# CHRONIC KIDNEY DISEASE-A PUBLIC HEALTH PROBLEM AND IT'S CARE

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## ABSTRACT

Chronic kidney disease (CKD) is far more prevalent worldwide than was previously assumed. It affects 10 - 15% of the adult population in the western countries, many of whom require costly treatments or renal replacement therapy. According to the Third National Health and Nutrition Examination Survey and the National Kidney Foundation Kidney Disease report nearly 26 million persons in the USA fall into this category and another 20 millions are at an increased risk for CKD. Chronic kidney disease is identified by a blood test for creatinine, analysis of glomerular filtration rate (GFR) and kidney biopsy. Treatment by dialysis or transplantation therapy is usually required to put control over on CKD.

**Key words: CKD**, GFR, Dialysis, Creatinine

**No: of Tables : 02** **No: of Figures: 01** **No:of References: 14**

## INTRODUCTION

Chronic kidney disease (CKD), also known as chronic renal disease, is progressive loss in kidney function over a period of months or years. CKD is a worldwide public health problem. In the United States, there is a rising incidence and prevalence of kidney failure, with poor outcomes and high cost. CKD is recognized as a major health problem affecting approximately 13% of the US population. [1] The symptoms of worsening kidney function are not specific, and might include feeling unwell and experiencing a reduced appetite. Often, chronic kidney disease is diagnosed as a result of screening of people known to be at risk of kidney problems, such as those with high blood pressure or diabetes and those with a bloodline relative with CKD. This disease may also be identified when it leads to one of its recognized complications, such as cardiovascular disease, anemia, pericarditis or renal osteodystrophy. [2, 3] CKD is a long-term form of kidney disease; thus, it is differentiated from acute kidney disease (acute kidney injury) in that the reduction in kidney function must be present for over 3 months. CKD is an internationally recognized public health problem affecting 5–10% of the world population.[4, 5]

Chronic kidney disease is identified by a blood test for creatinine, which is a breakdown product of muscle metabolism. Higher levels of creatinine indicate a lower glomerular filtration rate and as a result a decreased capability of the kidneys to excrete waste products. Creatinine levels may be normal in the early stages of CKD, and The condition is discovered if urinalysis (testing of a urine sample) shows the kidney is allowing the loss of protein or red blood cells into the urine. To fully investigate the underlying cause of kidney damage, various forms of medical imaging, blood tests, and sometimes a kidney biopsy (removing a small sample of kidney tissue) are employed to find out if a reversible cause for the kidney malfunction is present.[6]

## WHAT IS CHRONIC KIDNEY DISEASE?

Chronic kidney disease, or CKD, is a condition that affects the function of the kidneys, and that may progress over time to kidney failure. When the kidneys fail, dialysis or a kidney transplant is needed to support life and people can live for decades with dialysis and/or kidney transplants. Many diseases can cause CKD. The most common are diabetes and high blood pressure.

## RISK FACTORS:

- Diabetes
- High blood pressure (Hypertension)
- Kidney stones
- Overuse of painkillers and allergic reactions to antibiotics
- Family history of kidney disease
- Premature birth

## SIGNS AND SYMPTOMS:

CKD is initially without specific symptoms and is generally only detected as an increase in serum creatinine or protein in the urine. As the kidney function decreases the following signs and symptoms are found-

Blood pressure is increased due to fluid overload and production of vasoactive hormones created by the kidney via the renin-angiotensin system, increasing one's risk of developing hypertension and /or suffering from congestive heart failure.

Urea accumulates, leading to azotemia and ultimately uremia (symptoms ranging from lethargy to pericarditis and encephalopathy). Due to its high systemic circulation, urea is excreted in sweat at high concentrations and crystallizes on skin as the sweat evaporates.

Potassium accumulates in the blood (hyperkalemia with a range of symptoms including malaise and potentially fatal cardiac arrhythmias). Hyperkalemia usually does not develop until the glomerular filtration rate falls to less than 20-25 ml/min/1.73 m2, at which point the kidneys have decreased ability to excrete potassium. Hyperkalemia in CKD can be exacerbated by acidemia (which leads to extracellular shift of potassium) and from lack of insulin.[7]

Erythropoietin synthesis is decreased causing anaemia. Fluid volume overload symptoms may range from mild edema to life-threatening pulmonary edema. Swelling in the legs, ankles, feet, face, and/or hands. Metallic taste in mouth/ammonia breath.

**DIFFERENTIAL DIAGNOSIS**

It is important to differentiate CKD from acute kidney injury (AKI) because AKI can be reversible. Abdominal ultrasound, in which the size of the kidneys is measured, is commonly performed. Kidneys with CKD are usually smaller (≤ 9 cm) than normal kidneys, with notable exceptions such as in early diabetic nephropathy and polycystic kidney disease. Another diagnostic clue that helps differentiate CKD from AKI is a gradual rise in serum creatinine (over several months or years) as opposed to a sudden increase in the serum creatinine (several days to weeks). If these levels are unavailable (because the patient has been well and has had no blood tests), it is occasionally necessary to treat a patient briefly as having AKI until the kidney impairment has been established to be irreversible.

