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## A Prospective Observational Study on Chronic Kidney Disease and Its Complications



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**Keywords:** Chronic kidney disease, CKD, complications of CKD

### ABSTRACT

**Background-** Chronic kidney disease (CKD) is a permanent failure of the kidney to accomplish its actions. Chronic kidney disease is commonly seen in elder people. Only a few studies have evaluated the prevalence of CKD in hypertension and diabetes. The aim of the study was to assess the complications of chronic kidney disease which include anemia, hypertension, diabetes mellitus, cardiovascular disease (CVD) and metabolic complications like hyperkalemia, hyperphosphatemia. **Objectives-** To assess the prevalence of hospitalization of CKD and its association with cardiovascular morbidity. All patients are diagnosed with CKD with either sex or age group of above 20 years. **Methods-** A prospective observational study is carried out in 150 patients with chronic kidney disease who are hospitalized from age groups of 20-80 years to examine the complications of CKD such as Anemia, hypertension, diabetes mellitus, cardiovascular disease (CVD) and metabolic complications like hyperkalemia, hyperphosphatemia. **Results-** Out of 150 cases 93 was males and 57 were females. Majority patients were older a 51-70 of age group. Anemia is the most common complication seen in the chronic kidney disease of males(51%) and females(32%), hypertension of males (47%) and females (23%), diabetes mellitus of males (25%) and females (13%), and cardiovascular disease of males (2%) and females (0.66%).21 cases consists of hyponatremia (14%), 122 cases are normal (81.3%), and 7 cases are with hypernatremia (4.6%) respectively. out of 150 cases 2.6% are with Hypokalemia, 80% cases are with normal, and 16.6% are with Hyperkalemia, hyperphosphatemia and Hypocalcaemia consists of 150 cases (100%). **Conclusion-** CKD occur in elderly population and at are a risk of anemia, hypertension, Diabetic Mellitus, Hyperkalemia, hyperphosphatemia, Hypocalcaemia. Hence elderly patients with low Glomerular Filtration Rate should be monitored for metabolic complications, regardless of age.

## INTRODUCTION

The kidneys are important organ in body and maintain internal balances such as water, mineral and especially sodium, potassium, calcium, phosphorus, magnesium and sulphate. The kidneys also function as a part of endocrine system and produce erythropoietin and 1, 25-dihydroxychole-calciferol (calcitriol) and erythropoietin is involved in the protection of red blood cells and calcitriol plays a role in body as bone formation. A pre-renal reason for kidney injury is due to septic shock, bleeding extensive surgery including aortic aneurysm and obstruction of renal arteries. Primary renal kidney injury is a reason for kidney is a glomerulonephritis, intestinal nephritis due to local side effects of a pharmacological drugs or toxins.

**About chronic kidney disease:** Chronic kidney disease is a type of renal failure in which there is a gradual loss of kidney function over a period of months (or) years. Early on there are no typical symptoms shown and later its shows leg swelling, loss of appetite or confusion may develop. Impaired renal function is in itself to increase mortality and morbidity rate. Especially seen in cardiovascular disease patients. If the patient is also suffering with diabetes mellitus, the risk of death may occur due to cardiovascular disease is considered to be further increased. The causes of CVD has been connected with abnormal blood lipids malnutrition and atherosclerosis. upto 56% of cases of patient are treated with dialysis and have shown the presence of event is a heart failure when renal failure is strongly impaired then urine output is a reduced in body. The aim of disease is to reduce the risk of progression of kidney failure and it is most common cause of chronic renal failure that requires dialysis or diabetic nephropathy. Other conditions such as polynephritis, inflammation of kidney, parenchyma (bacterial infection) it is more common in diabetic's patients than in other population and development of kidney damage in patients with type 1 and type 2 diabetes.

### EXAMPLE VARIOUS REASONS FOR CKD

Post-Renal	Pre-Renal	Renal
Intermittent Pyelonephritis and urosepsis	Various chronic infection and parasites such as HIV, hepatitis B or C, Malaria	Hypertension Transplant kidney rejection/nephropathy

