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ORIGINAL ARTICLE

Evaluation of metabolic complications of chronic kidney disease

Ashutosh Kumar

Assistant Professor, Department of General Medicine, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

ABSTRACT:

Background: The prevalence of chronic kidney disease (CKD) is very high in the elderly population. The present study evaluated metabolic complications of chronic kidney disease. **Materials & Methods:** 70 patients of chronic kidney disease of both genders were assessed for estimation of calcium, phosphate, bicarbonate, potassium, urea etc. Metabolic complications was recorded. **Results:** Out of 70 patients, males were 40 and females were 30. Clinical features comprised of muscle pain in 45, numbness in 52, bone pain in 48, vomiting in 31 and fatigue in 33 patients. The difference was non-significant (P> 0.05). Hyperkalemia was seen in 10, hypocalcemia in 15, hyperuricemia in 15, metabolic acidosis in 11, hyperphosphatemia in 8 patients. The difference was non- significant (P> 0.05). **Conclusion:** Most common metabolic complications was hyperuricemia, hypocalcemia and hyperkalemia.

Key words: Chronic kidney disease, bicarbonate, potassium

Corresponding author: Ashutosh Kumar, Assistant Professor, Department of General Medicine, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

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INTRODUCTION

The prevalence of chronic kidney disease (CKD) is very high in the elderly population; more than 35% of patients over 70 years of age have stage 3 CKD or higher.[1]Chronic kidney disease (CKD) is a precursor to end-stage kidney disease and is associated with an increased risk of death.[2]CKD increases the risk of end-stage renal disease (ESRD) among the elderly, although the magnitude of risk is significantly lower compared to younger patients with CKD.[3] The decreased magnitude of risk is presumably due to elderly patients' increased risk for all-cause mortality and possibly a slower rate of decline in renal function. In addition, the increased cardiovascular risk conferred by CKD is seen, perhaps even accentuated, in the elderly with CKD.[4]

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.[5] Metabolic complications associated with CKD are anemia, hyperkalemia, hypocalcemia, metabolic acidosis, hyperphosphatemia and hypereuricemia etc.[6]According to Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines, all patients at stage 3 CKD or above (*i.e.*, those with a GFR <60 ml/min per 1.73 m^2), should be evaluated for all complications.[7]The present study evaluated metabolic complications of chronic kidney disease.

MATERIALS & METHODS

The present study comprised of 70 patients of chronic kidney disease of both genders. All were informed regarding the study and written consent was obtained.Inclusion criteria were age 65 years or greater, an index outpatient GFR in 2008 between 15 and 60 ml/min/1.73m^2, and an outpatient GFR less than or equal to 60 ml/min/1.73m^2 between 90 and 365 days prior to the index GFR.

Data such as name, age, gender etc. was recorded. A thorough physical examination was performed. 5 ml venous blood was obtained and 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 patients

Total- 70		
Gender	**Male**	**Female**
Number	40	30

Table I shows that out of 70 patients, maleswere 40 and females were 30.

Table II Assessment of clinical profile

Clinical features	Number	P value
Muscle pain	45	0.84
Numbness	52	
Bone pain	48	
Vomiting	31	
Fatigue	33	

Table II, graph II shows that clinical features comprised ofmuscle pain in 45, numbness in 52, bone pain in 48, vomiting in 31 and fatigue in 33 patients. The difference was non- significant (P> 0.05).

