

Original Research Article

Study of clinical profile of chronic kidney disease in non-diabetic patients

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ABSTRACT

Background: Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate. Cardiovascular disease is one of the major cause of morbidity and mortality in patients at every stage of CKD. Diabetes mellitus and hypertension together being major cause for CKD. Hypertension is a common cause for CKD and an independent risk factor for cardiovascular disease. This study mainly focused on the causes of CKD other than diabetes mellitus. An early detection and appropriate intervention of these patients will possibly help prevent progression of renal disease.

Methods: We assessed 55 non diabetic CKD patients who presented to the OPD/IPD in Victoria hospital, Bowring and Lady Curzon hospital and other hospitals affiliated to Bangalore medical college and research institute during period June 2018 to December 2019. A detailed history and clinical examination was performed and patients were subjected to necessary investigations.

Results: The commonest etiology for CKD was found to be hypertensive nephropathy followed by glomerulonephritis. Common symptoms were generalized weakness, lower limb swelling. Commonest signs are pallor, pedal edema and hypertension.

Conclusions: CKD is a major health problem. Diabetic nephropathy is the commonest cause for CKD followed by hypertensive nephropathy and glomerulonephritis. Anaemia, pedal oedema, oliguria and generalised weakness were the major presenting clinical signs and symptoms in CKD. This condition when detected in early stages and managed can slow down the progression of CKDs and delay the need of renal replacement therapy.

Keywords: Non-diabetic patients, Chronic kidney disease, Diabetic nephropathy

INTRODUCTION

CKD is a worldwide public health problem that affects millions of people from all racial and ethnic groups. CKD encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate.¹

Diabetes mellitus is the leading cause of CKD followed by hypertension.² Other causes include glomerular disease, cystic kidney disease, tubulointerstitial disease, obstructive uropathy, vascular diseases, recurrent renal

calculi disease, congenital defects of kidney or bladder, autoimmune diseases like systemic lupus erythromatosus, rheumatoid arthritis, wegener granulomatosis.³

Cardiovascular disease is a major cause of mortality and morbidity among patients with CKD. In CKD the most prevalent lipid abnormalities which have been noted are hypertriglyceridemia and decreased HDL concentration. The LDL levels are usually found to be normal or marginally increased.⁴

Kidney damage may be confirmed through a variety of methods including histologic evidence of kidney disease, abnormalities in the composition of blood or urine or abnormal findings on renal imaging.⁵

This study mainly focused on the causes of CKD other than diabetes mellitus. An early detection and appropriate intervention of these patients will possibly help prevent progression of renal disease, cardiovascular complications and thereby improve the survival rates.

Objectives

The objectives were to evaluate the clinical and demographic profile of CKD in non-diabetic patients and to assess the severity of CKD in non-diabetic patients.

METHODS

In this study we assessed 55 non-diabetic CKD patients who presented to the OPD/IPD in Victoria hospital, Bowring and Lady Curzon hospital and other hospitals affiliated to Bangalore medical college and research institute during period June 2018 to December 2019. A detailed history and clinical examination was performed and patients were subjected to necessary investigations. Clinical profile of CKD patients who are non-diabetics were studied in detail with respect to demography, renal function, commonest etiology, signs and symptoms, lab parameters and radiographic imaging. The findings were tabulated and analysis was done.

Inclusion criteria

Patients with history and physical findings of CKD and biochemical and radiological abnormalities suggestive of CKD were included in the study.

Exclusion criteria

Patients below the age of 18 years and are known case of diabetes mellitus were excluded.

Statistical methods

Data was entered in MS excel 2016 and analysis was done using statistical package for social sciences (SPSS) 19th version.

RESULTS

The study shows that males (69%) were more commonly affected than females (31%). Among males, the age group between 40-59 years was the most affected, whereas among females the age group most affected was 60-79.

