Evaluation of Epidemiological and Clinical Profile of Newly Diagnosed Cases of Chronic Kidney Disease in a Tertiary Healthcare Center: A Prospective Study

Sutariya Nirav[1], Aundhakar Swati[2], Kothia Divyen[3], Lathiya Nency[4], Jayveer Atodadiya[5], Mandade Arjun[6]

ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is a progressive disease which is characterised by a decreasing ability of the kidneys to maintain normal low levels of the products of protein metabolism (such as urea), normal blood pressure, haematocrit, sodium, water, potassium and acid-base balance. The present study aimed to study the aetiology and it's relation to clinical and laboratory profile of chronic kidney disease.

Material and Methods: It was an hospital based prospective observational study conducted among 100 consecutive adult patients with chronic Kidney Disease with serum creatinine above 2 mg% with abnormal Findings on renal ultrasound.

Results: We found 67% of the cases with oliguria and generalised weakness followed by gastrointestinal symptoms like anorexia, nausea and vomiting that is 63% and 59% respectively. The Respiratory symptom namely dyspnea found in 58% cases. 24% has facial edema and 19% are having abdominal pain as well as altered sensorium as a symptoms.

Conclusions: The growing incidence of this problem is a major health hazard in our country which we can ill afford. The major symptoms were swelling of feet, facial puffiness, oliguria and breathlessness, the major signs were pallor and persistent high blood pressure.

Keywords: Chronic Kidney Disease, End Stage Renal Disease, Hemo-Dialysis, Complications, Epidemiology

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive disease which is characterised by a decreasing ability of the kidneys to maintain normal low levels of the products of protein metabolism (such as urea), normal blood pressure, haematocrit, sodium, water, potassium and acid-base balance[1]. Increasing evidence occurred in the past decades indicates that the adverse outcome of chronic kidney disease, such as kidney failure, cardiovascular disease and premature death can be prevented or delayed[2]. In ESRD patient's haemodialysis should be done at least twice per week. However most of the Indian patients do not afford the cost of hemodialysis and succumb to the disease. More widespread effort at the prevention, early detection, evaluation, and management of CKD and antecedent conditions could prevent complications of decreased kidney function, slow the progression of kidney disease to kidney failure, and reduce cardiovascular disease risk[3]. Toxic, environmental and occupational risk factors are common in poor population. Other CKD risk factors are chronic use of drugs such as NSAIDs, nephrotoxic antibiotics, and sequelae of acute damage from poisoning, hypovolemia, obstruction or other causes. The present study aimed to study the aetiology and it's relation to clinical and laboratory profile of chronic kidney disease.

MATERIAL AND METHODS

It was an hospital based prospective observational study conducted among 100 consecutive adult patients with chronic Kidney Disease with serum creatinine above 2 mg% with abnormal Findings on renal ultrasound: - asymmetric kidney size, small kidneys (less than 9cm) or large polycystic kidneys. OR Elevated serum Creatinine with no improvement for more than 3 months OR Uremic symptoms over three months with elevated serum creatinine, presented to tertiary care hospital between January 2016 and August 2017. Patients below the age of 14, Patient who previously underwent Haemodialysis and Patients of Acute Renal Failure were excluded from the study. A detailed history and thorough physical examination was carried out in all patients. Data recorded in each patient included age, sex, the underlying primary renal and other medical disease, clinical and biochemical features of chronic kidney Disease on a standard proforma. Other Investigations such as Complete blood count, Blood sugar level, Blood urea levels, Serum Creatinine, Serum sodium, Serum potassium, Serum calcium, Serum phosphorus, Ultrasonography etc were carried out wherever necessary.

