on renal outcomes.

Materials and Methods: Overall 80 patients with comorbidities were enrolled in the study. The Study was conducted in inpatients with CKD of General Medicine department of age greater than 30 years of both genders were included.

Results: Hypertension and CKD have a high prevalence amongst the population with stage 3-5 CKD in our study. As per our study Diabetes is the most common cause of End Stage Renal Disease (ESRD). This study shows higher prevalence of CKD among males (61.25%) than females (38.75%). This cross-sectional study estimated that prevalence of CKD is highest among 40-49 years (32.5%) and lowest among >70 years (11.25%). There is significant association between smoking and CKD.

Conclusion: Our study revealed that patients with Diabetes and HTN who are found to have proteinuria are very likely to have CKD. Our study suggested that early detection and management of underlying causes may help to slow down the progression of CKD. Patients with multi-morbidity should take care by performing early screening for proteinuria and kidney function tests.

1. Introduction

CKD is defined as the presence of kidney damage that persists for more than 3 months indicated by abnormal albumin excretion or declined kidney function measured by estimated glomerular filtration rate.

CKD may be a leading cause of mortality and morbidity and commonly happens in people with synchronal comorbidity that is related to adverse clinical outcomes. CKD is related to complications that have an effect on all body systems and people with CKD expertise considerably lower health related quality of life compared with the general population.

Risk of death increases in people with CKD as kidney function deteriorates. Diabetes and Hypertension are the leading cause of CKD and are hazard elements for the development of both CKD and CVD. Targeting modifiable risk factors can thus improve survival and quality of life by reducing progression of CKD to ESRD.

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2. Aetiology

2.1. Chronic kidney disease associated hypertension

Hypertension is the common comorbidity correlated with chronic kidney disease (CKD). Various mechanisms of hypertension include salt retention, volume overload, endothelial dysfunction, sympathetic overactivity and alterations in hormonal systems that regulate blood pressure (BP). Hypertension remains as a leading cause of end-stage kidney disease (ESKD).[1] More patients develop HTN from CKD than developing CKD from HTN, which is termed as hypertensive nephrosclerosis.[2]

2.2. Chronic kidney disease associated diabetes mellitus

Diabetes is an important risk factor for death and enhances the cardiovascular risk of the patients. Microalbuminuria is the earliest clinical sign of diabetic kidney disease (DKD). Progression to Microalbuminuria is correlated with improved progression of CKD and possibly, ESRD. DM and Microalbuminuria represents independent risk factors for cardiovascular disease (CVD).[3]

2.3. Chronic kidney disease associated cardiovascular diseases

Generally, heart and kidneys work closely together. As CKD is a risk factor for CVD, CVD also promotes the progression of kidney disease. Mechanisms include heart failure promoting kidney function decline and atherosclerosis promoting progression of renovascular disease.[4–8] When there is a heart disease, heart may not pump blood properly this causes pressure to build up in main veins connected to kidneys which leads to blockage and decreased supply of oxygen rich blood leading to kidney disease and when kidneys are not working properly hormones that regulate blood pressure has to work hard to increase blood supply to kidneys, then heart has to pump harder which can lead to heart disease.[9–13]

3. Materials and Methods

This cross-sectional study was carried out in GSL General Hospital and Medical College for CKD Project from September 2019 to February 2020. Sample size was 80 inpatients. CKD patients with comorbidities of age group greater than 30 years were included in the study. Patients of both genders were included. Pregnant women were excluded. The data was collected directly from case sheets of individual patients through a self-designed questionnaire after filling the informed consent forms from each patient based on the objective of the study.[14–17]

4. Results

4.1. Patient's distribution based on gender

In this study, totally 80 patients were included. Among them 31(38.75%) were females and 49 (61.25%) were males.

4.2. Patient's distribution based on age

In this study among 80 patients, majority of subjects belongs to 40-49 (32.5%) age group followed by 30% in 50-59 yrs, 13.75% in 60-69 yrs, 12.5% in 30-39 yrs and 11.25% in subjects >70yrs of age. The details of age groups were given in the following Table 2.

4.3. Patient's distribution based on social history

In study population of 80 subjects, about 42.50% were current and ex-smokers. Among those 36.25% Males and 6.25% females were detected to have CKD. There were 38.75% (31 subjects) who consume alcohol, among them 12.50% (10) were ex-alcoholics. The prevalence of CKD is high among smokers and alcoholics. The details of the social history were given in the following Figure 1.

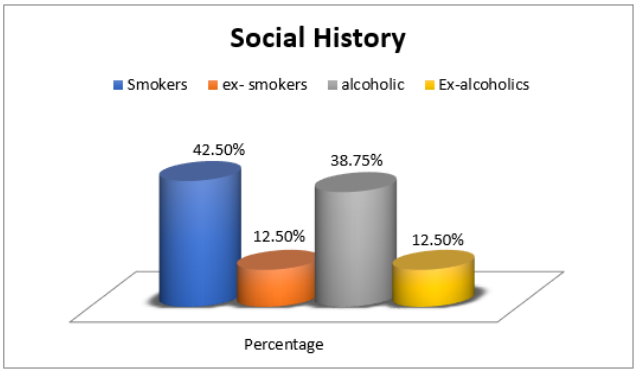

Fig. 1: Graphical representation of social history

4.4. Associated co-morbid conditions

We have identified 2 patients of stage-3 CKD, 21 of stage-4 CKD and 57 of stage-5 CKD patients. Of the total patients 28(35%), 32(40%), 20(25%) had one, two and at least three comorbidities respectively. Among all subjects, 65% met the definition of multimorbidity.

