Original Research Article

Study of clinical profile of chronic kidney disease at tertiary care hospital

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Abstract

Backgrounds: CKD is a progressive disease characterized by an increasing inability of the kidneys to maintain normal low levels of the products of protein metabolism, normal blood pressure, hematocrit, sodium, water, potassium and acid-base balance. Major etiology was diabetes & hypertension. Anorexia, nausea, vomiting, oliguria, easy fatigability, breathlessness, pedal edema were Common complaints where as Common complications were anemia, electrolyte imbalance and pulmonary edema. Early diagnosis and proper treatment of conditions like HT, DM, & Renal Stones may retard the progression of renal disease. **Objectives:**

1. To assess clinical profile of the patient with chronic kidney disease at the timeof presentation
2. To assess the biochemical of patient with chronic kidney disease
3. To determine the etiology of CKD.

Methods: In the present study 100 patient with CKD presenting to Kamineni Institute of Medical Sciences were included. **Results**: The commonest etiology for chronic kidney disease is found to be diabetic nephropathy followed by hypertensive nephropathy. Common symptoms presented were generalized weakness, lower limb swelling. Commonest signs are pallor, pedal edema and hypertension. **Conclusion**: Chronic kidney disease is a major health problem. Diabetic nephropathy is the commonest cause for CKD. Anaemia, hypertension, pedal oedema, oliguria, and generalised weakness were the major presenting clinical signs and symptoms in chronic kidney disease. This condition when detected in early stages and managed can slow down the progression of chronic kidney diseases and delay the need of renal replacement therapy.

Keywords: Chronic kidney disease; hypertensive nephropathy; Diabetic nephropathy;Hypertension

Introduction

Chronic kidney disease (CKD) an inevitable terminal event of chronic renal parenchymal disease due to various causes is known more for its morbidity than for its mortality. The effects of the altered functioning of the renal system are reflected in every organ system of the body.

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.

Chronic kidney disease is a worldwide public health problem that affects millions of people from all racial and ethnic groups. Diabetes mellitus is the leading cause of CKD, and the rapidly increasing prevalence of diabetes worldwide virtually assures that the proportion of CKD attributable to diabetes will continue to rise.

In the year 2000, approximately 2 to 2.4 Lakh patients with ESRD were currently maintained on chronic dialysis in Japan and the United States respectively[1]. In India studies have shown that upto 0.8% of the population may suffer from chronic kidney disease thereby putting the number at about 8 million of the 1 billion population[2].

A recent report from the National Health and Nutrition Education Survey found that prevalence of diabetic kidney disease increased steadily from 1988 through 2008, and the latest United States Renal Data System report indicates a~30% increase in incidence of End stage renal disease (ESRD) in persons with diabetes in the USA between 1992 and 2008[3].Cardiovascular disease is a major cause of mortality and morbidity among patients with CKD. More than 50 percent of patients with CKD die due to cardiovascular complications[4]. In recent times dyslipidemia has been identified as a major risk factor for coronary artery disease[5].An association between lipids and kidney disease was first noted byVirchow[6] who described fatty degeneration of renal epithelium in Brights disease in 1860. The magnitude of the problem has become more apparent in the recent years as a result of an increase in the life span of the patients due to the advent of hemodialysis .The incidence of coronary artery disease is seen in 26 percent of dialysis patients[7].In chronic kidney disease the most prevalent lipid abnormalities which have been noted are hypertriglyceridemia and decreased HDL concentration[8]. The LDL levels are usually found to be normal or marginally increased. Increased levels of atherogenic lipoproteins, especially LDL and possibly chylomicrons remnants, contribute to the development of atherosclerosis .Increased plasma concentration and reduced diameter favor sub endothelial accumulation of these lipoproteins. Following chemical modifications such as oxidation, the lipoproteins are no longer cleared by normal mechanisms. They trigger a self-perpetuating inflammatory response during which they are taken up by macrophages to form foam cells –a hallmark of the atherosclerotic process. Atherogenic lipoproteins also have an adverse effect on the endothelial function[9]. The arterial narrowing that follows impairs the blood supply to various organs.CKD is a major public health problem and over the years the number of patients as well as the mortality associated with ESRD has steadily increased. Thus early detection and management in such high risk patients helps in delaying the progression to ESRD and need for renal replacement.

