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Study of Etiology, Clinical and Laboratory Profile and Outcome of Chronic Kidney Disease in Patients Coming To Tertiary Care Hospital, Visakhapatnam.

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Abstract: *Introduction:Number of patients of CKD are growing worldwide [(3)] present study helps in knowing the cause of CKD and clinical and biochemical profile of patients and from the information it helps in preventing the cause of the disease or preventing the progression.Aim: To assess the clinical profile of patients with chronic kidney disease at the time of presentation. To assess the biochemical profile of patients with chronic kidney disease.To determine the etiology of Chronic Renal Failure wherever possible.Methods: After obtaining approval from the IEC and valid informed consent, the participants were recruited into the study Prospective descriptive study. For the study hundred adult patients with chronic kidney disease attending the OPD of Department of General medicine and OPD of Department of nephrology King George hospital, Visakhapatnam, Andhra Pradesh.Results:The study revealed that Diabetic nephropathy (40%), Hypertensive Nephropathy (23%) was the most common causes of CKD in our patients. The study also revealed a high number of patients with anemia, hypocalcemia and hyperkalemia. Conclusion:Out of 100 patients in our study, the majority (63%) were having CKD as a result of Diabetes and Hypertension, which when detected and managed at early stages can halt the progress to chronic kidney disease and renal replacement therapy. Other manageable conditions like Obstructive Uropathy should also be detected and managed at an early stage to prevent irreversible kidney damage.Keywords: Ethics, Chronic kidney disease, Diabetes,Hypertension, health-care providers.*

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I. Introduction

Chronic kidney disease (CKD) is a disease characterized by inability of the kidneys to Keep normal levels of the products metabolism of protein, normal blood pressure, hematocrit, sodium, water, potassium and acid-base balance. Renal functions are monitored by measuring of serum creatinine and blood urea nitrogen and by urinalysis. Once CKD develops it is likely to advance to end stage renal disease (ESRD) over a very variable period (from a few years to as many as 20 to 25). Unless contraindications are present, all patients with ESRD need renal replacement therapy (RRT) [(1)].

Chronic kidney disease affects all aspect of the diseased person who suffer from the disease. Treatment must be given life long and be guided against the etiology, the progression and the several consequences of the loss of endocrine function and renal excretory function [(2)].

II. Aims And Objectives

To assess the clinical profile of patients with chronic kidney disease at the time of presentation. To assess the biochemical profile of patients with chronic kidney disease.To determine the etiology of Chronic Renal Failure wherever possible.

III. Materials and Methods

STUDY DESIGN
Prospective descriptive study.

STUDY POPULATION
For the study hundred adult patients with chronic kidney disease attending the OPD of Department of General medicine and OPD of Department of nephrology King George hospital, Visakhapatnam, Andhra Pradesh.

STUDY PERIOD
From December of 2016 to October of2018 .

SAMPLING TECHNIQUE AND SAMPLE SIZE
A Convenient sample with hundred adult patients were taken.

INCLUSION CRITERIA
- Patients with serum creatinine 2 mg% or above.
- Abnormal Findings on renal ultrasound: - asymmetric kidney size, contracted kidneys (less than 9cm) or polycystic kidneys.
- Raised serum Creatinine with no improvement for more than 3 months. Or

Uremic symptoms over three months with raised serum creatinine

EXCLUSION CRITERIA
- Patients below the age of 18.
- Pregnant women were not included in this study

ETHICAL CONSIDERATIONS:
After obtaining permission from Department of General medicine and institutional ethics committee, Andhra Medical College, Visakhapatnam.
A written informed consent in the local language Telugu was taken from all the participants who are included in the study .For those who were illiterates ,the consent was read out and explained to them and consent was obtained by taking their thumb impression in the presence of a witness.