RESULTS

The present prospective observational study was conducted among 100 newely diagnosed patients of chronic kidney diseases attending department of medicine in a tertiary healthcare institute in Western Maharashtra. Out of our study participants, 61% of the patient were males with mean age of

[1]Resident, Department of Medicine, [2]Professor and Head, Department of Medicine, [3]Resident, Department of Medicine, [4]Neurophysiotherapist, Department of Medicine, [5]Resident, Department of Medicine, [6]Resident, Department of Medicine, Krishna Institute of Medical Sciences, Karad, Maharashtra, India

Corresponding author: Dr Swati Aundhakar, Professor and Head, Department of Medicine, Krishna Institute of medical sciences, Malkapur, Karad, Satara-415110, Maharashtra, India

How to cite this article: Sutariya Nirav, Aundhakar Swati, Kothia Divyen, Lathiya Nency, Jayveer Atodadiya, Mandade Arjun. Evaluation of epidemiological and clinical profile of newly diagnosed cases of chronic kidney disease in a tertiary healthcare center: a prospective study. International Journal of Contemporary Medical Research 2018;5(5):E7-E12.

DOI: http://dx.doi.org/10.21276/ijcmr.2018.5.5.7

60 years. Remaining 39% of patient were females with the mean age of 58.55 years. There was no significant difference between mean age groups among both the genders (Figure 1). In the present study, we recorded clinical presentation of newely diagnosed cases of chronic kidney diseases. We found 67% of the cases with oliguria and generalised weakness followed by gastrointestinal symptoms like anorexia, nausea and vomiting that is 63% and 59% respectively. The Respiratory symptom namely dyspnea found in 58% cases. 24% has facial edema and 19% are having abdominal pain as well as altered sensorium as a symptoms. The numbers of cases having dysuria were 5% and 4% of the cases exhibited polyuria as a symptom. The incidence of convulsion is only 3% (Table 1).

Symptoms	Percentage (n=100)
Oliguria	67.0
Generalised Weakness	67.0
Anorexia	63.0
Vomiting/Nausia	59.0
Dyspnea	58.0
Facial Edema	24.0
Abdominal Pain	19.0
Altered Sensorium	19.0
Dysuria	5.0
Polyuria	4.0
Convulsion	3.0

Table-1: Distribution of cases according to their clinical presentation

Signs	Percentage of cases
Pallor	71.0
Pedal edema	48.0
Pleural effusion	26.0
Ascitis	19.0
Pulmonary edema	16.0
Nail changes	16.0
Derma changes	9.0
Palp kidney	8.0
Peripheral Neuropathy	6.0
Pericardial effusion	6.0

Table-2: Distribution of cases according to their clinical examination findings

Aetiology	Percentage of cases
Chronic GN	26.0
DM. Nephropathy	26.0
HTN Nephropathy	23.0
Obstructive Uropathy	14.0
PCKD	2.0
Chronic Pyelonephritis	8.0

Table-3: Aetiology of Chronic Kidney Disease

The clinical examination of the study subjects reflected that almost 71% of the patients have pallor, 48% had pedal edema. 26% of patients had pleural effusion and only 19% of them had ascites. Pulmonary edema and nail changes were observed in 16% of patients. Other signs like dermatological changes, palpable kidney, peripheral neuropathy and pericardial effusion were found to be below 10% (Table 2).