### Kidney function:

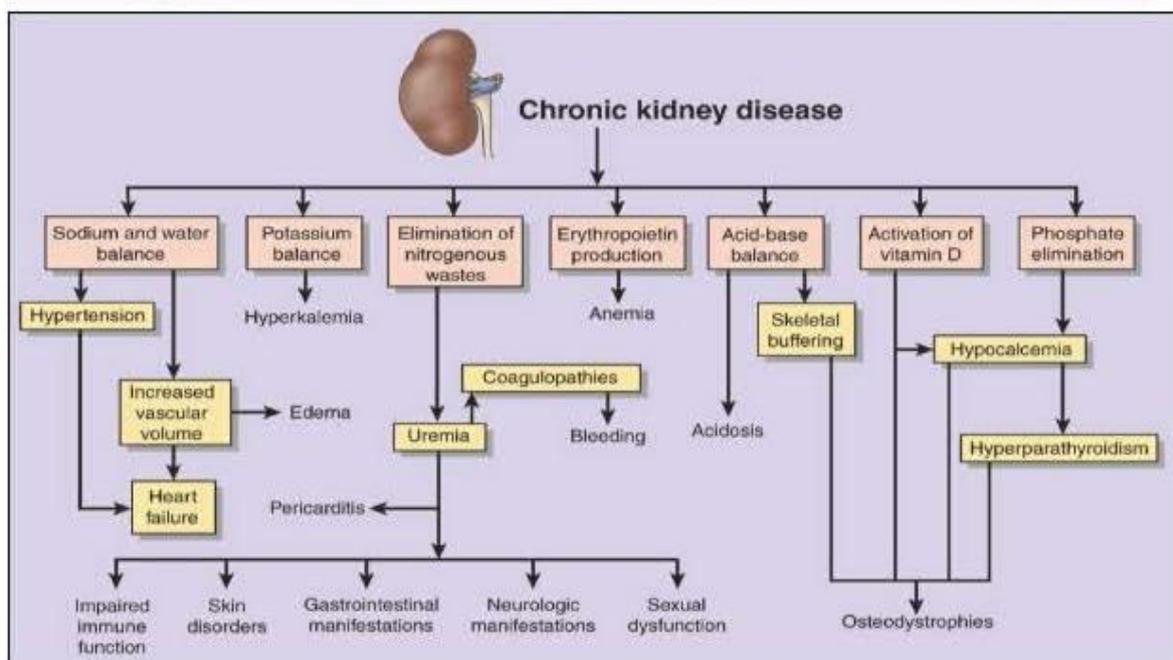
The kidney function may be known made by using laboratory variables such as serum creatinine, urea and cystatin c, these are most common analyses performed in daily clinical practice. To get a more accurate assessment of kidney function to measured as GFR. The methods are Cr-EDTA clearance and iohexol-clearance and plasma clearance these methods are often as expensive and time consuming. These methods are cheap but difficult to approach with patients. These values can be inserted in formula.

### Gault formula

$$eGFR(\text{men}) = 1.23 \times 140 - \text{age} \times \text{weight} / \text{sr. creatinine}$$

$$eGFR (\text{women}) = 1.04 \times 140 - \text{age} \times \text{weight} / \text{Sr-creatinine}.$$

### PATHOPHYSIOLOGY



### MANAGEMENT AND ITS STAGES OF KIDNEY DAMAGES

For progressive renal disease that include declining renal function and increasing creatinine levels. It is recommended to contact nephrologists unless post renal causes post operation. Renal medical investigation generally requires extensive sampling to evaluate renal function such as following blood count, reactive protein, sedimentation rate, plasma glucose,

potassium, sodium, creatinine, cystatin-c and estimated GFR. Liver function tests (ASAT, ALAT, and LD).

## STAGES

There are 5 stages in CKD.

### STAGE-1

It means you have mild kidney damage and eGFR is between 90 (or) greater. Most of the time, a GFR of 90 means your kidney working is healthy and good condition. Other signs indicate kidney damage could be protein in your urine (pee) or physical damage in kidneys. It does not be seen to be cost beneficial to make population screening. The screening of patients above 60 years may not be cost beneficial, urinary tests with dipsticks and lab samples to detect early and manage most of patients. Here the way slow down kidney damage in stage 1 is control it.

### STAGE-2

Here the stage 1 and stage 2 are similar in condition of kidney damage and it has mild damage is normal and GFR is between 60 and 89.

The condition of kidney is well working and healthy.

### STAGE -3

Here stage 3 means have a GFR is between 30 and 59; this means some damage of a kidney function. If a progressive renal disease is present (decreasing GFR increasing proteinuria). At this stage the patient has a secondary CVD complication. The stage 3 is divided into two sub stages 3a and 3b the stage 3a means have a GFR is between 45 & 59, stage 3b means have a GFR is between 30 & 44. to control stage 3 of kidney damage may getting worse, you can stay at healthy diet and weight, meet with a dietician, visit a nephrologists to check kidneys are in healthy condition.

### STAGE 4

The stage 4 means have a GFR is between 15 & 29. if the patient for the first time meets the nephrologists in this stage of kidney function. In this stage the kidney function is not working

well or severally damage, the risk of bleeding is increased in this patient. The patient has complications at this stage are high in Blood pressure, anemia, bone disease and transplant of kidney. Symptoms are back pain, urinating and swelling in your hands and feet.