According to etiology, the study shows that hypertensive nephropathy (63%) is the most common cause of CKD. This was kept in mind that the study included only non-

diabetic CKD. This is followed by glomerulonephritis (20%).

As we divide the etiology age-wise, it was seen that in the younger subjects between 20-39 years of age, glomerulonephritis (79%) was the most common cause. As the age progressed, as was evidenced in all the other age groups, hypertensive nephropathy remained the most common cause. Hypertensive nephropathy, by itself, was seen as the biggest player in the middle-aged subjects between 40-59 years of age. The least commonly seen etiologies were polycystic kidney disease, solitary kidney and reflux nephropathy, all of which were most important in the younger subjects below 59 years of age.

General weakness was noted to be the most widespread symptom, present in 98% of subjects. However, this was a non-specific symptom and did not hold much significance. Puffiness of face (87%) was the most common specific symptom seen. Dysuria, sleep disturbances and weight loss, in that order, were the least commonly seen, noticed only in 7%, 9% and 10% of the subjects, respectively.

Signs of CKD were tabulated and it was noted that pallor was seen inevitably in 100% of the subjects. Apart from this, pedal edema was noted in 75% and hypertension in 64% of subjects, which made them the second and third most common signs seen in CKD. Nail changes of CKD that may be attributed to hypoalbuminemia was the least common sign.

Generalised swelling was seen only in 2% subjects and pleural effusion in 9% and these were the least common signs to be noted in the study subjects.

Majority of the subjects studied fell in the GFR bracket of 15-29.9 ml/min. This classifies them into CKD stage 4 (36%). This was followed by a close second being CKD stage 5 (34.5%). Stage 0 and stage 2 saw the least number of subjects, being approximately 4% each.

The study showed that most of subjects (69%) studied had a moderate elevation of creatinine levels, with the serum creatinine levels remaining below 5 mg/dl. Severely raised creatinine >12 mg/dl was only seen in 5.5% subjects.

Blood urea levels of 50-150 mg/dl was seen in majority of the patients (69%) followed by the urea being <50 mg/dl (22%). Blood urea levels raised >250 mg/dl were rare and seen in about 4% of subjects only.

Urine albumin levels showing 1+ was most frequently noted, in about 47% subjects. 20% subjects showed traces and 20% showed nil urine albumin.

As evidenced earlier, pallor was the most frequently noted sign. Hence, anemia is seen more often than not in patients of CKD. Hb levels <10 were seen in 73% of the study subjects.

Table 1: Cross-tabulation of age and gender.

Sex	Age (in years)				Total
	20-39	40-59	60-79	>80	
Male	10	21	7	0	38
(N, %)	71.4	80.8	53.8	0.0	69.1
Female	4	5	6	2	17
(N, %)	28.6	19.2	46.2	100.0	30.9
Total	14	26	13	2	55
(N, %)	100.0	100.0	100.0	100.0	100.0

Table 2: Distribution of the subjects based on diagnosis.

Diagnosis	Frequency	Percent
Glomerulonephritis	11	20.0
Hypertensive nephropathy	35	63.6
Polycystic kidney disease	2	3.6
Reflux nephropathy	4	7.3
Solitary kidney	3	5.5
Total	55	100.0

Table 3: Cross-tabulation of age and etiology of CKD.

Etiology of CKD	Age (in years)				Total	P value
	20-39	40-59	60-79	>80		
Glomerulonephritis (N, %)	11	0	0	0	11	0.001
	78.6	0.0	0.0	0.0	20.0	
Hypertensive nephropathy (N, %)	2	21	10	2	35	
	14.3	80.8	76.9	100.0	63.6	
Polycystic kidney disease (N, %)	1	0	1	0	2	
	7.1	0.0	7.7	0.0	3.6	
Reflux nephropathy (N, %)	0	3	1	0	4	
	0.0	11.5	7.7	0.0	7.3	
Solitary kidney (N, %)	0	2	1	0	3	
	0.0	7.7	7.7	0.0	5.5	
Total (N, %)	14	26	13	2	55	
	100.0	100.0	100.0	100.0	100.0	

Table 4: Distribution of the subjects based on symptoms.