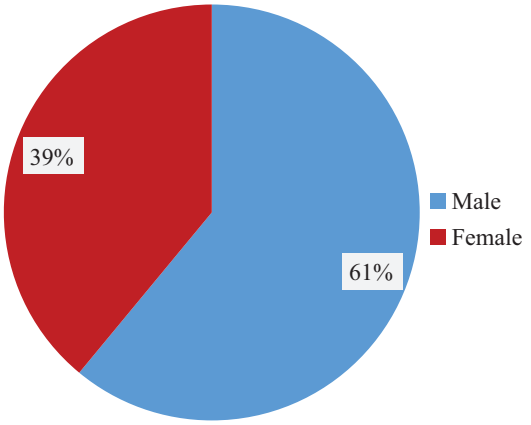

Figure-1: Distribution of cases according to their gender

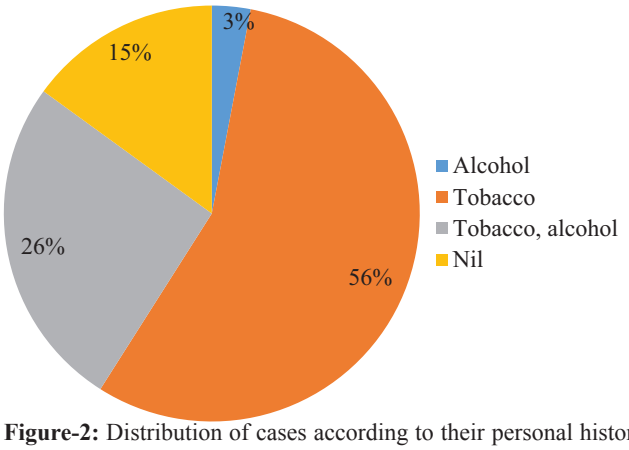

Figure-2: Distribution of cases according to their personal history (Addictions)

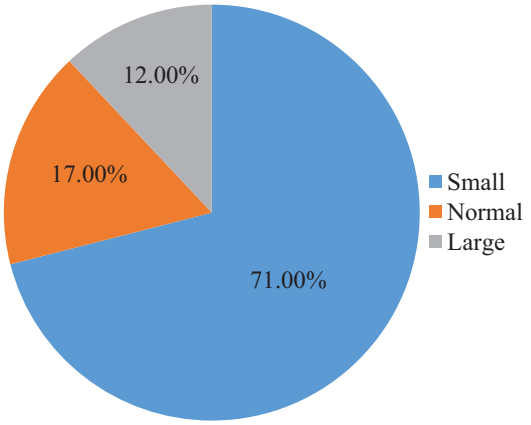

Figure-3: Kidney Size (by USG) in Chronic Kidney disease

Parameters	Sample size	Minimum value	Maximum Value	Mean Value	SD
Pulse	100	60	180	92	21.41482
SBP	100	70	250	147	33.69587
DBP	100	30	160	85	22.11905

Table-4: Pulse and Blood pressures in Chronic Kidney Disease

Variables		Percentage (n=100)	Mean value	P-value (in comparison with serum creatinine values)
Haemoglobin	<5	3.0	8.6780	0.082
	5-10	73.0		
	>10	24.0		
Sr Ca	<8	65.0	7.5830	0.733
	8-10	34.0		
	>10	1.0		
Sr P	<2.5	1.0	5.9630	<0.001
	2.5-4.5	23.0		
	>4.5	76.0		
Sr Alb	<3.5	68.0	3.0840	0.589
	>=3.5	32.0		
Urea	<100	17.0	164.59	---
	101-150	28.0		
	151-200	29.0		
	201-250	19.0		
	>251	7.0		
Sr Creat	<5	15.0	9.4860	---
	5.1-12	62.0		
	>12	23.0		
Creatine clearance	<=5	33.0	7.5683	---
	5.1-10	44.0		
	10.1-15	20.0		
	> 15.1	3.0		
K	<3.5	14.0	4.8726	<0.001
	3.5-5	46.0		
	>5	40.0		
Na	<130	50.0	127.0	0.249
	130-143	48.0		
	>143	2.0		

Table-5: Comparison of various clinical parameters with serum creatinine

We also enquired about their personal habits and addictions. 56% of patients were chronic tobacco abuser including both smoke and smokeless tobacco. While 26% of patients are addicted to both tobacco as well as alcohol and only 3% are addicted to alcohol alone. 15% are neither addicted to alcohol nor tobacco (Figure 2). The aetiology of CKD in our patients were found to be diabetic nephropathy in 26%, hypertensive nephropathy in 23%, chronic glomerulonephritis in 26%, obstructive uropathy in 14%, polycystic kidney disease in 2% and chronic pyelonephritis in 8% (Table 3).