#### STAGE 5 AND 5d

The stage 5 have a GFR is less than 15.it is very closely to failure of kidney damage. up to 30% of patients who start chronic kidney replacement such as dialysis has not been in contact with a physician before initiation of dialysis. The acute option may be to admit the patient to a dialysis unit to remove the excess of water .the stage 5 of CKD patients has an increased inflammation in kidney and its complication is congestive heart failure. The 5d dialysis of the incidence is shown as diabetic nephropathy is one of the most frequent diagnoses (25%). In addition, 10% of patients with CKD stage 5 &5d also suffer with DM. overall 1/3 patients in a Sweden who currently need dialysis or kidney transplant have diabetes as a root cause to their kidney damage. Also considered result in end stage renal disease are 20% glomerulonephritis & polycystic is 5-10%, Polynephritis represent 5% of ESRD (END STAGE RENAL DISEASE). The heart failure is common in patients with advanced renal failure at end stage is 56%.the 70% of patients are dialysis population and age-related cardiovascular reasons for mortality rate than in general population.

#### COMPLICATIONS

- Dyslipidaemia,
- Hyperkalaemia,
- Metabolic acidosis,
- Anemia
- Bone and mineral disorders,
- Hypertension,
- Increased risk of bleeding,
- Increased risk of infection,
- Dehydration,

- Fluid overload(edema),
- Dehydration
- Diabetes mellitus

Chronic acidosis has recently been shown to be a risk factor in the progression of CKD renal dysfunction. Therefore, treatment is mandatory.

## **METHODS TO CONTROL CKD**

### **Two types of Dialysis**

**1. Peritoneal Dialysis:** It is used to remove the excess fluid correct electrolyte problems, and remove toxins in those with kidney failure. Peritoneal dialysis (PD), also called abdominal dialysis, is used in Sweden for about 20% of all dialysis cases.

**2. Hemodialysis:** Hemodialysis is a method of removing excess fluid salt and wastes from the blood effectively replacing the excretion functions of failed kidneys is the most common dialysis treatment (about 80%). To dialyze effectively requires a large blood flow and a blood vessel that can withstand being punctured with a thick needle as often as the patient needs dialysis.

## **MATERIALS AND METHODS**

- A Prospective observational study being focused on demographic details of patients & complications (age, gender, and occupation), weight, height (for BMI), and chief complaints, past medical history, medication adherence, past medication history, family history, social history, and allergies. The Patients who meet the above study criteria are enrolled into the study. The protocol and data collection form of study was submitted to Chaitanya College of Pharmacy Education and Research after the review of study documents by members of the department the study was approved.

## RESULTS AND DISCUSSION

**Table No. 1: AGE CATERIZATION**

AGE (years)	MALES	FEMALES	TOTAL
10-20	1	0	0.66%
21-30	9	2	7.33%
31-40	10	5	10%
41-50	14	12	17.3%
51-60	20	30	33.3%
61-70	25	15	40%
71-80	5	2	4%

**Table No. 2: Complications Improved in Patients**

Complications	No of cases	Improved	Remained constant
BP	106	74 (49%)	32(21.3%)
Anemia	126	30(20%)	24(16%)
Diabetes mellitus	58	32(21.3%)	26(17.3%)

**Table No. 3: Medication for CKD**

Drug	Dose	ROA	Frequency	No of case
Cefpodoxime	325 mg	PO	BD	97(64.6%)
Amikacin	750 mg	PO	BD	36(24%)
Prazosin	5 mg	PO	BD	34(4%)
Cholicalciferol	500 mg	PO	BD	36(24%)
Flupirine + Paracetamol	1 tab	PO	BD	24(22%)

The study demonstrates that 50 % older patients with CKD, lower GFR is associated with the presence of complications of CKD such as anemia, hypertension, diabetes mellitus, and cardiovascular problems. Decline in the kidney function is seen in the older age individuals. Some studies “Chronic kidney disease and the risks of death, cardiovascular events and hospitalization”, evaluated the estimated GFR and the risk of outcomes in the general population. In the second national health and nutritional examination survey an estimates GFR of less than 70 ml/ min /1.73 m<sup>2</sup> was associated with a 68% increase in the risk of death

from any cause and the 51% increase in the risk of death from cardiovascular causes, as compared with an estimated GFR of at least 90 ml/min/1.73 m<sup>2</sup>. Our studies shown that males are more prone to CKD than females. But some studies “Chronic kidney disease and cardiovascular risk in hypertensive type 2 diabetes: a primary care perspective”, shown that the prevalence of CKD in hypertensive, type 2 diabetes patients was 26% with older subjects and woman showing higher rates In our study the mostly observed complication is the Anemia (83%) patient population, next mostly seen complication is the hypertension, followed by diabetes and cardiovascular risks respectively.