STUDY TOOL
A detailed history and thorough physical examination were carried out in all patients. Data is recorded in each patient included age, sex clinical and biochemical features of chronic renal failure on a standard proforma. An etiological diagnosis was made on each patient whenever possible even though it's not confirmed by histopathology

Chronic Glomerulonephritis was diagnosed in patients with history of edema, hypertension and documented nephritic range of proteinuria. Hypertensive nephropathy was diagnosed in patients with long history of hypertension and other target organ damage. Diabetic Nephropathy was diagnosed in patients with long history of diabetes, presence of diabetic retinopathy and proteinuria more than 500mg in 24 hours. Chronic Pyelonephritis was diagnosed on ultra-sonogram when there is presence of small kidneys with irregular borders. Autosomal dominant polycystic kidney disease and Obstructive Uropathy and were diagnosed by ultra-sonogram.
The CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) is used to calculate glomerular filtration rate.

DATA ANALYSIS
- Data obtained was entered in Microsoft excel worksheet 2013.
- Descriptive statistical analysis has been carried out in present study.
- Categorical variables were represented as proportions /percentages and quantitative variables were represented as mean and standard deviation.
- Chi-square test has been used to find out significant association. P value <0.05 is considered as statistical significance at 95 percent confidence interval.

IV. Results

A total of hundred adult patients participated in this study, and the observations and results of the study are as follows

Table 1: Age and Sex incidence

	MALE	FEMALE	TOTAL
Number of patients	65	35	100
Mean age	51.92	50.571	51.44
Youngest patient	22	19	-
Eldest patient	72	71	-

Note: Male Female ratio is1.86 to 1.In the study population there are 65 male and 35 female patients with mean age of them is 51.44, youngest patients age is 19 years where as eldest patients age is 72.

Table 2: Etiology of Chronic Kidney disease

Etiology	percentage
Diabetic nephropathy	40
Hypertensive Nephropathy	23
Chronic glomerulonephritis	5
Obstructive Uropathy	4
Chronic pyelonephritis	3
Polycystic Kidney Disease	3
Idiopathic	22
Total	100

In the study the most common etiology for CKD is diabetic nephropathy followed by hypertensive nephropathy. followed idiopathic cause, chronic glomerulonephritis, obstructive uropathy, chronic pyelonephritis and polycystic kidney disease.

Table 3: eGFR (in ml/min/1.73m^2) in chronic kidney disease

eGFR	percentage
<10	6
10.1—20	26
20.1—30	45
>30	23

The percentage of chronic kidney disease patients with eGFR<10 ml/min/1.73m^2 is 6%, 10.1 -20 ml is 26%, 20.1-30 ml is 45%, >30 ml is 23%.

Table 4: Hemoglobin levels in chronic kidney disease

Hemoglobin(gm%)	percentage
<5	6
5-10	79
>10.1	15

The above table reveals that 79% of the patients have their hemoglobin level in the range of 5-10 gm%. Only 6% of the patients have its value below 5mg%, but 15% of the patients exhibit that their hemoglobin level more than 10 mg%.

Table 5: Blood urea (in mg/dl) in chronic kidney disease

Blood urea(mg/dl)	Percentage
<50	1
50-100	68
101-150	22
>150	9
Total	100

From the table almost 68% have their blood urea level in the range 101-250 mg/dl. Also, one can see from the table that 9% of patients have their blood urea level more than 150 mg/dl and hardly 1% had the value below 50 mg/dl.

Table 6: Serum Creatinine Values in Chronic kidney disease

Serum creatinine (mg/dl)	percentage
2	14
2-4	68
4-6	14
>6	4
Total	100

From the above observation the number of patients with serum creatinine of 2-4 mg/dl are 68 percent and 4-6 mg/dl are 14 percentage and above 6 mg/dl is 4 percentage.

Table 7

Serum potassium levels in Chronic kidney disease

serum potassium in mmol/lit	Percentage
<3.5	14
3.5-5.5	54
>5.5	32

From the above observation 32% of patients had hyperkalemia and 54%of patients had values with in normal limits.Only 14% had the value less than 3.5 mmol/1.

Table 8: Serum Sodium levels in Chronic Kidney disease

serum sodium(meq/l)	Percentage
<135	17
135-145	81
>145	2

From the above observation it appears that hyponatremia (Serum sodium level < 135 meq/1) is present in 17% of patients. Further in 81% cases this value lies between the normal limits (135-145 meq/1). Only 2% had the value > 145 meq/1.