Among vital parameters, the mean pulse rate was 92 bpm with SD 21.41, while the mean SBP was 147 mm/Hg with SD 33.70 and the mean DBP was 85 mm/Hg with SD of 22.12 (Table 4). In the present study, necessary investigations were done, which included renal profiles, complete blood count, serum electrolytes etc. 73% of the patients had their haemoglobin level in the range of 5-10 gm%. Almost 76% of study participants had their blood urea level in the range 101-250 mg/dl and only 3% of patients have their blood urea level more than 300 mg/dl. 62% of the patients had their Serum Creatinine value in the range of 5-12 mg/dl. Significant number of patient have its value greater than 12.1 mg/dl that is 23%, but only 15% of the patients exhibit that their serum Creatinine value in the range <5 mg/dl. 44% of patients have their creatinine clearance value within the range 5.1-10 ml/minute whereas 20% of them have this value in the range 10.1-15 ml/mt. Further 3% of patients had this value in the range>15.1 ml/mt. 33% had the value below 5 ml/mt.(Table 5)

Among serum electrolytes, we observed that 40% patients had Hyperkalemia. 46% had the value within normal limits (3.5-5 meq/L). Only 14% have the value less than 3.5 meq/L. There is statically highly significant difference regarding serum potassium level among these three groups (p=<0.01). Hyponatremia (Serum sodium level < 130 meq/L) was present in 50% of patients. Further in 48% cases this value lied between the normal limits (130-143 meq/L) However there is no statistically significant difference in serum sodium level among these three group.(p=0.249). Hypocalcaemia (<8 mg/dl) can be seen in 65% of cases. 35% of cases have this value within normal limits (8.10 mg/dl) but this difference is statistically non-significant(p=0.733). Hypophosphatemia (<2.5 mg/dl) can be seen in only 1% of cases. 23% of cases have this value within normal limits (2.5-4.5 mg/dl) while the majority of patient 76% were having hyperphosphatemia (>4.5 mg/dl), and this difference is statically highly significant.(p=<0.01). Hypoalbuminemia (Serum Albumin < 3.5g/dl) can be seen in 68% of cases.

32% of cases have this value within normal limits (3.5 - 5 g/dl) Though this difference is statistically not significant. (p=0.589) (Table 5).

In the present study, it was reported that 71% of the cases seem to have decreased kidney size and 12% appears to have an increased kidney size. Whereas 17% of the patients have exhibited normal size.

DISCUSSION

The present study consisted of 100 patients of CKD who were admitted to the hospital or seen on the OPD basis and underwent dialysis for the first time. These patients fulfilled the criteria set by the National Kidney Foundations' Kidney Disease Outcome Quality Initiative for diagnosing CKD. They were studied and evaluated clinically and laboratory investigated and ultrasonography of abdomen was done. In our study male: female ratio was observed to be 1.56: 1. The mean age was 60 years for male and 58.55 years for female. The youngest patient was 16 years of age and the oldest 90 years of age. This shows the broad variation in age in our study group highlighting the preponderance of CKD across a very large age group. Out of the 18 studies analyzed by the National Kidney Foundations K/DOQI, 17 reported that the male sex was more at risk for CKD and 14 showed that the male sex was associated with a faster rate of progression to ESRD. Our studies showed that the prevalence of chronic kidney damage as a result of hypertension and diabetes is far lower in younger age groups than in adult patients above the age of 30 years. In contrast, the prevalence of urinary tract abnormalities, congenital tubular disorders and chronic glomerulonephritis is far more common in the younger age groups i.e less than 30 yrs. Our findings are similar to those reported by the National Kidney Foundations K/DOQI subgroup on children and adolescents study conducted by Fivush et al.[4]

Udipi Badikillaya Vijayalakshmi, Manasa Rayidi et al. also showed that the patients with end stage renal disease (ESRD) had a mean age of 53.5±14.5 years in their study conducted during a period of one year from January 1st 2014 to December 31st 2014 that included total 140 patients[5]. We reported that the most common symptoms in our patients were excretory symptoms namely decreased urine output, gastrointestinal symptoms like anorexia,nausea,vomiting, respiratory symptom namely breathlessness and generalised weakness as a part of chronic illness. While the other symptoms like facial puffiness, abdominal pain, altered sensorium, dysuria, polyuria, convulsion are relatively less common(25%). Renuka Prasad. Y. S, Krishna Murthy. H. A. et al. also found in their study that the most common symptoms in their patients were decreased urine output, breathlessness, vomiting and anorexia. CNS symptoms like altered sensorium and convulsion were found in <10% of patients[6]. Li et al in their study also found that gastrointestinal system manifestations, excretory system manifestations were common in their patients[7].