Objectives

1. To assess the clinical profile of the patient with chronic kidney

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disease at thetime of presentation
2. To assess the biochemical profile of patients with chronic kidney disease.
3. To determine the aetiology of chronic kidney disease.

Materials and methods

In the present study 100 patients with chronic kidney disease presenting to Kamineni Institute of Medical Sciences were included.

Study period

It is a one year study done at Kamineni Institute of Medical Sciences.

Inclusion criteria

1. Patient with serum creatinine value greater than 2mg% with any one or both ofthe following
- Small contracted kidneys on ultrasound abdomen
- Elevated S. creatinine with no improvement for more than three months .

Exclusion criteria

1. Patient of age group(<18yrs) are not included.
2. Patients with GFR >60ml/min per 1.73m^2 with no renal changes in USG.

For each of the selected patients a detailed history and physical examination was done. Data was collected for each patient on a standard proforma including age, sex and the underlying primary renal disease. Clinical and laboratory parameters were evaluated and recorded on the data sheet.

Etiological diagnosis was made on each patient even though it could notalways be confirmed by histopathology.

Diabetic nephropathy was considered as etiology when there was a long history of diabetes, presence of diabetic retinopathy, with albuminuria and with a classicalhistory of slow progression.

Hypertensive nephropathy was diagnosed in patients with long history ofhypertension, and other target organ damage.

Chronic Glomerulonephritis was diagnosed in patients with history of oedema,hypertension and documented nephritic range of proteinuria.

Obstructive uropathy, polycystic kidney disease and reflux nephropathy wereultrasonologically diagnosed .

Creatinine clearance was calculated using Cockcroft-Gault formula

$$\text{Creatinine clearance} = \frac{(140-\text{age}) \times (\text{weight in kg})}{\times (0.85 \text{ if female}) 72 \times (\text{S.creatinine in mg/dl})}$$

Method of analysis

Data was entered in MS Excel 2010 and analysis was done using statistical package for social sciences(SPSS) 19th version.

Results

Table 1:Age and Sex incidence

Age	Male (%)	Female (%)	Total
<40years	11(11%)	7(7%)	18(18%)
>40years	59(59%)	23(23%)	82(82%)
Total	70(70%)	30(30%)	100

Table shows that 70% of study subjects were male and 30% were females. 82% ofpatients were above 40 years of age.

Table 2: Etiology of CKD

Etiology	No of patient	Percentage(%)
Diabetic nephropathy	40	40
Hypertensive nephropathy	22	22
Glomerulonephritis	16	16
Obstructive uropathy	06	6
Solitary Kidney	05	5
Reflux nephropathy	05	5
Multiple myeloma	03	3
Poly cystic kidney disease	03	3

Of the 100 study subjects ,the most common causes were

a) Diabetic nephropathy seen in (40%) of patients ,
b) Hypertensive nephropathy(22%)
c) Glomerulonephritis(16%).

Table 3:Comparison of important etiologies of CKD with age distribution

		No of patients(%)		
AGE (YEARS)	**Diabetic nephropathy**	**lomerulonephritis**	**Hypertensivenephropathy**	**Others**
<40	2 (5%)	8(50%)	3(13.6%)	6
>40	38(95%)	8(50%)	19(86.4%)	16
Total	**40**	**16**	**22**	**22**

Table shows that 96% of diabetic nephropathy and 85.7% of hypertensive nephropathy patients are above 40 years. 50% of patients with glomerulonephritis was seen below 40 years. This difference obtained is statistically significant.

Table 4:. Symptoms of CKD

Symptoms	No of patients	Percentage (%)
Generalised weakness	75	75
Lower Limb swelling	60	60
Oliguria	54	54
Breathlessness	52	52
Anorexia	42	42
Nausea	40	40
Facial puffiness	38	38
Vomiting	29	29
Nocturia	19	19
Paresthesia/altered sensorium	17	17

Other symptoms	11	11
Dysuria	08	08
Obstructive symptoms	08	08
Bone pain	06	06
Abdominal swelling	05	05
Generalised body swelling	05	05

Table shows that majority of study subjects presented with generalized weakness(75%), lower limb swelling(60%), oliguria (54%) and breathlessness(52%).