Table 9: Serum Calcium levels in Chronic kidney disease

Serum calcium(mg/di)	Percentage
<8.9	69
8.9-10.1	29
>10.1	2

Hypocalcemia (<8.9 mg/dl) can be seen in 69% of cases. 29% of cases have this value within normal limits of serum calcium levels and 2% of patients has more than 10.1 mg/dl.

Table 10: Serum Albumin levels in Chronic kidney disease

Serum albumin(g/dl)	Percentage
<3.5	61
3.5-5.5	39

Hypoalbuminemia (Serum Albumin < 3.5g/dl) can be seen in 61% of cases. 39% of cases have this value within normal limits (3.5 – 5.5 g/dl).

Table 11: Signs of Chronic kidney disease

Signs	Percentage
Hypertension	87
Pallor	81
Ascites	23
Pleural effusion	10
Pulmonary edema	7
Skin changes	4
Nail changes	3
Palpable kidneys	3

The clinical examination reflects that almost 87 % of the patients had hypertension, 81% reflected the presence of pallor. 23% them had ascites and pleural effusion in 10% of patients all the other signs were found to be below 10%.

Table 12: Symptoms of Chronic kidney disease

Symptoms	Percentage
Pedal edema	81
Generalized weakness	80
Oliguria	70
Breathlessness	65
Nausea	64
Puffiness of face	57
Loss of appetite	37
Abdominal distension	31
Hematuria	22
Altered sensorium	8
Polyuria	7

The presences of various symptoms observed in 100 patients are presented in the above table. We see that 81% of the cases had pedal edema followed by generalized weakness in 80%. Oliguria is present in 70% of cases The Gastrointestinal symptom namely anorexia is found in 64% cases. The numbers of cases having puffiness of face were 57% and 65% of the cases had breathlessness. The percentage of patients having various other symptoms can be seen from the table.

Table 13: Kidney size (by USG) in Chronic Kidney Disease

Size (in cms)	Percentage
Normal	11
Decreased	85
Increased	4

Kidney size is decreased in 85% of patients whom participated in the study, normal in 11% of patients , increased in 4% of patients.

Table 14: Serum sodium (in meq/l) in Chronic kidney disease

Serum sodium	Percentage
<135	17
135—145	81
>145	2

81% have normal sodium levels between 135-145 meq/l, 17% have hyponatremia<135meq/l, 2% of patients have hypernatremia >145meq/l.

TABLE-15 : The Comparison between groups based on Serum Creatinine levels in terms of Hemoglobin, Potassium, Calcium and Albumin Levels

GROUP	Sr. creatinine(mg/dl)	Percentage of patients	Hb(gm/dl) Avg+/-St.dev	Sr. potassium(meq/l) Avg+/-St.dev	Sr. calcium(mg/dl) Avg+/-St.dev	Sr. Albumin(gm/dl) Avg+/-St.dev
I	2.0-4.0	82	8.81+/-1.63	4.66+/-1.04	8.62+/-0.79	3.56+/-0.81
II	4.0-6.0	14	7.17+/-2.25	4.82+/-1.15	8.45+/-0.67	3.05+/-0.51
III	>6.1	4	8.12+/-0.68	4.57+/-1.05	8.55+/-0.57	1.90+/-1.13

In the first group, the average haemoglobin level is found to be 8.81 with standard deviation of 1.63, in the second group average haemoglobin is 7.17 with the standard deviation of 2.25, in the third group average haemoglobin is 8.12 with standard deviation of 0.68. The p value is 0.03, hence here is significant decrease in haemoglobin with increase in serum creatinineis observed.

In the first group average potassium is 4.66 with standard deviation of 1.04, in the second group average potassium is 4.82 and standard deviation of 1.15, in the third group average potassium is4.57 with standard deviation of 1.05. p value is >0.05, so the increase in the serum potassium with increase in serum creatinine is insignificant.

In first group, the serum calcium is 8.62 with standard deviation of 0.79, in the second group serum calcium is 8.45 with standard deviation of 0.67, in the third group serum calcium is 8.55 with standard deviation of 0.57. p value is >0.05, so the trend observed for serum calcium is insignificant.