The most common signs were pallor, pedal oedema, pleural effusion, ascitis, pulmonary oedema and nail changes. Other signs like palpable kidney, skin changes, peripheral neuropathy and pericardial effusion etc were found in less than 10% of patients

Other two studies Renuka Prasad, Y. S, Krishna Murthy. H. A. et al[9] and Ashvani Pathak, Lalit Jain et al[8], also suggests the similar trends in their studies.

In our study, 26% of patients have diabetic nephropathy and 23% patient have hypertensive nephropathy as a etiology for CKD. This trend is similar to that reported by Dash and Agarwal in the study conducted at the All India Institute of Medical Sciences.[10] Lysaght et al have also demonstrated similar trends in American populations[11]. In the study conducted by Xue et al the number of patients with diabetic nephropathy was almost 50% of the study group[12]. The etiological data also shows the prevalence of Chronic glomerulonephritis at 26% in our study which is concurrent with the data from other developing countries like Egypt and Bolivia[13].

Our study showed that 56% of patients are chronic tobacco abuser including both smoke and smokeless tobacco. While 26% of patients are addicted to both tobacco as well as alcohol. This finding of the study is collaborated by studies by Sawicki et al. also reported association of smoking with renal failure[14]. Menon et al. also illustrated that 52% of CKD patients had history of excessive alcohol consumption[15].

The haemoglobin levels were below 10 gm/dl in 76% of the patients thereby emphasising the need for correction of anaemia in patients with CKD. It is well established that anaemia develops in the course of chronic Kidney disease and is nearly universal in patients with chronic renal Disease. Lower haemoglobin levels may result from a loss of erythropoietin synthesis in the kidneys and/or the presence of inhibitors of erythropoietin synthesis. Numerous articles describe the association of anaemia with kidney failure and describe its various causes.

Renuka Prasad. Y. S, Krishna Murthy. H. A. et al. also found that 90% of patient of ESRD had their haemoglobin level below 10mg% in their study conducted between year 2009 to 2011 on 50 patients[6].

The incidence of Hyperkalemia was 40% which shows the need for the early detection and management of this dangerous complication like cardiac arhthymia. Hyperkalemia is a well-known complication of CKD which may be precipitated in a number of conditions but certain aetiologies of CKD may be associated with more earlier and more severe disruption of potassium secretory mechanisms in the distal nephron, relative to the reduction in GFR. Most important are conditions associated with hyporeninemic hypoaldosteronism like diabetic nephropathy and renal tubular acidosis. Sonal Korgaonkar, Anca Tilea et al also showed the similar findings that serum potassium level was increasing as the eGFR decreases and associated with high mortality with hyperkalemia.

Hyponatremia was reported at an incidence of 50% in our study which is also a known association with CKD. The maximum Serum sodium level was 147 and minimum was 110 with mean value 127 with SD 12.31. However, Sandip