From the sample size of 80, the three most common comorbidities observed were hypertension, diabetes and cardiovascular. In patients with at least three comorbidities, the prevalence of hypertension approached 75%. From, 72.5% of the subjects developed hypertension, 67.5% developed diabetes and 15% had cardiovascular diseases, 8.75% had tuberculosis, 11.25%, 10%, 5% developed UTI, Hypothyroidism, Renal calculi respectively. Proteinuria condition was majorly associated with both hypertension

Table 1: Age group details of the study participants.

Age Classes	Male	Female	Number of Patients (n =80)	Percentage (%)
30-39	7	3	10	12.5
40-49	12	14	26	32.5
50-59	15	9	24	30
60-69	8	3	11	13.75
>70	7	2	9	11.25
Total	49	31	80	100

Table 2: Table of Co-morbid conditions in various stages of CKD.

Comorbidity	CKD Stage 3(eGFR 30-59)Total n =2		CKD Stage 4(eGFR 15-29)Total n =21		CKD Stage 5(eGFR <15)Total n =57		Total n =80	
	n	%	N	%	n	%	N	%
Hypertension	1	50	14	66.67	43	75.4	58	72.5
Diabetes mellitus	1	50	19	90.47	34	59.64	54	67.5
CV	1	50	4	19.04	7	12.28	12	15
TB	0	0	1	4.76	6	10.52	7	8.75
UTI	0	0	2	9.52	7	12.28	9	11.25
Hypothyroidism	0	0	2	9.52	6	10.52	8	10
Renal calculi	0	0	1	4.76	3	5.26	4	5
Proteinuria	0	0	13	61.90	34	59.64	47	58.75

and diabetes and 58.75% of the patients were found with presence of albumin in urine (proteinuria).

Subjects on MHD: Out of 80 subjects, 37(46.25%) were on maintenance haemodialysis. Males (32.50%) were predominant than females (13.75%).

5. Discussion

The case study was carried out with data of 80 patients at GSL General Hospital and College, Rajamahendravaram, Andhra Pradesh. In India, diabetes and hypertension today account for 40-60% cases of CKD.[18] Chronic kidney disease (CKD) is a silent epidemic. The true prevalence of CKD within a population is very difficult to estimate, since early to moderate CKD were usually asymptomatic. ESRD in the consequence of CKD is one of the most expensive diseases to treat. Only way is to prevent it.[19] Individuals with comorbidities like diabetes, hypertension, cardiovascular are considered on high priority as they are potential candidates for rapid evaluation to halt the progression of CKD complications. This case study presented observational data from a greater part of patients with CKD attending a tertiary care teaching hospital, Rajahmundry. This study was aimed to determine the co-morbid conditions in various stages of CKD, so that we can decrease the progression of CKD to early ESRD.

This study shows higher prevalence of CKD among males (61.25%) than females (38.75%). From the sample size of 80, this cross-sectional study estimated that prevalence of CKD is highest among 40-49 years (32.5%) and lowest among >70 years (11.25%). In this study there were no female alcoholics. There were 42.50% (34) subjects who are smokers and 10 participants identified as past smokers. Current smokers were likely to be males compared with females. There is significant association between smoking and CKD. There were 38.75% (31) subjects who are alcoholics. This study observed significant association between alcoholism and CKD similar to K Kokila study.[20]

In CKD patients, Multimorbidity is common. Of all the comorbidities identified hypertension (72.5%) is the one which majorly affected the kidney function. Hypertension is the most causative factor for CKD and contributes to its progression as eGFR declines, the severity of Hypertension increases drastically. Hypertension and CKD are both independent risk factors for cardiovascular diseases and they may raise the risk of CVD mortality and morbidity. Diabetes mellitus (67.5%) was the second most comorbidity that leads to CKD in our study. Diabetes is correlated with adverse outcomes in all stages of CKD. Patients with both diabetes and hypertension who are found to have proteinuria (58.75%) are very likely to have CKD. Renal calculi (5%) are the comorbidity that minorly affected the kidney.

Progressive CKD is linked to several complications with higher prevalence and intensity at lower levels of kidney function. In our study, out of 80 patients, majority of the patients developed anaemia 14 (17.50%) as a major complication. Dialysis induced headache was observed as minor complication with 2.50%, it generally occurs as a result of large amount of water and electrolyte shifts. Other complications like dys-electrolytemia, sepsis, pulmonary oedema, GI problems were also observed. As kidney disease

progresses, patients often experience a variety of symptoms. Symptoms were evaluated in 80 CKD stage 1-5 patients. Each patient reported experiencing atleast one symptom out of which Shortness of breath (80%) was majorly experienced and burning micturition (1.25%) was minorly experienced. Out of 80 patients, 46.25% patients were on maintenance hemodialysis.

6. Conclusion

Our research study revealed that diabetes and hypertension are the dominant comorbidities for chronic kidney disease. Based on the findings of the study, proteinuria is mainly associated with diabetes and hypertension. Our study subjects had been developed the outcome because of the progression of CKD is mainly due to lack of early screening and detection.

Hence, we recommend the following steps for those who are having the threat of developing CKD,

1. Patients with diabetes and hypertension should take care by performing early screening for proteinuria, frequent check-ups and kidney function tests.
2. Early detection and management of underlying causes and comorbidities may result in reduced progression of CKD.

7. Abbreviations

CKD: Chronic Kidney disease; HTN: Hypertension; DM: Diabetes Mellitus; ESRD: End Stage Renal Disease; BP: Blood Pressure; ESKD: End Stage Kidney Disease; DKD: Diabetic Kidney Disease; CVD: Cardiovascular Disease; UTI: Urinary Tract Infections; AKI: Acute Kidney Injury; GFR: Glomerular Filtration Rate; SCr: Serum Creatinine; Hb: Haemoglobin; ICMER: India Council of Medical Research Data.

8. Source of Funding

None.

9. Conflict of Interest

None.

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