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ORIGINAL ARTICLE

Evaluation of metabolic complications associated with chronic kidney disease

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ABSTRACT

Background: Chronic kidney disease is a precursor to end-stage kidney disease and is associated with an increased risk of death. The present study assessed metabolic complications associated with chronic kidney disease. **Materials & Methods:** The present study was conducted on 78 patients of CKD of both genders. General physical examination was done. Blood sample was collected in a dry disposable syringe. The blood sample was centrifuged at 3000 rpm for 10 minutes for the separation of serum and plasma respectively for the estimation of calcium, phosphate, bicarbonate, potassium, urea etc. **Results:** Out of 78 patients, there were 48 male and 30 females. Out of 78 patients, fatigue was seen in 57 patients, muscle pain in 58, numbness in 52, bone pain in 42 and vomiting in 47. CKD1 was seen in 3, CKD 2 in 3, CKD 3A in 4, CKD 3A in 4, CKD 3B in 16, CKD 4 in 22 and CKD 5 in 30. Hyperkalemia was seen in 13, hypocalcemia in 21, hyperurecemia in 20, metabolic acidosis in 15, hyperphosphatemia in 10 patients. The difference was non- significant (P> 0.05). **Conclusion:** Authors found that metabolic complications are common in patients with CKD. Hence authors recommend screening for all the metabolic complication from stage 3A onwards.

Key words: Chronic kidney disease, Hyperkalemia, metabolic complication.

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INTRODUCTION

Chronic kidney disease (CKD) is a precursor to end-stage kidney disease and is associated with an increased risk of death.[1] End-stage kidney disease has a poor prognosis and requires major intervention, in the form of dialysis or transplant. Early identification of subjects with CKD should, therefore, be encouraged for the purpose of targeting potential interventions, e.g. low-protein diet, control of blood pressure, etc.[2] Chronic kidney disease encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate. Chronic Kidney Disease is a major public health problem and major cause of morbidity and mortality worldwide.[3]

Prevalence of CKD worldwide is estimated to be 8-16% [2] and in India prevalence is 17.2%. CKD is diagnosed on the basis of presence of markers of kidney damage and kidney function. During the last decade the prevalence of chronic kidney disease (CKD) has increased considerably and is estimated to range from about 10-15% of the elderly population. Only portion of patients with early stage 3 CKD progresses to stage 4 where the risk of cardiovascular disease, end stage renal disease (ESRD), or death becomes substantially higher. Metabolic complications associated with CKD are anemia, hyperkalemia, hypocalcemia, metabolic acidosis, hyperphosphatemia and hypereuricemia etc.[4] The present study assessed metabolic complications associated with chronic kidney disease.

MATERIALS & METHODS

The present study was conducted in the department of Internal Medicine. It comprised of 78 patients of CKD of both genders. The study protocol was approved from institutional ethical committee. All were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. General physical examination was done. Blood sample was collected in a dry disposable syringe under aspectic condition by vein puncture and arterial sample was collected by arterial puncture under aseptic condition. Venous sample was stored in EDTA and plain tube arterial sample was stored in heparinized tube. The blood sample was centrifuged at 3000 rpm for 10 minutes for the separation of serum and plasma respectively for the estimation of calcium, phosphate, bicarbonate, potassium, urea etc. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Total- 78		
Gender	**Male**	**Female**
Number	48	30

Table I shows that out of 78 patients, there were 48 male and 30 females.

Table II Clinical features in patients

Clinical features	Frequency	P value
Fatigue	57	0.82
Muscle pain	58	
Numbness	52	
Bone pain	42	
Vomiting	47	

Table II, graph II shows that out of 78 patients, fatigue was seen in 57 patients, muscle pain in 58, numbness in 52, bone pain in 42 and vomiting in 47. The difference was non- significant (P> 0.05).