Table 5. Signs of CKD

SIGNS	No of patient	Percentage (%)
Pallor	83	83
Pedal oedema	81	81
Hypertension	70	70
Ejection systolic murmur	29	29
B/L Crepitation	27	27
Pulmonary oedema	19	19
Ascitis	14	14
Asterixis	10	10
Pleural effusion	10	10
Nail changes	08	08
Skin changes	08	08
Peripheral neuropathy	06	06
Anasarca	03	03

Table shows that pallor is the most common finding in all subjects ,seen in 83% of patients. Other common findings were pedal oedema(81%) and Hypertension(70%).

Table 6. Haematological levels in CKD

Haemoglobin(mg/dl)	No of patient	Percentage (%)
<5	06	6
5-10	68	68
>10	26	26

The table reveals that majority of study subjects were anaemic, with 68% had Hb of5-10 mg/dl and 6% patients were severely anaemic with Hb of less than 5mg/dl.

Table 7. Blood Urea levels in CKD

B.UREA (mg/dl)	No of patient	Percentage (%)
<50	06	6
50-150	62	62
150-250	27	27
>250	05	5

Table shows that majority of study subjects has high urea levels in the range of 50-250, from which 62% were in range of 50-150. Only 5 % has urea levels more than250 and 6% has urea levels less than 50.

Table 8. Serum creatinine levels in CKD

S.Creatinine(mg/dl)	No of patients	Percentage(%)
2-5	32	32
5.1-12	55	55
>12	13	13

Table shows that 55% of study subjects have their S.creatinine in range of 5.1-10mg/dl. S.creatinine of more than 12 was seen in 13% of patients.

Table 9. Creatinine clearance in CKD

Creatinine clearance(ml/min)	No of patient	Percentage (%)
>30	02	02
15.1- 30	22	22
0-15	76	76

Majority of study subjects 76% are in ESRD with creatinine clearance less than 15ml/min.

Table 10. Comparision of haemoglobin levels with Creatinine clearance

		Creatinine clearance(ml/min)	
	0-15(%)	**15.1-30(%)**	**Total**
Hb> 10gm%	15(15%)	11(11%)	26
Hb<10gm%	61(61%)	13(13%)	74
Total	76	24	100

Table shows that 61% of study subjects with Hb below 10gm% were in stage 5 CKD (ESRD) and 13% of patient with low Hb were in stage 4 CKD. This difference obtained is statistically significant.

Table 11. Sodium Levels in CKD

S.Sodium(mEq/lit)	No of patients	Percentage (%)
<130	40	40
130-143	57	57
>143	03	03

57% of study subjects have their sodium levels in normal range from 130-143 mEq /lit. 40% of patients presented with hyponatremia with sodium levels less than130mEq /lit.

Table 12. Potassium levels in CKD

S.Potassium(mEq/lit)	No of patient	Percentage (%)
<3.5	06	6
3.5-5	54	54
>5	40	40

Majority of patients had normal serum potassium levels. 40% patients presented withhyperkalemia with potassium more than 5 mEq/lit.

Table 13. Calcium levels in CKD

S.calcium(mg/dl)	No of patients	Percentage (%)
<8	55	55
8-10	43	43
>10	02	02

Hypocalcemia was observed in 55% of study subjects.

Table 14. Phosporus levels in CKD

S.Phosphorus (mg/dl)	No of patients	Percentage (%)
<3	05	05
3.1-4.5	27	27
>4.5	68	68

Hyperphosphatemia was observed in 68% with phosphorus levels more than4.5mg/dl.

Table 15. Serum albumin levels in CKD

S.Albumin (g/dl)	No of patients	Percentage (%)
<3.5	59	59
3.5-5	41	41

Hypoalbuminemia was observed in 59 of study subjects.

Table 16. Kidney size (By USG) in CKD

Size(cm)	No of patients	Percentage (%)
Normal	46	46
Reduced	49	49
Increased	05	5

The study reveals that 49% of patients have reduced kidney size, where as 46% of patients have normal kidney size. Only 5% of patients have increased kidney size.

Table 17. Comparison between diabetic nephropathy and non diabetic causes of CKD in relation with S. creatinine and creatinine clearance

	Diabetic nephropathy	Non diabetic causes
No of patients	40	60
Males	30	40
Females	10	20
Average S.creatinine(mg/dl)	6.4±3.53	8.33±4.51
Average creatinine clearance(ml/min)	13.55±6.79	10.86±7.14

Table shows average creatinine clearance of diabetic nephropathy (13.55 ml/min) is higher compared to creatinine clearance of non diabetic etiologies of CKD(10.86 ml/min).

