Review Article

International Journal of Clinical Pharmacokinetics and Medical Sciences

Published by Pharma Springs Publication Journal Home Page: https://pharmasprings.com/ijcpms/

Review article on chronic kidney disease

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Article History:

Received on: 28 Mar 2022
Revised on: 07 Apr 2022
Accepted on: 10 Apr 2022

Keywords:

CKD,
GFR,
ESRD,
Dialysis,
treatment

Abstract

The hallmarks of chronic kidney/renal disease (CKD) include patient urogenital abnormalities, anatomical abnormalities, or lowered excretory renal function that may indicate the absence of functioning nephrons. The majority of CKD cases have increased mortality and cardiovascular complaint threat. The difficulty in carrying out renal replacement therapy for those with end-stage renal complaints is an issue far and wide around the globe. Low nephron count at birth, nephron loss with aging, and acute or chronic kidney damage brought on by toxic exposures or illnesses are risk factors for the development and progression of CKD (for illustration, obesity, and type 2 diabetes mellitus). Cases with CKD are managed with an emphasis on early discovery or prevention, treatment of the underlying cause to decelerate development, and attention to secondary processes that fuel continued nephron loss. The pillars of remedy include lowering blood pressure, blocking the renin-angiotensin system, and accepting actions adapted to a case's particular condition. Diagnosis and therapy are necessary for CKD consequences such as secondary hyperparathyroidism, metabolic acidosis, and anemia, which impact cardiovascular health and quality of life.

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eISSN: 2583-0953

DOI: https://doi.org/10.26452/ijcpms.v2i4.470

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INTRODUCTION

WHO DEFINES CKD as kidney damage or glomerular filtration rate [GFR] less than 60 ml/min or 1.73 m2 for three months or more, regardless of the underlying cause. Albuminuria, indicated by an albumin-to-creatinine ratio of more than 30 mg/gm in two of three spot urine samples, is a reliable indicator of kidney impairment in many renal disorders. According to the CDC, kidney disease (CKD) is a disorder in which the kidneys are damaged and unable to filter blood wastes as effectively as healthy kidneys. As a result, blood waste builds up in the body, leading to various health issues. More than or equal to three months' worth of structural or functional problems in the kidneys, as shown by kidney damage with or without a reduced GFR [1].

GFR less than 60 mg/min/1.73 m^2 whether or not renal impairment is present.

Stages of CKD [2]

Stage 1: GFR > 90 ml/min/1.73 m^2 (NORMAL)

Stage 2: GFR 60-89 ml/min/1.73 m2 [MILD]

Stage 3: GFR 30-59 ml/min/1.73 m2 [MODERATE]

Stage 4: GFR 15-29 ml/min/1.73 m2 [SEVERE]

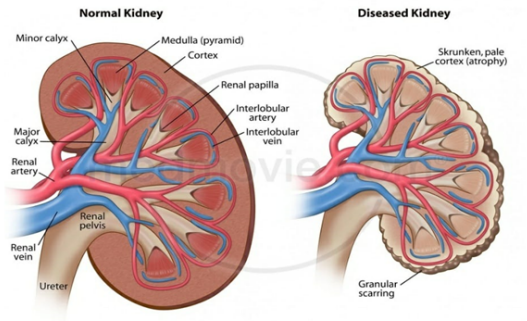

Figure 1: The distinction between healthy kidneys and kidneys with diseases

Stage 5: GFR less than 15 ml per minute per square meter [KIDNEY FAILURE].

Albuminuria staging:

Stages include:

Stage 1 (urine ACR 30mg/gm),

Stage 2 (urine ACR 30-300mg/gm), and

Stage 3 (urine ACR > 300mg/gm).

Incidence of CKD in India [3]

According to nephrology dialysis transplantation, roughly 7.85 million people in India suffer from chronic renal failure. The spectrum's aetiologies included diabetes (41%), hypertension (22%), chronic glomerular nephritis (16%), chronic interstitial disease (5.4%), ischemic nephropathy (2.7%), obstructive uropathy (2.7%), and other causes (5.4%). CKD is thought to affect women more frequently than males [16% versus 13%].