**DIFFERENT STAGES OF SEVERITYIN CKD**[1, 8]

All individuals with a glomerular filtration rate (GFR) <60 ml/min/1.73 m2 for 3 months are classified as having chronic kidney disease, irrespective of the presence or absence of kidney damage (Table-1). The rationale for including these individuals is that reduction in kidney function to this level or lower represents loss of half or more of the adult level of normal kidney function, which may be associated with a number of complications such as the development of cardiovascular disease.

**Stage 1:**

Slightly diminished function; kidney damage with normal or relatively high GFR (≥90 ml/min/1.73 m2). Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

**Stage 2:**

Mild reduction in GFR (60–89 ml/min/1.73 m2) with kidney damage. Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

**Stage 3:**

Moderate reduction in GFR (30–59 ml/min/1.73 m2). British guidelines distinguish between stage 3A (GFR 45–59) and stage 3B (GFR 30–44) for purposes of screening and referral.

**Stage 4:**

Severe reduction in GFR (15–29 ml/min/1.73 m2). Preparation for renal replacement therapy.

**Stage 5:**

Established kidney failure (GFR <15 ml/min/1.73 m2), permanent renal replacement therapy, or end-stage kidney disease.

**EPIDEMIOLOGY**

Data from the 2000 Annual Data Report of the US Renal Data System (USRDS) documents the incidence of end-stage renal diseases (ESRD) in 1998 of more than 85,000, or 308 per million individuals per year at risk. The point prevalence of ESRD on December 31, 1998 was more than 320,000,or 1,160 per million populations, of whom 72% were treated by dialysis and 28% had functioning kidney transplants. [9, 10]About one in ten people suffer from chronic kidney disease. African Americans, American Indians, Hispanics, and South Asians, particularly those from Pakistan, Sri Lanka, Bangladesh and India, are at high risk of developing CKD. African Americans are at greater risk due to a prevalence of hypertension among them. As an example, 37% of end-stage kidney diseases (ESKD) cases in African Americans can be attributed to high blood pressure, compared with 19% among Caucasians.[11]

**DIALYSIS THERAPY:**

Dialysis is a treatment that does some of the things done by healthy kidneys. It is needed when patient's own kidneys can no longer take care of the body needs. Dialysis machine (Fig.1) used in dialysis that filters a patient's blood to remove excess water and waste products when the kidneys are damaged, dysfunctional, or missing. The dialysis machine itself can be thought of as an artificial kidney. Inside, it consists of more plastic tubing that carries the removed blood to the dialyser, a bundle of hollow fibers that forms a semi permeable membrane for filtering out impurities. In the dialyser, blood is diffused with a saline solution called dialysate, and the dialysate is in turn diffused with blood. When the filtration process is complete, the cleansed blood is returned to the patient. Most patients who undergo dialysis because of kidney impairment or failure use a dialysis machine at a dialysis clinic. Also, a machine called a peritoneal dialysis machine can be used chronically at home for dialysis.