Discussion

Chronic kidney disease is a global health problem. Increasing incidence of chronic kidney disease, and the high costs and poor outcomes of treatment constitute a worldwide public health threat.

The present study was conducted to assess the profile of cases of chronic kidney disease presenting to Kamineni Institute of Medical Sciences for a period of one year. A total of 100 patients was prospectively studied and analysed with respect to clinical and laboratory parameters.Out of the 100 patients studied, majority of patients were male sex consisting 70% of the total study group. The male to female ratio was 2.33:1. This finding was consistent with other studies done in India.

The increased incidence of male population in India was explained by Mani and Kher[10] saying that most of the studies done in India are hospital based (compared to community based studies in the west) and they reflect the bias that male patients are brought to the hospital more often. In another study done by Hida M et al found out that males were more commonly affected and progression of the disease to renal failure seemed to be more rapid in males than in females[11].

In the study the average age of the patients were 52.2years. Findings were consistent with an Indian study done by Mohan M Rajapurkar et al which showed mean age of patients was 50.1 years[12]. The youngest patient in our study was 21 years old and oldest was 76 years old. 82% of patients were above 40 years of age and only 18% were below 40 years of age. This shows that incidence of CKD increases as the age advances. Mclntyre NJ et al conducted a similar study showing increasing incidence of CKD with age and increased prevalence in older age group[13]. In our study,

majority of patients, the cause for CKD was found to be diabetic nephropathy seen in 25(40%) patients.There has been a changing trend around the world. Diabetic nephropathy and hypertensive nephropathy are common etiologies compared to glomerulonephritis. A similar trend was noted in other Indian study by Mohan Rajapurkar et al showing that Diabetic nephropathy was the commonest cause (31%), followed by chronic glomerulonephritis (14%) and hypertensive nephrosclerosis (13%)[12].

Lysaght et al have also demonstrated similar trends in American populations[14]. In the study conducted by Xue et al the number of patients with diabetic nephropathy was almost 50% of the study group[15].This result was dissimilar to some old Indian studies which showed glomerulonephritis as the leading cause of CKD[15].

The second most important cause was hypertensive nephropathy seen in 22(22 %) patients which was higher compared to study done by Mohan Rajapurkar[12]. Glomerulonephritis was seen in 16(16%) of patients .Other causes seen in the study was obstructive uropathy which was observed in 6% of patients. Reflux nephropathy and solitary kidney was seen in 5% of patients. Three cases of both multiple myeloma and polycystic kidney disease was observed in the study.In our study, we also compared the important etiologies of Chronic kidney disease with age distribution. We found that 95% of the patient with diabetic nephropathy and 86.4% of patients with hypertensive nephropathy were above 40 years of age, whereas among the 16 patients of glomerulonephritis, 50% were below 40 years of age. Study reveals that majority of patients who develop CKD due to systemic illness like diabetes and hypertension belong to the older age group, where as CKD due to primary renal disease like glomerulonephritis was seen more commonly in younger age group. Few other studies done showed similar results[15,16]. A study conducted by Fivush et al showed diabetic and hypertensive nephropathy commoner in older age group compared to chronic glomerulonephritis[17].In this study, majority of patients came with symptoms of generalised weakness seen in 75% of patients. Other common symptoms observed were lower limb swelling seen in 60%, decreased urine output in 54% and breathlessness seen in 52%. Gastrointestinal symptoms like anorexia, nausea, vomiting was common and seen in 42% ,40% , 29% respectively. In NHANES III patients anorexia was noticed in almost one third of patients(33%). Gastrointestinal (GI) symptoms may lead to reduced food intake(dietary proteins), resulting in increased prevalence of protein-energy malnutrition and impaired well-being in patients with CKD. This observation was made by Hansstrid et al[18].

Obstructive symptoms was present in 8% of patients, nocturia in 19% and swelling of the face was seen in 38% of patients. CNS symptoms like paresthesia and altered sensorium was present in 17% of patients. A study by Li showed 11.6% of patients with neurological manifestation[19].

In this study, most common findings seen was pallor (83%) and pedal oedema (81%). Hypertension was seen in 70% of patients. Many studies have shown that elevated blood pressure is associated with faster rate of GFR decline. The prevalence of hypertension is progressively increased with severity of CKD. USRDS 2010, showed 84.1% of patients developed hypertension in ESRD and 59.9% in stage 3 CKD[20].Other findings on systemic examination was pulmonary oedema seen in 19%, ascitis in 14%. Skin and nail changes, pleural effusion and anasarca was seen in less than 10 % of patient.