Graph II Clinical features in patients

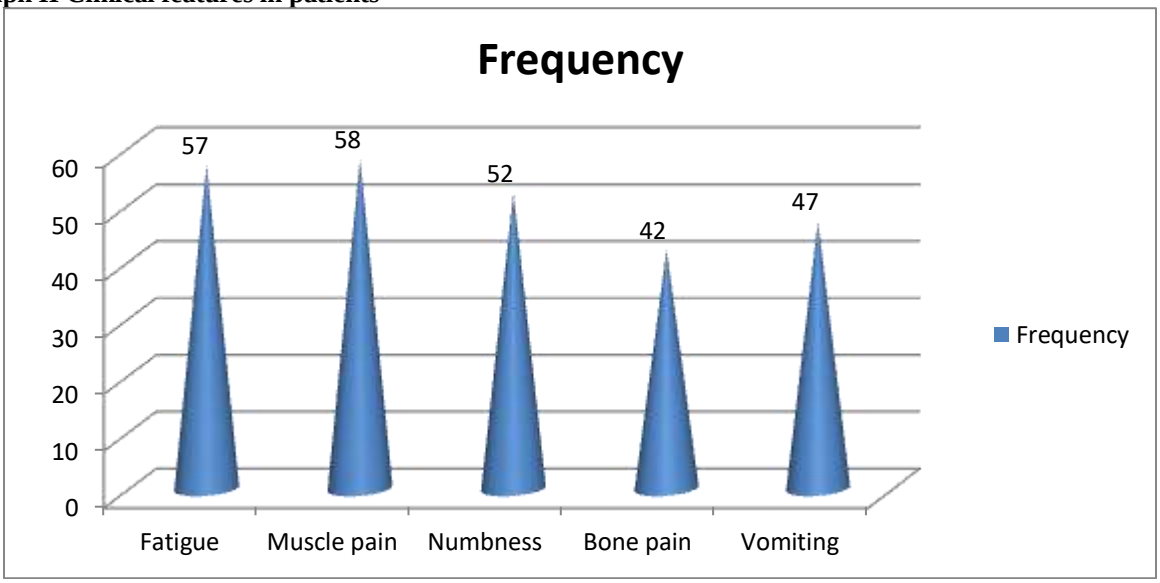

Table III Distribution of patients based on CKD stage

Stages of CKD	Frequency	P value
CKD 1	3	0.001
CKD 2	3	
CKD 3A	4	
CKD 3B	16	
CKD 4	22	
CKD 5	30	

Table III sows that CKD1 was seen in 3, CKD 2 in 3, CKD 3A in 4, CKD 3A in 4, CKD 3B in 16, CKD 4 in 22 and CKD 5 in 30. The difference was significant (P< 0.05).

Table IV Metabolic complications in patients

Stage of CKD	Hyper kalemia	Hypo calcemia	Hyper uricemia	Metabolic Acidosis	Hyper phosphatemia	P value
CKD 1	1	1	1	0	0	NS
CKD 2	1	1	1	1	0	NS
CKD 3A	0	1	1	1	1	NS
CKD 3B	3	4	5	2	2	NS
CKD 4	4	6	5	6	1	S
CKD 5	4	8	7	5	6	S

Table IV shows that hyperkalemia was seen in 13, hypocalcemia in 21, hyperuricemia in 20, metabolic acidosis in 15, hyperphosphatemia in 10 patients. The difference was non- significant (P> 0.05).

DISCUSSION

The National Kidney Foundation published its definition and classification of chronic kidney disease (CKD), evidence has accumulated showing that it is a common disease. Early detection of CKD and its metabolic complications is now a priority for delaying disease progression and for primary prevention of many CKD-associated chronic diseases, including cardiovascular, mineral, and bone diseases. However, data on the natural history of these complications according to reference methods are sparse, and there is little evidence about the most appropriate timing for their detection.[5] Patients with CKD (especially advanced CKD) are at high risk for hyperkalemia, especially when factors and comorbidities that interfere with renal potassium excretion are present. The prevalence of hyperkalemia in CKD patients is much higher than in the general population.[6] CKD carries a 3-fold higher risk of death. Therefore, clinical risk factors for the initiation and/or progression of CKD should be ascertained during routine healthcare encounters and periodically, thereafter. Individuals at increased risk for CKD must be tested for kidney damage and have their eGFRs evaluated more frequently. In addition, aggressive risk factor reduction should be carried out in individuals at increased risk for CKD even when CKD is not clinically apparent.[7] The present study assessed metabolic complications associated with chronic kidney disease. In present study, out of 78 patients, there were 48 male and 30 females. Kuriakose et al[8] found that Out of 50 patients, 62% (n = 31) were men, a mean age of 46.22 years (± 12.89 SD), a mean creatinine clearance of 5 mmol/24 hours (±2.16 SD), a mean albumin: creatinine ratio of 49 mg/g (±11.33 SD) and a mean serum creatinine of 16.5 mg/dl (±6.65 SD). Chronic glomerulonephritis (30%), hypertension (24%) and diabetic nephropathy (20%) were the leading causes of CKD. Anemia (94%) was universal finding on laboratory work up. Gastrointestinal manifestations stand out among the clinical presentations with anorexia (76%), nausea (60%) vomiting (40%) and abdominal pain (26%).

We found that out of 78 patients, fatigue was seen in 57 patients, muscle pain in 58, numbness in 52, bone pain in 42 and vomiting in 47. CKD1 was seen in 3, CKD 2 in 3, CKD 3A in 4, CKD 3A in 4, CKD 3B in 16, CKD 4 in 22 and CKD 5 in 30. Hyperkalemia was seen in 13, hypocalcemia in 21, hyperurecemia in 20, metabolic acidosis in 15, hyperphosphatemia in 10 patients.

Gjørup et al[9] found that of the total 229 study participants, 50.2% were females and the mean age was 47±15.7 years. Among study participants, the prevalence of chronic kidney disease (CKD) was found to be 21.8%. Of all study participants, 9 (3.9%) had renal impairment (eGFR < 60 ml/min/ 1.73 m^2) and 46 (20.1%) had albuminuria. Older age, systolic blood pressure ≥140mmHg, type 2 diabetes mellitus and longer duration of diabetes were independent risk factors of CKD.

The kidneys play a major role in maintaining potassium homeostasis by matching potassium intake with potassium excretion. Potassium is freely filtered by the glomerulus and 90-95% is reabsorbed in the proximal tubule and loop of Henle. Urinary excretion of potassium begins in the distal convoluted tubule and is further regulated by the distal nephron and collecting duct.[10]

CONCLUSION

Authors found that metabolic complications are common in patients with CKD. Hence authors recommend screening for all the metabolic complication from stage 3A onwards.

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