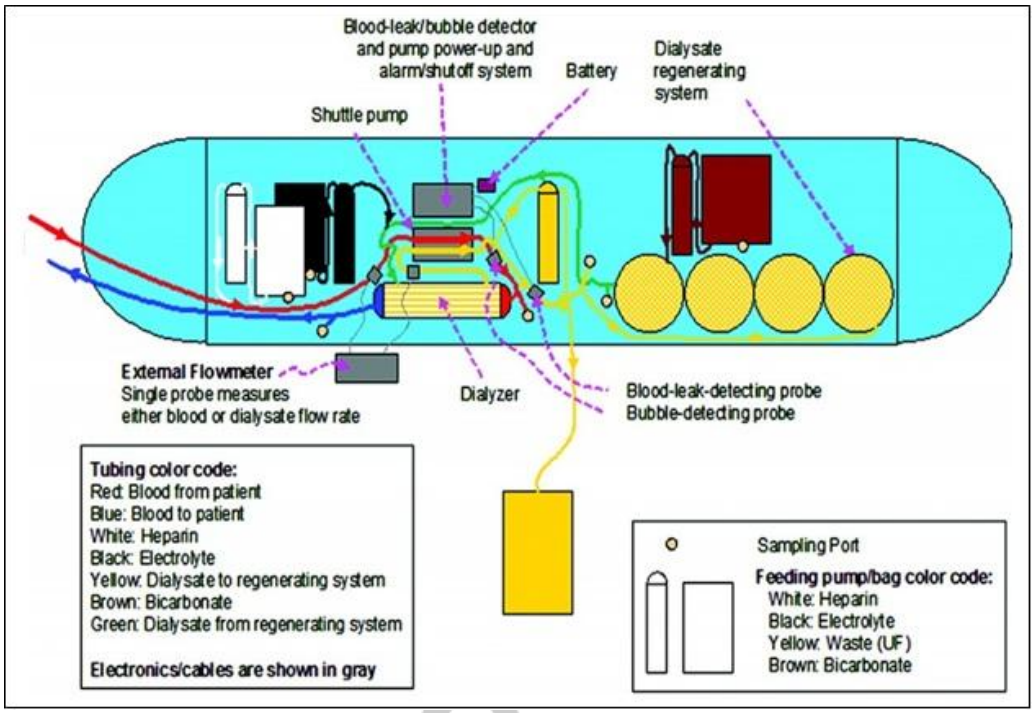


**Fig.1: Dialysis machine and it's function**

**Table-1: Glomerular (GFR) Filtration Rate at different stages of severity.**

| CKD Stage | GFR level (mL/min/1.73 $m^2$) |
|---|---|
| Stage 1 | ≥ 90 |
| Stage 2 | 60 – 89 |
| Stage 3 | 30 – 59 |
| Stage 4 | 15 – 29 |
| Stage 5 | < 15 |

**Table-2: Nutrition targets for people with CKD and eGFR ≥ 30ml/min/1.73$m^2$**[16]

| Parameter | Target |
|---|---|
| Protein | 0.75-1.0 g/kg/day (no restriction necessary). |
| Salt | No greater than 100 mmol/day (or 2.3 g sodium or 6 g salt per day). |
| Phosphate | No restriction necessary. |
| Potassium | If persistent hyperkalaemia is present, consult Accredited Practising Dietitian regarding restricting intake and avoiding foodstuffs high in potassium. |
| Fluid | Drink water to satisfy thirst. Increased fluid intake is not necessary. |
| Carbonated beverages | Avoidance is preferable. Minimize intake to less than 250 mL per day. |

## MEDICATIONS

It is important to review renally excreted medications, as well as avoid nephrotoxic medications in people with CKD. Dosage reduction or cessation of renally excreted medications is generally required Once the GFR falls below 60 mL/min/1.73m2.

The presence of CKD confers a markedly increased risk of cardiovascular disease, and people with CKD often have other risk factors for heart disease, such as high blood lipids. The most common cause of death in people with CKD is cardiovascular disease rather than kidney failure. Aggressive treatment of hyper lipidemia is warranted.[12]Apart from controlling other risk factors, the goal of therapy is to slow down or halt the progression of CKD to stage 5. Control of blood pressure and treatment of the original disease, whenever feasible, are the broad principles of management. Generally, angiotensin converting enzyme inhibitors (ACEIs) or angiotensin II receptor antagonists (ARBs) are used, as they have been found to slow the progression of CKD to kidney failure.[13] They have also been found to reduce the risk of major cardiovascular events such as myocardial infarction, stroke, heart failure, and death from cardiovascular disease when compared to placebo in individuals with CKD.[13] Furthermore, ACEIs may be superior to ARBs for protection against progression to kidney failure and death from any cause in those with CKD.[13]

Replacement of erythropoietin and calcitriol, two hormones processed by the kidney, is often necessary in people with advanced disease.

Guidelines [14] recommend treatment with parenteral iron prior to treatment with erythropoietin. A target haemoglobin level of 9–12 g/dl is recommended.[15]The normalization of haemoglobin has not been found to be of benefit. It is unclear if androgens help with anaemia. Phosphate binders are also used to control the serum phosphate levels, which are usually elevated in advanced chronic kidney disease. Although the evidence for them is limited, phosphodiesterase-5 inhibitors and zinc show potential for helping men with sexual dysfunction.

At stage 5 CKD, renal replacement therapy is usually required, in the form of either dialysis or a transplant.

## NUTRITION

People with CKD should be encouraged to eat a balanced and adequate diet according to energy requirements in line with the Dietary Guidelines of Australian Adults recommended by NMHRC (Table-2).Australian guidelines recommend that people with eGFR(Estimated glomerular filtration rate)< 30 mL/min/1.73m2should have individualised diet intervention involving an Accredited Practising Dietician. Overweight or obese people with CKD should be prescribed caloric restriction under the management of an Accredited Practising Dietician.

## RESEARCH

Currently, several compounds are in development for the treatment of CKD. These include the angiotensin receptor blocker (ARB) olmesartan medoxomil and sulodexide, a mixture of low

molecular weight heparin and dermatan sulfate.

## DISCUSSION AND CONCLUSION

CKD on the global burden of diseases is probably underestimated by current methods of evaluation. However, CKD are emerging as a major health problem. First, the costs of renal replacement therapy are excedingly high and are consuming a significant proportion of health care budgets of developed countries, while in developing countries are out of reach. Therefore, as a complement to clinical approaches to controlling it, a broad and coordinated public health approach will be necessary to meet the burgeoning health, economic, and societal challenges of chronic kidney disease.

## CONFLICT OF INTREST

The authors declared that there is no conflict of interest.

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