There is a decreasing trend of serum albumin from 3.56 to 1.90 when serum creatinine is raising from 2 to 6 and above. This difference didn't show any statistical significance as p value>0.05.

V. Discussion

One hundred adult patients having chronic kidney disease were included in the study. They presented to King George Hospital Andhra Medical College Visakhapatnam. These patients satisfied the inclusion criteria. They were studied and evaluated clinically, and laboratory investigated, and ultrasonography of abdomen was done.

In our study of 100 patients there is male and female ratio of 1.6:1. The mean age was 51.44 years. The youngest patient was 19 years of age and the oldest 72 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. This study showed that the prevalence of chronic kidney disease in age above 40 years as a result of hypertension and diabetes is more common when compared to younger age groups in contrast, the chronic glomerulonephritis prevalence is more common in the younger age groups i.e. less than 40 years

This study showed a greater number of patients were found to have diabetic nephropathy (40%) and hypertensive nephropathy (23%). This trend is like that of Dash and Agarwal in the study conducted at the All India Institute of Medical Sciences.

Lysaghtet al have also demonstrated similar trends in American populations [(4)]. In the study done by Xueet al showed patients with diabetic nephropathy were almost 50% of the study population [(5)]. The etiological data also shows the prevalence of Chronic glomerulonephritis at 4% which is not like the data from other developing countries like Egypt and Bolivia. [(6)]

The hemoglobin levels were below 10 gm/dl in 85% of the patients thereby emphasizing the need to improve hemoglobin levels in patients of CKD. It is a well-known fact that anemia develops in the course of chronic Kidney disease and is nearly common in patients with chronic Kidney disease. Decreased hemoglobin levels maybe due to loss of synthesis of erythropoietin by the kidneys and or due to presence of inhibitors of erythropoietin synthesis. Numerous articles describe the association of anemia with chronic kidney disease and describe its various causes. McGonigle, Wallinet al study found up to 90% of patients to have hemoglobin less than 10 gm/dl [(7)] out of 863 patients for anemia and They also established that erythropoietin deficiency and disorders related to its synthesis are the main factor of anemia in patients with CKD. These results are consistent in this present study. Furthermore, they also established that the severity of anemia is related to extent of kidney damage and duration. The lowest hemoglobin levels were found in patient who commenced dialysis at very severely decreased levels of kidney function. This study showed that patients with increasing creatinine there is decrease in hemoglobin levels. More severe anemiais seen in patients with greater extent of damage of kidneys.

The incidence of Hyperkalemia was 32% which shows the need for the early detection and management of this dangerous complication. Hyperkalemia is a known complication of CKD which may be precipitated in several conditions, but some causes of Chronic kidney disease may be associated with earlier and severe disturbance of mechanisms of potassium secretion in the distal nephron, relative to the reduction in GFR.

Most important are conditions having hyporeninemichypoaldosteronism like diabetic nephropathy and renal tubular acidosis.

Hyponatremiawas reported at an incidence of 17% in our study which is also a known association with CKD. Hyponatremia is an uncommon complication in predialysis patients, and water restriction is necessary only when hyponatremiais documented.

Hypocalcemia is a well-established abnormality in patients with CKD and in this study showed the prevalence at 69%. It is known that disorders of calcium, phosphorus metabolism and bone disease develop during CKD. In most of patients with severely decreased kidney function the Radiological and histological demonstration of bone disease can be demonstrated. Reduced levels of calcium have been described in patients with GFR less than 70 ml/ min in various studies. At earlier stages of CKD also histological changes in the bone have also been shown to occur. In Hamdy et al study conducted on the effect of alfacalcidol on natural course of renal bone disease in mild to moderate renal failure [(8)] on 176 patients having creatinine clearance values between 15 to 50 ml/ min,75% of patients showed to have histological abnormalities with most of them has osteitisfibrosa with or without osteomalacia