Figure 5: CKD is widespread in the world

Causes of CKD [4]

1. Diabetes.
2. Hypertension.
3. Impaired urine flow.
4. Kidney disease (interstitial and glomerular nephritis).
5. Stenosis of the kidney artery.
6. Certain poisons include lead, solvents like carbon tetrachloride, and fuels.
7. A developmental issue in the fetus.
8. Erythematous systemic lupus.
9. Yellow fever and malaria
10. A few drugs [NSAIDs].
11. Abusing illegal substances like heroin or cocaine.
12. Injury: a physical or blunt hit to the kidney.
13. Kidney illness with several cysts.

Risk Factors of CKD [5]

1. Clinical

- Diabetes mellitus.
- Obesity;
- Hypertension;
- Cardiovascular Disease.
- Malignancy.
- Renal stones.
- Obstruction of the urinary tract.
- Decreased kidney mass (low birth weight, nephrectomy).
- Acute renal damage in the past.
- Smoking.
- Using drugs intravenously.
- Kidney illness in the family history.
- Immune system disorders.

2. Sociodemographic

- Older than 60 years.
- Minority races.
- Low earnings.
- Limited education.

3. Alleles associated with APOL 1 risk.

- The sickness and trait of sickle cell.
- Kidney polycystic disease.

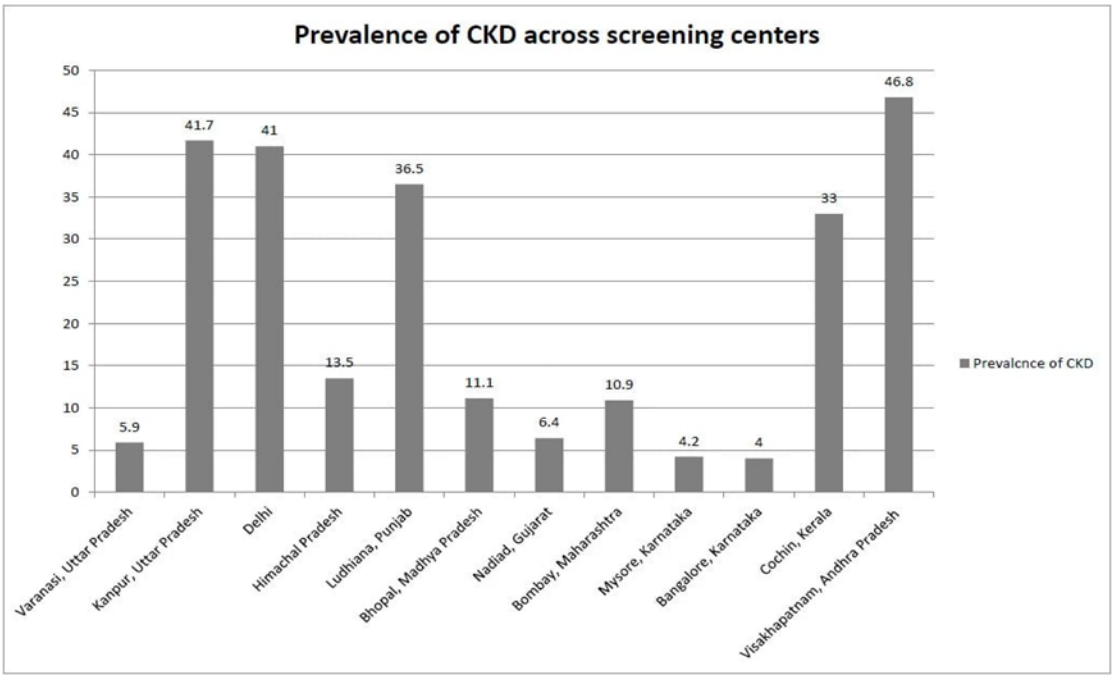

Figure 2: CKD prevalence across screening facilities

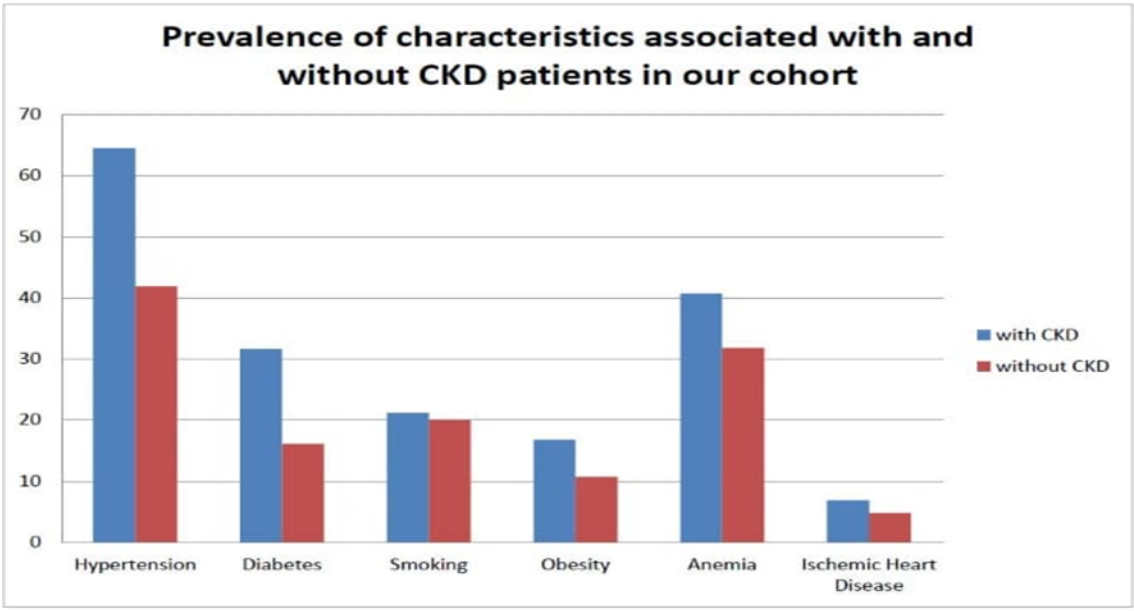

Figure 3: Prevalenceof traits connected to and unrelated to CKD in our group

- Alport syndrome is characterized genetically by kidney impairment, hearing loss, and atypical eyes.
- Urinary tract and congenital kidney abnormalities.
- Additional family factors.

Figure 6: Risk Factors of CKD

Complications of CKD [6]

- Hyperkalaemia, fluid retention, and cardiovascular disease are among the examples.