Laboratory parameters

Most of the patients were anaemic, with Hb less than 10 gm% seen in 74% of patients. 6% of patients were severely anaemic with Hb less than 5gm%. Similar study done by McGonigle et al found upto 90% of patients to have haemoglobin less than 10 gm/dl[21]. They also established that erythropoietin deficiency and disorders related to its synthesis are the main cause of anaemia in patients with CKD. Considering the high incidence of anemia in CKD and morbidity and mortality associated with it, thereby indicates the need for its correction.In our study, serum creatinine at presentation was above 12mg/dl in 13% of patients. 55% of patients had s.creatinine in the range of 5-12 mg/dl. Average serum creatinine in our study was 7.45±4.19 mg/dlStudy showed 76% of patients with creatinine clearance of <15ml/min. Average creatinine clearance found in the study was 12.14± 6.98 If classified according to K/DOQI guidelines majority of patients presented in stage 5 CKD (ESRD). This is similar to incidence in other Indian studies. Study done by Modi GK, Jha VK showed a higher incidence of ESRD in Indian population[22].In our study we compared creatinine clearance (stage 4 and stage 5) with Hb levels. 63% of patients in stage 5 CKD had Hb levels less than 10gm% . Study showed a strong association of anemia with declining GFR. Thus proving that prevalence of anemia increases as the kidney functions decrease. Similar association was observed by McClellan W, Aronoff SL et al[23]. They found 75 % of patients to have anemia with GFR<15ml/min.

In this study hyponatremia was noted in 39% of patients. Hyponatremia is a uncommon complication in CKD. A study done by Csaba, Evan et al showed independent association of low sodium levels with increased mortality in CKD patients[24].

Hyperkalemia is a potential threat to patient safety in chronic kidney disease. In our study 39.68% of patients had potassium levels more than 5 meq/L. Lisa M, Min Zhan et al[25] observed increased incidence of hyperkalemia in CKD and also observed increasing severity with decline in GFR. Principal causes explained was impaired glomerular filtration rate (GFR) combined with a frequently high dietary potassium intake relative to residual renal function, and a commonly observed extracellular shift of potassium caused by the metabolic acidosis of renal failure.

In this study, hypocalcemia was noted in 55.5% of patients. Majority of patients also had abnormal phosphorus levels. Hyperphosphatemia was seen in 68.25% of study subjects. Abnormalities in calcium and phosphorus metabolism is a known entity in CKD and is associated with development of bone diseases. Reduced levels of calcium have been described in patients with GFR less than 70 ml/ min in various studies. Metabolic alteration occurs early in the course of disease and progresses with decreasing GFR. Similar studies done detected increased association of low calcium and high phosphorus levels with increased mortality in ESRD[26].

In our study, 49 % of patients had reduced kidney size where as 46% of patient had normal sized kidney which was attributable to the large number of diabetic nephropathy cases in which normal kidney size is a known entity. Study done by Michael D et al showed association between kidney size and echogenicity with declining GFR. Kidney length can be used as a predictor for CKD.

Out of 100 patients 6 patients underwent kidney biopsy. All six cases was diagnosed as glomerulonephritis.92 patients underwent echocardiography. Commonest finding found was LVH seen in46.7% of patients.In our study we also compared diabetic nephropathy and non diabetic causes with serum creatinine and creatinine clearance. Study showed diabetic nephropathy patients to have a lower serum creatinine and higher creatinine clearance compared to non diabetic etilogies of CKD.

Conclusion

kidney disease is a major public health problem. There has been a dramatic increase in the incidence of ESRD and relative shift in etiologies. Diabetic nephropathy was the commonest cause for chronic kidney disease. Anaemia, hypertension, pedal oedema, oliguria, and generalised weakness were the major presenting clinical signs and symptoms in chronic kidney disease. Hyperkalemia, hyponatremia, hypocalcemia and hyperphosphatemia are the common complications seen in CKD and needs detection and correction to reduce the associated morbidity and mortality. Early detection and management of such high risk patients helps in delaying the progression to ESRD and the need for renal replacement therapy. This condition when detected at early stages and managed can slow the progression of chronic kidney disease and delay the need for renal replacement therapy.

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