According to study conducted by Coen et al on Chronic kidney disease patients having osteodystrophic bone disease and Metabolic acidosis patients with creatinine clearance of 20 to 59 ml/ min, showed that 87% of those patients had unusual histology of bones and most of them had lesions of high bone formation rate associated with hyperparathyroidism [(9)]

According to results of our study size of kidneys was observed to decreasedin 85% of the CKD patients. The kidney size appears to be normal in 11% of CKD patients is attributed due to presence of more patients of diabetic nephropathy in whom presence of normal renal size is a well-known fact. In the patients having reduced kidney size had small hyperechoic kidneys which ischaracteristic feature in Chronic kidney disease

In the present study serum Albumin levels was observed to decreased in 61% of the CKD patients who participated , and this is compared with studies like Koppel et al -Modification of diet in renal disease(MDRD study group)[(10)].with decreased levels of Glomerular filtration rates the serum albumin is also tend to decrease , specifying decreased serum protein concentration or circulating proteins ,inflammation or loss of proteins .with bromocresol green method justifiable target of albumin is above 40mg/dl.. According to USRDS Chronic kidney disease study in united states between 2007 and 2015 in patients around 57,277 average albumin levels is decreased Multivariate analysis showed that hypoalbuminemia is more common among blacks or other non-Caucasian race, diabetes and females

Stall et al observed that though we initiated dialysis regimen and even after providing appropriate dialysis regimen, most of these CKD patients not getting acceptable levels of nutrition as documented by persistence of hypoalbuminemia and nourishment

The common symptoms observed in this present study were pedal edema (81%), generalized weakness (80%), oliguria (70%), breathlessness (65%) and nausea (64%). altered sensorium is observed in 8% of patients in this study. In NHANES patients decrease in glomerular filtration rate is associated with impaired lifting ability walking. In the same study another subgroup of patients of CKD, the decrease in Glomerular filtration rates associated with the physical impairment was eight times greater than in the general population. physical function was not significantly associated with the level of functioning of kidneys, but patients on dialysis reports more physical dysfunction when compared to transplanted patients, but diabetic nephropathy patients on dialysis and transplanted patients tend to report physical dysfunction more often than those patients who are not diabetics. Poor kidney function is also associated with reduced employment in the above NHANES study. The above-mentioned study also observed decrease in social interaction, social functioning and social activities due to symptoms of Chronic kidney disease. Anorexia was evidenced by almost a third (37%) of our patients. Anorexia which are hallmarks of Chronic kidney disease is supported by decrease in dietary intake of protein. Decreased dietary protein intake may be viewed as adaptive in patients with CKD. The reduction of intake of protein reduces accumulation of harmful substances obtained from protein metabolism Thus, because of the outcome of this adaptive change may cause increase in protein energy malnutrition in patients of Chronic kidney disease

The most usual signs are Hypertension (87%), pallor (81%), and ascites (23%). Other signs like palpable kidney, pulmonary edema, skin and nail changes, pleural effusion etc. are found in less than ten percentage of patients in this study. National Kidney Foundations K/DOQI conducted twenty-six studies which are associatedto blood pressure and the extent of GFR decline in many univariate and/or multivariate analysis. Most studies observed a considerable association between increase in blood pressure, and faster rate of decline in glomerular filtration rate. From this data it confirms that elevation in blood pressure is associated with rapid decrease of GFR when controlling other factors. Ascites and Pedal edema are related with abnormal biochemical parameters and if the correction of ascites and pedal edema showed to improve outcome in these

patients. Outcome according to present study was 75%of patients managed conservatively, 20% with dialysis and five deaths occured.

STRENGTHS

- Multiple parameters are assessed in one study
- Less time consuming.

VI. Conclusion

We aim 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. Out of 100 patients in our study, the majority (63%) were having CKD as a result of Diabetes and Hypertension, which when detected and managed at early stages can halt the progress to chronic kidney disease and renal replacement therapy. Other manageable conditions like Obstructive Uropathy should also be detected and managed at an early stage to prevent irreversible kidney damage. The other complications like Anemia, Hypocalcemia, Hyponatremia and Hyperkalemia were also present in significant numbers and emphasize the need for the detection and correction of these complications.

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