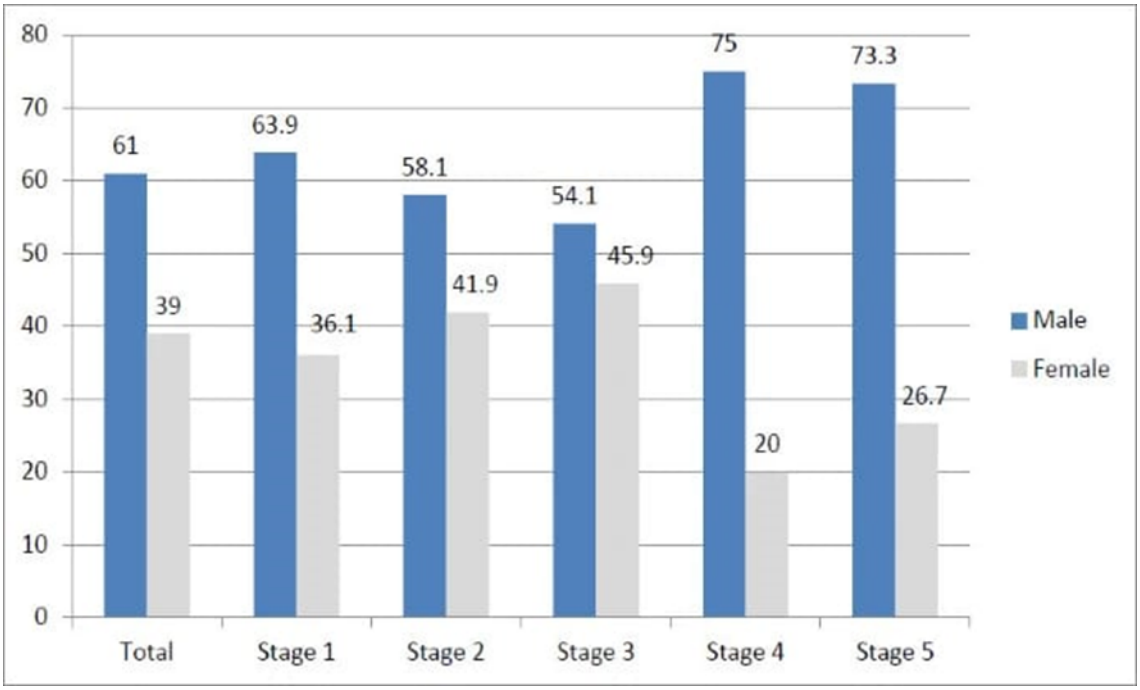

Figure 4: Stage-specific prevalence of CKD in men and women

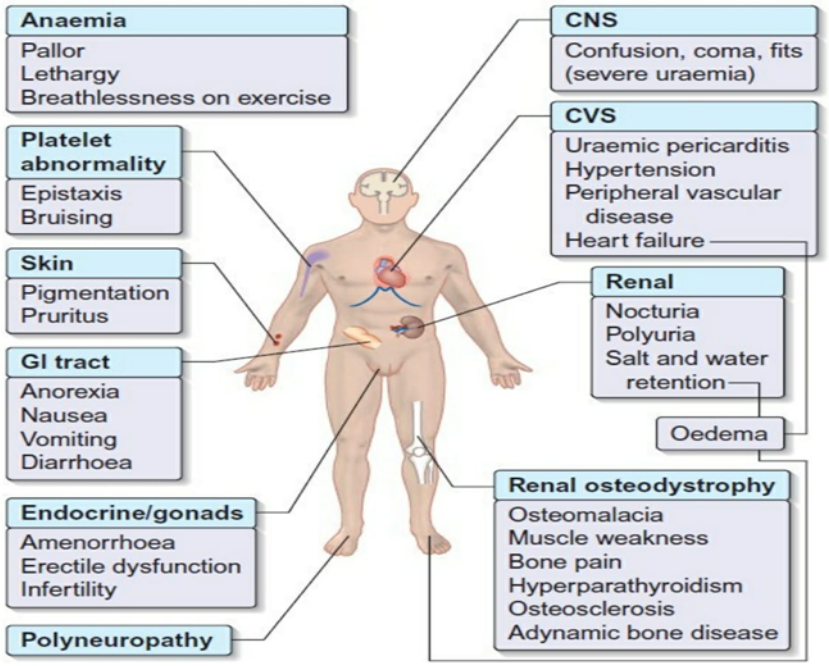

Figure 7: Signs and symptoms of CKD

- Fractures are more likely in those with weak bones
- Anaemia.
- Reduced fertility, erectile dysfunction, or decreased sex drive
- Your central nervous system is harmed.
- A diminished immunological response.
- Obstetric problems that put the mother and growing fetus in danger.
- Irreversible kidney disease (ESRD).