Symptoms		Frequency	Percentage
General weakness	Absent	1	1.8
	Present	54	98.2
Puffiness of face	Absent	7	12.7
	Present	48	87.3
Nausea	Absent	34	61.8
	Present	21	38.2
Vomiting	Absent	34	61.8
	Present	21	38.2
Oliguria	Absent	41	74.5
	Present	14	25.5
Dysuria	Absent	51	92.7
	Present	4	7.3
Sleep disturbances	Absent	50	90.9
	Present	5	9.1
Weight loss	Absent	49	89.1

Continued.

Symptoms		Frequency	Percentage
Loss of appetite	Present	6	10.9
	Absent	20	36.4
	Present	35	63.6

Table 5: Distribution of the subjects based on signs.

Symptoms		Frequency	Percentage
Abdominal swelling	Absent	47	85.5
	Present	8	14.5
General swelling	Absent	54	98.2
	Present	1	1.8
Pallor	Absent	0	0.0
	Present	55	100.0
Pedal edema	Absent	14	25.5
	Present	41	74.5
Hypertension	Absent	20	36.4
	Present	35	63.6
ESM	Absent	40	72.7
	Present	15	27.3
B/L crepitation	Absent	35	63.6
	Present	20	36.4
Pulmonary oedema	Absent	39	70.9
	Present	16	29.1
Ascitis	Absent	44	80.0
	Present	11	20.0
Pleural effusion	Absent	50	90.9
	Present	5	9.1
Nail changes	Absent	55	100.0
	Present	1	4.1

Table 6: Distribution of the subjects based on GFR.

GFR (ml/min)	Frequency	Percent
>90	2	3.6
60-90	2	3.6
30-59.9	12	21.8
15-29.9	20	36.4
<15	19	34.5
Total	55	100.0

Table 7: Distribution of the subjects based on creatinine levels.

Creatinine (mg/dl)	Frequency	Percent
<5	38	69.1
5.1-12	14	25.5
>12	3	5.5
Total	55	100.0

Table 8: Distribution of the subjects based on blood urea levels.

Blood urea (mg/dl)	Frequency	Percent
<50	12	21.8
50-150	38	69.1
150.1-250	3	5.5

Continued.

Blood urea (mg/dl)	Frequency	Percent
>250	2	3.6
Total	55	100.0

Table 9: Distribution of the subjects based on urine albumin.

Urine albumin	Frequency	Percent
1+	26	47.3
2+	3	5.5
3+	4	7.3
Nil	11	20.0
Traces	11	20.0
Total	55	100.0

Table 10: Distribution of the subjects based on haemoglobin.

Haemoglobin (mg/dl)	Frequency	Percent
<6	1	1.8
6-10	39	70.9
>10	15	27.3
Total	55	100.0

Severe anemia of Hb <6 mg/dl was seen in 1.8% of the subjects.

Anemia, being such an important aspect of CKD, was required to be further classified into the types based on peripheral smear. The most commonly seen anemia in CKD was the normocytic normochromic type of anemia, seen in 51% subjects.

It was seen that most of the subjects (78%) had a roughly normal sodium level between 130-143 mEq/l. This being said, hyponatremia was seen more commonly than hypernatremia, seen in 20% and 2% of the subjects, respectively.

As seen with sodium levels, potassium levels in 71% of the subjects was seen within normal limits, 3.5-5 mEq/l. However, hyperkalemia was more common than hypokalemia, seen in 22% and 7% of the subjects.

As opposed to the previously seen ions, calcium was seen to be reduced in majority of the subjects, with 49% showing hypocalcemia of <8 mg/dl. However, normal calcium levels were seen in almost as many subjects, upto 45.5% of them.