Some studies suggests that the patients with reduced GFR are in fact more prone to develop coronary heart disease and cardiovascular events that to reach ESRD.

- In our study shortness of breath is the common complaint which is seen among the 63% patients with CKD which is followed by pedal edema, loss of appetite and decrease urine output respectively.
- In our study out of 150 cases 29 cases have condition nausea (19.3%), followed by loin pain (11.3%), dyspnea (6.6%), altered sensorium (5.3%), vomiting, general weakness, Oliguria, constipation, respectively.
- In our study out of 150 cases 21 cases consists of hyponatremia (14%), 122 cases are normal (81.3%), and 7 cases are with hypernatremia (4.6%) respectively.
- In our study out of 150 cases 2.6% are with hypokalemia, 80% cases are with normal, and 16.6% are with hyperkalemia.
- In our study out of 150 cases 10 cases are with hypochloremia (6.6%), normal 120 cases (86%), and 20 cases with hyperchloremia (13.3%).
- In our study out of 150 cases hyperphosphatemia consists of 150 cases (100%).
- In our study out of 150 cases hypocalcaemia consists of 150 cases (100%).

The serum creatinine mean was found to be  $4.56 \pm 1.27$ .

The GFR mean was found to be  $13.57 \pm 4.25$ .

The random blood sugar mean was found to be  $123 \pm 58.56$ .

Antibiotics are mostly preferred drugs, multivitamins and calcium supplements are also given in most of the patient population groups. Pantoprazole is given as an ulcerative prophylaxis in about 95.3% patients. In our study out of 150 cases 140 cases are using antibiotics. 97 number of cases are using Cefpodoxime (64%), followed by Salbactam + Cefaperazone 36 cases (24%), Tazobactam 5 cases (3.33%), vancomycin 1 case (0.66%), Ofloxacin (1%), Clavulanic acid 1 case (0.66%), amikacin 1 case (0.66%) respectively. In our study out of 150 cases, 119 cases are using calcium supplements. 24% are using cholecalciferol, 58.6% are using calcium glucono-galacto gluconate, and 1.33% is using calcitriol. In our study out of 150 cases, 95.3% are using ulcer prophylaxis drugs. 4% are using pantocid, 1.3% is using Ranitidine, and 94% are using pantoprazole. In our study out of 150 cases, 32% are using Analgesics. In which 25.3% are using flupirtine + paracetamol, 4.6% are using Hyoscine, 0.66% are using Tramadol, and 0.66% are using Diclofenac. In our study out of 150 cases 53.3% are using hypertension drugs. 5.3% are using Amlodipine, 17.3% are using hydrochloride + Metoprolol, 6.66% are using Cilnidipine, 2.66% are using penbutolol sulfate, 20% are using torsemide, and 22.6% are using prazosin respectively. In our study out of 150 cases BP consists of 106 cases in which 49% cases are improved and 21.3% remained constant, Anemia consists of 126 cases out of which 20% cases are improved and 16% are remained constant, Diabetes mellitus consists of 58 cases in which 21.3% cases are improved and 17.3% cases remained constant.

## CONCLUSION

Our study shows that older patients with CKD, lower GFR is associated with the presence of complications of CKD such as anemia, hypertension, diabetes mellitus, and cardiovascular problems. The main causes of hospitalization of CKD patients is shortness of breath, pedal edema, loss of appetite, and decreased urine output. In our study males are more prone to CKD than females. Anemia is the common complication which is seen among the stage 5 CKD patient population groups. In the day wise plan the decrease in the serum creatinine was observed with an increase in the GFR values. Haemoglobin levels also increased in day wise plan which decreases the complication Anemia. Random blood sugar levels also decreased to normal thus which reduces the diabetic complication. In our study out of 150 cases, the Hemoglobin mean was found to be  $10.8 \pm 1.81$  at day 3. The Hemoglobin was improving day by day. In our study out of 150 cases, BP consists of 106 cases in which 49% cases are improved and 21.3% remained constant, Anemia consists of 126 cases out of which 20%

cases are improved and 16% are remained constant, Diabetes mellitus consists of 58 cases in which 21.3% cases are improved and 17.3% cases remained constant.

Hence we conclude that chronic kidney disease complications are observed in our study and treatment options are given to the patients and most of the complications are subsided.

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