Diagnostic Studies of CKD [7]

1. Urine analysis
2. Urine culture

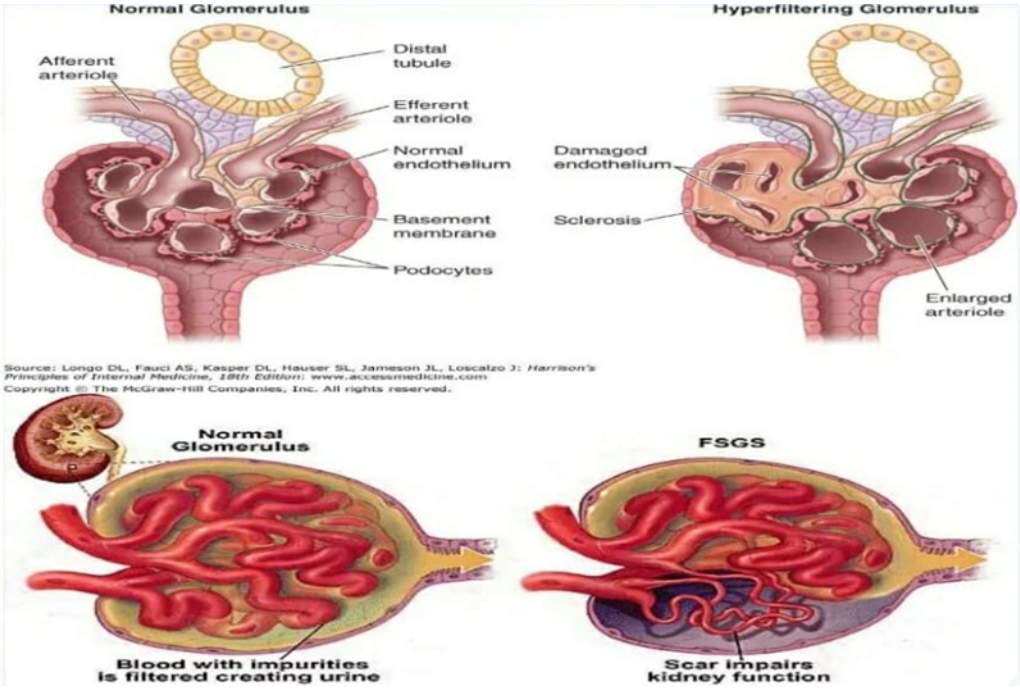

Figure 8: Pathophysiology of CKD

3. Hematocrit test
4. Renal function test
5. Angiography.
6. Formulas for calculating the GFR rate

- Dietary changes in the research of renal disease

1. GFR is calculated as follows: 186.3 x (serum creatinine) x age x 0.742 (if female)

- Cockcroft-Gault equations.

1. Men - (140-age (years) x (body weight (kg))/ (72)x(serum creatinine (mg/dl)).
2. 0.85 times as much for women as men.

Management of CKD [8]

1. Non - Pharmacological Management

a. Nutritional therapy:

1. 35kcal/kg/day< 60yrs, 30-35kcal/kg/day >or= 60 yrs.

b. Protein intake:

1. Stage 1-3 – 0.75gm/kg/day
2. Stage 4 or 5(not on dialysis) – 0.6gm/kg/day.
3. Stage 5(on dialysis)– 1.2-1.3gm/kg/day.

- All stages (if malnourished)– eat additional protein.

c. Fluids:

1. Urine output + 1000ml.
2. Limit IDWG (interdialytic weight gain)– 2-5% estimated dry weight.

d. Maintain food diet:

- Avoid super-sized beverages.
- Limit salty foods.
- Add lemon or lime juice to the Water.

e. Water and electrolyte balance:

1. Daily fluid consumption equals urine output from the previous day plus 600 ml

2. a rigid input-output chart for fluids.

f. Every day weighing.

g. Refrain from nephrotoxins.

2. Pharmacological Management:

The first goal of treatment is to identify vulnerable people with the chronic renal disease early.

- To manage high blood pressure.
- To regulate blood sugar levels.
- To address other root causes.
- To avoid issues and further declines in renal function.
- Care for underlying illnesses (Diabetes, HTN, Autoimmune diseases, etc.)

Treatment of fluid overload: Furosemide (oral/IV) 40–120 mg daily is a diuretic.

Treatment of hypertension: BP maintenance < 130/80mmhg, Antihypertensive and cardiovascular agents are used **[9]**.