Normal range of phosphorus between 3.1-4.5 mg/dl was seen in 49% subjects. Almost as common as normalcy was hyperphosphatemia of phosphorus levels >4.5 mg/dl which was seen in 40% of the study subjects.

52% of the subjects were found to have normal uric acid levels. 47% showed hyperuricemia. Hypouricemia as such was not an entity that was noted.

Overall, the lipid profile was seen to be within normal limits but deranged in 20% of subjects.

55% subjects were seen to have normal TSH levels, which can be taken to mean their thyroid status was normal. Hypothyroidism (high TSH levels) was seen (44%) more commonly than hyperthyroidism.

Evaluation of the kidney function was not complete without actually witnessing the damage to the kidney. This was done by a USG of the abdomen and pelvis to note the status of the kidneys. Grade I medical renal disease was the most common finding, noted in 42% of the subjects, followed by grade II MRD in 38%. Grade III MRD and polycystic kidneys were least commonly seen, noted in only 4% of subjects each.

41.8% subjects showed a normal 2D Echo. Among the significant findings were reduced EF seen in 27.3% subjects and concentric LVH seen in 26%.

DISCUSSION

CKD is a problem that has a global reach. The biggest concern in a patient of CKD is the chronicity of the disease and the high treatment cost it incurs, especially if a patient progresses into the need for dialysis. Diabetes is a major risk factor. When we exclude diabetics, there unfolds a variety of other etiologies that need to be looked into and targeted to reduce the CKD burden of the country.

This study was conducted in 55 patients of CKD who were non-diabetics. The study was conducted in the hospitals attached to Bangalore medical college and research institute, Bangalore. These patients were studied with

respect to their clinical, laboratory and radiological parameters and compiled.

The study showed the mean age of patients to be 50 years. This was in accordance with the study by Lusignan et al that showed a mean age of 57 years.⁶ The minimum age is 20 years and the maximum age is 85 years. 75% of the patients were above 40 years of age, showing that the incidence of CKD increases with age.

The male to female ratio this studied showed was 2.35:1. This skew in the sex distribution in India is explained by Kher.⁷ In his paper, where it states that studies like this are essentially hospital based and, in our country, males are generally brought to hospitals more often than females. The male preponderance was also true in other parts of the world as is shown in the study by Drey et al.⁸ It shows a male:female ratio of 1.6:1 in a population based in the US.

Many studies around the world show diabetes to be the leading cause of CKD. This study focuses entirely on non-diabetic causes. Among those, hypertension was seen to be the leading etiology (64%) followed by glomerulonephritis (20%). The study by Hill et al showed hypertension to have a global average of 31% of the etiology.⁹ A Spanish study shows hypertension to be responsible for upto 66% of the CKD cases.¹⁰ Some older studies also show glomerulonephritis as the leading cause of CKD.

Other causes as shown by this study are reflux nephropathy seen in 7%. Solitary kidney as the cause for CKD was seen in 5% cases and polycystic kidney disease in 3%, making them the least common causes.

In this study, the relation between age distribution and etiology was studied. As can be expected, hypertension was seen less commonly in younger age groups. In the youngest age group between 20-40 years, the most common etiology was found to be glomerulonephritis (79%). Above 40 years of age, hypertension remained the most common cause of CKD. This was in keeping with the fact that it is the older age group that were more prone to developing systemic illnesses like hypertension. CKD due to primary renal diseases present earlier and are more important in younger patients. This pattern of findings was in keeping with other studies like an Indian study conducted by Sakhuja et al.¹¹

The study brought out statistics regarding the common symptoms in patients of CKD. General weakness (98%), puffiness of face (87%) and loss of appetite (63%) were seen to be the most common symptoms. Generalised weakness is the most common and most bothersome symptom. Being unspecific, patients remain undetected for long periods. The importance of this symptom is proven by many studies like one by Kader et al.¹²