T. Chaudhari et al.(80) showed hyponatremia in only 28% of cases and the mean serum sodium was 138.63±5.13 in a study conducted by Ashvani Pathak, Lalit Jain et al[16]. Hyponatremia in itself is an uncommon complication in pre dialysis patients, and water restriction is necessary only when hyponatremia is documented. Study conducted by Sushrut S and Waiker et al showed that even mild hyponatremia is associated with increased risk of mortality in CKD patients[17]. Hypocalcaemia is a known entity in patients with CKD and our studies showed the prevalence at 65%. It is known that bone disease and disorders of calcium and phosphorus metabolism develop during the course of CKD. Radiological and histologic demonstration of bone disease can be demonstrated in nearly 40% of patients with severely decreased kidney function. Reduced levels of calcium have been described in patients with GFR less than 70 ml/min in various studies. Histological changes in the bone have also been shown to occur at earlier stages of CKD. In a study of 176 patients with creatinine clearances of 15 to 50 ml/min, 75% had "important histological abnormalities, with the majority having osteitis fibrosa with or without osteomalacia" as reported by Hamdy et al in their study on the effect of alfacalcidol on natural course of renal bone disease in mild to moderate renal failure[18]. Hyperphosphatemia is a known entity in patients with CKD and our studies showed the prevalence at 75%. Renal osteodystrophy was common in patients with hyperphosphatemia. Bone pain and muscle weakness is a manifestation of renal osteodystrophy. In renal osteodystrophy, hyperphosphatemia and hypocalcaemia are common.

This findings are similar to study conducted by Sandip T. Chaudhari et al that showed the incidence of Hyperphosphatemia was 70% Serum phosphorus levels were normal in 30% of patients in their study carried out in 2013-15[19]. A study by Miller et al., showed that a low serum calcium <9 mg/dl along with a high serum phosphorus of >3.5 mg/dl was associated with greater mortality[20].

The serum Albumin levels were decreased in 68% of the patients and this is consistent with known studies like Koppel et al -Modification of diet in renal disease (MDRD study group)[20]. The serum albumin is found to be lower at levels of GFR below 30 ml/min, indicating a decline in circulating protein levels or serum protein concentrations, protein losses or inflammation. An acceptable goal for albumin level is above 4.0 mg/dl by bromocresol green method. Stall et al found that, even once dialysis was initiated and an "adequate" dialysis regimen was provided, many patients were not attaining acceptable levels of nutrition as evidenced by continued hypoalbuminemia and changes in body composition[21].

The kidney size was decreased in 71% of the patients. The normal sized kidneys in 17% of the patients is attributable to the large number of diabetic nephropathy cases in which normal kidney size is a known entity. The small hyperechoic kidneys which are characteristic of CKD were found in the patients with decreased kidney size and this is consistent with known study Sandip T. Chaudhari, Ashwin V. Sadavarteand Deodatta Chafekar et al conducted in in 2013-15 in which 80% had decreased kidney size[19].

CONCLUSIONS

The present study aims to spotlight the growing incidence of CKD among the population. The growing incidence of this problem is a major health hazard in our country which we can ill afford. The major symptoms were swelling of feet, facial puffiness, oliguria and breathlessness, the major signs were pallor and persistent high blood pressure. So if any patient present with these features, they need to be evaluated thoroughly to detect renal disease as early as possible. The major causes of CKD found in the present study were, type2diabetes mellitus, hypertension, chronic glomerulonephritis and obstructive uropathy. So if we detect and treat these conditions early, we can prevent further progression and irreversible damage to the kidney. Early detection and correction electrolyte imbalances needed to prevent mortality. Only a limited proportion of patients are able to afford haemodialysis. It is important to implement appropriate screening programmes to aid early detection of CKD in at risk populations. Early detection and aggressive control of the risk factors for development of CKD are necessary to prevent and reduce the scourge of CKD in resource poor settings where services for renal replacement therapy are not widely available or are unaffordable for most patients requiring such services. Screening programs for early detection of risk factors of CKD (primordial prevention), health education (primary prevention), early detection of disease (secondary prevention) and establishment of dialysis units in all district hospitals (tertiary prevention) will go a long way in ensuring that the incidence of the disease decreases, and patients of CKD are treated timely and as close to community as feasible to ensure longevity and social, medical and vocational rehabilitation of CKD cases. As the medical management of CKD is costly and prolonged, social security schemes are essential if the nation wants to ensure an affordable, acceptable and effective health care for all citizens. Dietary counselling is of utmost importance in ESRD patients. Proper follow up of dietary advice decreases morbidity and prolongs survival in patients with ESRD.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 19-04-2018; **Accepted:** 20-05-2018; **Published:** 31-05-2018