1. ACE (angiotensin-converting enzyme) inhibitors, such as the oral medications lisinopril (5-40 mg) and ramipril (2-5 mg).

2. ARBs (angiotensin two receptor blockers): An example is losartan (oral) 25–100 mg daily.

80–160 mg of valsartan (oral) per day

Treatment of anemia

1. Injection of erythropoietin– 50-100 units IV/SC thrice a week
2. Treatment is initiated at HB < 10gm/dl.
3. Tab ferrous sulfate -200mg thrice a day.

Treatment of hyperkalemia or metabolic acidosis

1. 10% calcium gluconate IV – 10-20 ml over 2-5mins+.
2. Sodium bicarbonate IV – 8.4% 50 meq over 5 mins+.
3. Regular insulin IV– 10 units in 50-100ml 50% glucose.

Treatment of hyperphosphatemia

1. Phosphate binders

Examples: calcium acetate or calcium carbonate – 2 capsules (1334mg orally with food).

Treatment of hypocalcemia

1. Calcium citrate – 1gm per day oral.
2. Vit D supplement – 2 tablets (800IU) once daily.

Treatment of pruritus

1. Capsaicin cream or cholestyramine.

Treatment of bleeding

1. Desmopressin– 0.3mcg/kg IV over 15-30 mins.

Other Therapy [10]

Dialysis

When the kidneys cannot perform those functions, dialysis removes fluid and uremic waste products from the body. Those with edema that doesn't respond to therapy, hepatic coma, hyperkalemia, hypercalcemia, hypertension, and uremia may also benefit from its usage. There are two kinds.

Haemodialysis

A medical procedure to remove fluid and waste products from the blood and to correct the electrolyte imbalance. This is accomplished using a machine and a dialyzer called an "ARTIFICIAL KIDNEY." Haemodialysis is used to treat both acute and chronic kidney failure.

Principle of Haemodialysis

Haemodialysis is based on the concepts of diffusion, osmosis, and ultrafiltration.

Types of Haemodialysis [11]

1. Conventional hemodialysis: This procedure is typically performed a week thrice for about three to four hours per treatment. The patient's blood is drawn out through a tube at 200 to 400 ml per minute.

2. Daily hemodialysis: Less stressful but necessitates more frequent access; this kind of dialysis is often utilized by patients who perform their at-home treatments.

3. Nocturnal hemodialysis: it is like conventional hemodialysis except it is performed 3-6 nights a week and between 6 and 10 hrs per session while the patients sleep.

Peritoneal Dialysis

The usage of peritoneal dialysis is less when compared to hemodialysis due to the complication (peritonitis, then subsequent septic shock) associated with peritoneal dialysis.

Renal Transplant

The preferred course of treatment for people with irreversible renal failure. Unfortunately, the availability of organs restricts the utilization of transplantation.

CONCLUSION

Cases with CKD are managed with an emphasis on early discovery or prevention, treatment of the underlying cause to decelerate development, and attention to secondary processes that fuel continued nephron loss. The pillars of remedy include lowering blood pressure, blocking the renin-angiotensin system, and accepting actions adapted to a case's particular condition. It has been concluded that diagnosis and therapy are necessary for CKD consequences such as secondary hyperparathyroidism, metabolic acidosis, and anemia, which impact cardiovascular health and quality of life.

Acknowledgement

The authors are thankful to the Correspondent & Principal Dr. M Sreenivasulu from Ratnam Institute of Pharmacy, Pidathapolur Village and Post, Muthukur (M), SPSR Nellore District, Pidathapolur, Nellore, Andhra Pradesh for providing the necessary facilities to carry out this review work.

Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

Funding Support

The authors declare that they have no funding for this study.

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Cite this article: C. Madhavi Latha, CH. Varshitha, P. Hari babu, SK. Harshiya, L. Charunya, Sreenivasulu M. **Review article on chronic kidney disease**. Int. J. of Clin. Pharm. Med. Sci. 2022; 2(4): 146-152.