This symptom was so widespread that even in patients undergoing dialysis for CKD, fatigue and weakness remains the most commonly reported symptom. This was

shown in a study by Kaplin et al.¹³ Upto 82% of CKD patient report fatigue. Loss of appetite and anorexia was another important aspect in CKD. In NHANES III, anorexia was noted in almost 33% patients.¹⁴

GI disturbances play an important role in patient discomfort. Nausea (38%), vomiting (38%) and weight loss (11%) are seen in patients. Urinary symptoms that are noticed are as follows. Oliguria was seen in 25% patients and dysuria in 7%. This shows that renal symptoms per se are not the most commonly presenting symptoms and it is hence important to keep note of the other general systemic symptoms a patient can present with.

Pallor (100%), pedal edema (75%) and hypertension (64%) were noted as the most common clinical findings. Pallor was invariably associated with CKD because anemia was an indispensable factor. Erythropoietin was principally produced by the kidneys. As the kidneys fail, the production of erythropoietin became less. Hence anemia, and as a result, pallor was present in 100% of the patients. Decreased clearance of hepatic hormone hepcidin causes iron restricted erythropoiesis. There were also uremic induced inhibitors of erythropoiesis. All these lead to low RBS number, reduced span of RBCs and hence anemia. This mechanism has been explained by Babitt et al.¹⁵

Hypertension was both a cause and effect of CKD. Hypertension was associated with a greater rate of GFR decline. Increasing severity of CKD progressively increases the risk of hypertension. USRDS 2010 showed 84.1% of patients developed hypertension in ESRD and 59.9% in stage 3 CKD.¹⁶

Pedal edema was seen in 75% and ascites in 20% but generalised swelling or anasarca was seen in only about 2% patients. Pulmonary findings include crepitations (36%), pulmonary edema (29%) and pleural effusion (9%). ESM was seen in 27% of CKD patients.

Summary

The following can be considered as the take home points of the study.

The study was conducted on 55 non-diabetic patients of CKD in hospitals attached to Bangalore medical college and research centre.

It was done over one and half year and the patients were assessed clinically and laboratory parameters were assessed.

It showed the mean age to be 50.11 years. There was a male preponderance will the male:female ratio being 2.35:1.

Our study showed hypertensive nephropathy (63%) to the most common cause of CKD, followed by

glomerulonephritis (20%). It was also noted that hypertensive nephropathy was the most common cause in the older age groups. The younger patients had glomerulonephritis as the most common etiology.

General weakness (98%), puffiness of face (87%) and loss of appetite (63%) were seen to be the most common symptoms. Pallor (100%), pedal edema (75%) and hypertension (64%) were noted as the most common clinical findings.

According to the classification of CKD, most subjects fell in CKD stage 4 (36%) and CKD stage 5 (34.5%). 69% of subjects studied had a moderate elevation of creatinine levels, with the serum creatinine levels remaining below 5 mg/dl. 69% showed blood urea levels between 50-150 mg/dl. Normal uric acid (53%) levels followed by hyperuricemia (47%) was seen most commonly.

Hyponatremia, hyperkalemia, hyperphosphatemia and hypocalcemia were seen most commonly in patients of CKD.

Total 73% of patients were anemic with 51% showing normocytic normochromic type of anemia. Lipid profile was deranged in 20% of subjects. Hypothyroidism was seen in 42% of subjects. Shrinkage of the kidney with grade II medical renal disease was seen in 42% patients. 41.8% subjects showed a normal 2D Echo, reduced EF was seen in 27.3% subjects and concentric LVH was seen in 26%.

Limitations

Some limitations needed to be addressed in our study. First was our small sample size and secondly the study duration was for one and a half years.

CONCLUSION

CKD encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate. An early detection and appropriate intervention of these patients will possibly help prevent progression of renal disease, cardiovascular complications and thereby improve the survival rates.

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