Graph II Assessment of clinical profile

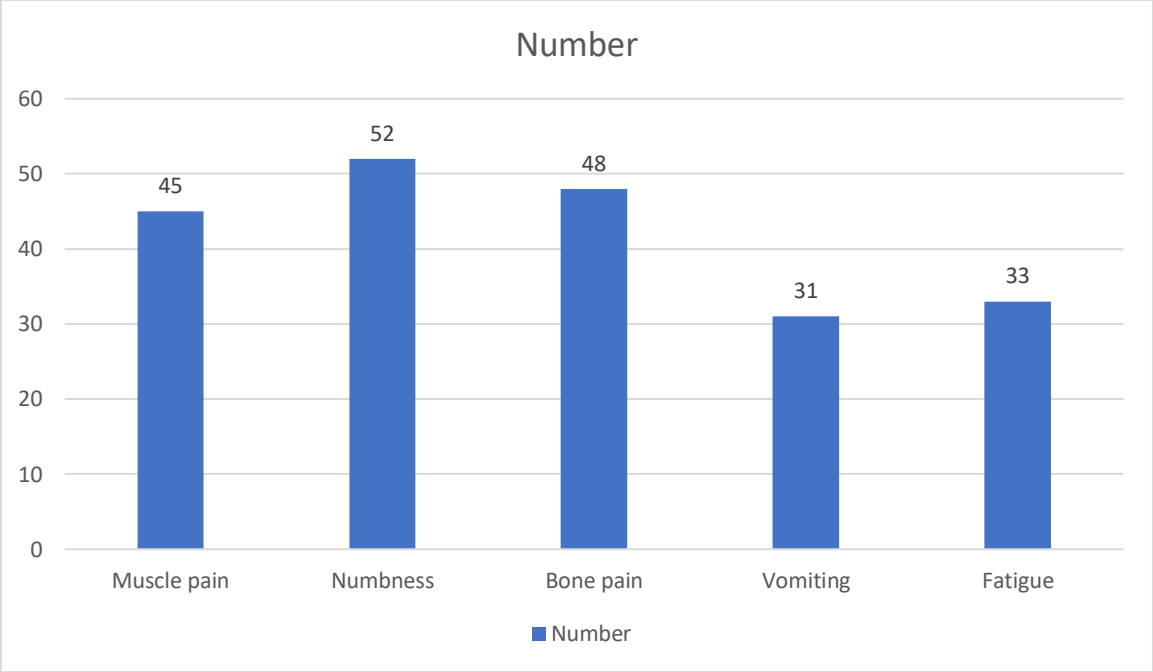

Table III Assessment of metabolic complications

Stage	Hyper kalemia	Hypo calcemia	Hyper uricemia	Metabolic Acidosis	Hyper phosphatemia	P value
CKD 1	1	1	1	0	0	0.91
CKD 2	1	1	1	1	0	0.98
CKD 3A	1	1	1	1	1	1
CKD 3B	2	2	3	2	2	0.87
CKD 4	2	4	4	3	1	0.94
CKD 5	3	6	5	4	4	0.92

Table III shows that hyperkalemia was seen in 10, hypocalcemia in 15, hyperuricemia in 15, metabolic acidosis in 11, hyperphosphatemia in 8 patients. The difference was non- significant (P> 0.05).

DISCUSSION

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.[8] Only a portion of patients with early stage 3 CKD progress to stage 4 where the risk of cardiovascular disease, end stage renal disease (ESRD), or death becomes substantially higher.[9] Identifying the subset of patients who enter stage 3 and are most likely to progress to stage 4 CKD could both improve outcomes, by allowing more appropriate referrals for specialist care, as well as spare those unlikely to progress the adverse effects and costliness of an unnecessarily aggressive approach.[3]Prevalence of CKD worldwide is estimated to be 8-16% and in India prevalence is 17.2%.CKD is diagnosed on the basis of presence of markers of kidney damage and kidney function.[10]The present study evaluated metabolic complications of chronic kidney disease.

We found that out of 70 patients, males were 40 and females were 30. Paul E et al[11] found that the average age was 79, the average GFR was 46.5; 3.1% had anemia, 2.5% hyperkalemia, 2.3% acidosis, and 4.4% had hyperphosphatemia. Lower GFR was associated with increased rates of metabolic complications across all age groups (odds ratio per 5mL/min/1.73m2 decrease in GFR in multivariable models was 1.21 for anemia, 1.26 for hyperkalemia, 1.45 for acidosis, and

1.72 for hyperphosphatemia). There was no significant interaction between age and GFR in models including only age and GFR or in multivariable models (p values for the age X GFR interaction term: 0.66 for anemia, 0.19 for hyperkalemia, 0.54 for acidosis, and 0.22 for hyperphosphatemia).

We found that clinical features comprised of muscle pain in 45, numbness in 52, bone pain in 48, vomiting in 31 and fatigue in 33 patients. Moranne et al[12] found that as mGFR decreased from 60 to 90 to <20 ml/min per 1.73 m2, the prevalence of hyperparathyroidism increased from 17 to 85%, anemia from 8 to 41%, hyperphosphatemia from 1 to 30%, metabolic acidosis from 2 to 39%, and hyperkalemia from 2 to 42%. Factors most strongly associated with metabolic complications, independent of mGFR, were younger age for acidosis and hyperphosphatemia, presence of diabetes for acidosis, diabetic kidney disease for anemia, and both male gender and the use of inhibitors of the renin-angiotensin system for hyperkalemia. mGFR thresholds for detecting complications with 90% sensitivity were 50, 44, 40, 39, and 37 ml/min per 1.73 m2 for hyperparathyroidism, anemia, acidosis, hyperkalemia, and hyperphosphatemia, respectively. Analysis using estimated GFR produced similar results.

We found that hyperkalemia was seen in 10, hypocalcemia in 15, hyperuricemia in 15, metabolic acidosis in 11, hyperphosphatemia in 8 patients. Chase et al[13] found that at the entry to stage 3 CKD, hemoglobin, bicarbonate, calcium, and albumin values were significantly lower and phosphate values significantly higher in progressors compared to non-progressors even though initial eGFR values were similar. The differences were sufficiently large that a prediction model of progression could be developed based on these values. Post-test probability of progression in patients classified as progressors or non-progressors were 81% (73% − 86%) and 17% (13% − 23%), respectively. Gjørup et al[14] found that out of 229, 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%. 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.

CONCLUSION

Authors found that most common metabolic complications was hyperuricemia, hypocalcemia and hyperkalemia.

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