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# CHRONIC KIDNEY DISEASE

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**Resume:** Chronic Kidney Disease (CKD) is a progressive condition characterized by the gradual loss of kidney function over time. This article discusses the causes, symptoms, diagnostic methods, and treatment approaches for CKD.

**Keywords:** kidney, symptoms, therapy, treatment.

## Introduction.

Chronic Kidney Disease (CKD) is a global health concern affecting millions of people worldwide. It is characterized by a persistent reduction in kidney function, which can lead to kidney failure if left untreated. CKD is associated with increased morbidity and mortality, particularly due to its link with cardiovascular diseases.

Causes of Chronic Kidney Disease. The most common causes of CKD include:

• Diabetes mellitus – leading cause of kidney failure.

• Hypertension – damages kidney blood vessels over time.

• Glomerulonephritis – inflammation of kidney filters.

• Polycystic kidney disease – a genetic disorder.

• Chronic urinary tract infections and obstructions.

• Long-term use of nephrotoxic drugs[1].

**Complications of CKD.** CKD is associated with various complications that affect multiple organ systems:

• Cardiovascular diseases – Increased risk of heart attacks, strokes, and hypertension.

• Anemia – Due to reduced erythropoietin production in the kidneys.

• Bone mineral disorders – Imbalance of calcium and phosphate, leading to osteoporosis.

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• Electrolyte imbalances – High potassium levels (hyperkalemia) and metabolic acidosis.

• Fluid overload– Resulting in edema and pulmonary congestion.

• Neurological symptoms – Cognitive impairment, neuropathy, and restless legs syndrome[2].

CKD may result from disease processes in any of the 3 categories, including prerenal (decreased renal perfusion pressure), intrinsic renal (pathology of the vessels, glomeruli, or tubules-interstitium), or postrenal (obstructive).

Chronic prerenal disease occurs in patients with chronic heart failure or cirrhosis, where persistently decreased renal perfusion increases the risk of intrinsic kidney injury, such as acute tubular necrosis. Over time, this can lead to a progressive loss of renal function.

Intrinsic renal vascular disease: The most common chronic renal vascular disease is nephrosclerosis, which causes ongoing damage to blood vessels, glomeruli, and the tubulointerstitium. Other renal vascular diseases include renal artery stenosis due to atherosclerosis or fibromuscular dysplasia, which, over months or years, can lead to ischemic nephropathy. This condition is characterized by glomerulosclerosis and tubulointerstitial.[4]

Intrinsic glomerular disease (nephritic or nephrotic): A nephritic pattern is indicated by abnormal urine microscopy showing red blood cell (RBC) casts, dysmorphic red cells, and occasionally white blood cells (WBCs), along with a variable degree of proteinuria.[5] The most common causes are post-infectious glomerulonephritis, infective endocarditis, IgA nephropathy, lupus nephritis, Goodpasture syndrome, and vasculitis.[6]

A nephrotic pattern is associated with proteinuria, usually in the nephrotic range (>3.5 g/24 h), and an inactive urine microscopic analysis with few cells or casts. Common causes include minimal change disease, focal segmental glomerulosclerosis, membranous glomerulonephritis, diabetic nephropathy, and amyloidosis.

Intrinsic tubular and interstitial disease: The most common chronic tubulointerstitial disease is polycystic kidney disease (PKD). Other etiologies include nephrocalcinosis (often due to hypercalcemia and hypercalciuria), sarcoidosis, Sjögren syndrome, and reflux nephropathy in children and young adults.[7]

There is increasing recognition of a relatively high prevalence of CKD of unknown cause among agricultural workers from Central America and parts of Southeast Asia, known as MesoAmerican nephropathy or chronic interstitial nephritis in agricultural communities. Please see StatPearls' companion resources, "Chronic Interstitial Nephritis in Agricultural Communities (CINAC)" and "Reflux Nephropathy," for more information.

Chronic obstruction may result from prostatic disease, nephrolithiasis, or an abdominal/pelvic tumor exerting a mass effect on the ureter(s). Congenital abnormalities causing obstruction at the ureteropelvic or ureterovesical junctions are also common. Rare

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causes of chronic ureteral obstruction include retroperitoneal fibrosis or neurogenic bladder[8-9].

Prevention of Chronic Kidney Disease. Preventing CKD involves lifestyle modifications and regular health screenings, particularly for at-risk populations. Key preventive strategies include:

a) Maintaining a healthy diet rich in fruits, vegetables, and whole grains.
b) Regular physical activity to control weight and blood pressure.
c) Avoiding excessive use of nephrotoxic medications such as NSAIDs.
d) Monitoring blood sugar levels in individuals with diabetes.
e) Staying hydrated and limiting excessive salt intake.

Recent Advances in CKD Treatment. Recent developments in CKD treatment have focused on personalized medicine, new pharmaceutical agents, and innovative dialysis techniques. Notable advancements include:

– SGLT2 inhibitors – A new class of drugs that slow CKD progression and reduce cardiovascular risk.
– Gene therapy – Potential future treatment targeting genetic forms of kidney disease.
– Wearable dialysis devices – Improving mobility and quality of life for dialysis patients.
– Artificial kidneys – Under development as an alternative to transplantation[10].

Symptoms of CKD. CKD progresses slowly and may remain asymptomatic in early stages. Common symptoms include:

• Fatigue and weakness.

• Swelling in legs, ankles, and feet due to fluid retention.

• High blood pressure.

• Changes in urination patterns (frequent urination, foamy urine).

• Nausea, vomiting, and loss of appetite.

• Itching and dry skin[7].

Diagnosis of CKD. Diagnosis of CKD involves several tests and assessments, including:

1. Blood tests – measuring creatinine and glomerular filtration rate (GFR).
2. Urinalysis – detecting proteinuria or hematuria.
3. Imaging studies – ultrasound, CT scans to assess kidney structure.
4. Kidney biopsy – for detailed examination of kidney tissue[7].

Treatment and Management. The treatment of CKD focuses on slowing disease progression and managing symptoms:

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• Controlling blood pressure and blood sugar levels.

• Dietary modifications – reducing sodium, potassium, and protein intake.

• Medications – ACE inhibitors, angiotensin receptor blockers (ARBs).

• Dialysis – for advanced stages of CKD.

• Kidney transplantation – in cases of end-stage renal disease (ESRD).

**Conclusions.** Chronic Kidney Disease is a serious health condition that requires early detection and effective management to prevent complications. Regular medical check-ups, lifestyle modifications, and adherence to treatment plans can significantly improve the prognosis for patients with CKD.

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